



Knowledge worker motivation

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Abstract

Demand for knowledge workers has increased relative to the available supply. A further cause for concern is that the requirements for managing knowledge workers differ from those for managing lower qualified employees. Due to scarcity and different management requirements, attracting and retaining the best available knowledge workers poses a serious challenge.

The purpose of this study was to to identify and understand the impact of some of the key factors that motivate knowledge workers.

A quantitative research design was employed with knowledge workers the targeted sample through purposive sampling combined with an element of snowballing. The final sample consisted of 91 respondents from different industries, educational backgrounds and age groups, but who all indicated that they were knowledge workers in the survey. The survey data was tested for reliability, validity and factor analysis used to narrow down the elements for the statistical analysis of the hypotheses.

Following the research, the initial five hypotheses were narrowed down to four of which three were correlated to knowledge worker motivation. Management relationships as well as independence and interpersonal relationships were positively correlated whilst staff turnover was negatively correlated to knowledge worker motivation. Based on the research outcomes, recommendations were made to both knowledge workers and management. Furthermore, suggested areas for future research were provided.

Key Words: Knowledge Worker, Motivation, Relationships, Independence, Staff
Turnover

Declaration

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements of 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.

Name: Fabian Chad Denson

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Signature:

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Chapter 1: Introduction

1 Research Title

Knowledge worker motivation.

1.1 Research Problem

Erne (2011, p.59) states that with regard to OECD countries, “the demand for employees with an academic education has increased by 190 percentage-points between 1975 and 2004 whereas the demand for employees with a lower educational level is continually decreasing”. The requirements for leading and managing higher qualified employees are different from how one leads and manages lower qualified or unqualified employees. Drucker first called these employees knowledge workers in his book, *Landmarks of Tomorrow*, in 1957.

Based on Erne (2011) there may be a shortage of these higher qualified employees and managing them in order to ensure attracting and retaining the best suited candidates, is a key factor in the successful management of organisations that wish to secure continuity and ongoing performance improvements. As a result Thompson (2012) states that managers need to be aware of and be sensitive to employee’s skills and shortcomings. They must also communicate their expectations clearly when delegating. It is also stated that managers need to create an environment where employees are comfortable in approaching them. Thompson’s statements may be true, but real life observations may reveal the opposite as stated below:

- Managers do not always consider competence when delegating,
- Expectations are not always clearly communicated, and
- Work environments are not necessarily conducive to open communication.

Managers have to be cognisant of the different requirements for an employee and indeed a knowledge worker to be motivated; and be aware enough to know the differences in the workplace. In support of this, Carleton (2011) states that it is important for organisations to retain knowledge workers by attending to their unique characteristics and motivational needs. Carleton (2011) also states that large numbers of knowledge workers are retiring and that as a result, there is a significant risk of a loss of knowledge. As this may compromise organisational success, the need for knowledge worker retention and knowledge sharing is amplified.

Having defined the need for motivation, it is important to expand on what it means. Mohanta and Thooyamani (2010) proposed that motivation has three foundational elements with these being (1) “a need, vision, dream or desire to achieve”; (2) a learning culture encompassing risk and the pursuit of new opportunities, and (3) the ability to overcome setbacks and be resilient. They also present detail on how to motivate. The first element makes sense as being present in all knowledge workers whilst the other two elements do not hold true for all knowledge workers as risk-taking and resilience are in all probability not present in the profiles of all knowledge workers. Some people prefer stability and do not respond well to setbacks. This would be linked to their locus of control. A strong internal locus of control results in an improved response to setbacks and greater resilience. Lamb and Sutherland (2010) state that knowledge workers need to build on their internal locus of control from a better knowledge of their emotional maturity.

Further work on defining motivation was completed by Gagné, Forest, Gilbert, Aubé, Morin and Malorni (2008) who developed the motivation at work scale (MAWS). This scale is based on self-determination theory (SDT) which offers the ability to measure both the level and type of motivation. Under SDT, the types of motivation proposed are intrinsic and extrinsic. Intrinsic motivation is defined as doing something because you want and like to do it, while extrinsic is defined as doing something for reasons related to amongst others, benefits and penalties. MAWS measures the following constructs: external regulation, introjection, identification and intrinsic motivation.

1.2 Research Aims

Carleton (2011, p. 461) quotes Davenport, Thomas and Cantrell (2002: 26-27) as saying “hire smart people and leave them alone”. As a case in point this is contrary to how one would manage a lower qualified or less experienced worker. The ideal way to extract maximum benefit and ensure loyalty from these smart people is to ensure that they remain motivated to achieve the results that their managers require and expect from them; and that they remain loyal to the organisation. This loyalty may be linked to various factors including:

- Relationships with management,
- Relationships with peers and teams,
- Independence,
- Rewards, and
- Job design.

There is thus a need to conduct research into how to monitor and manage these knowledge workers. It is important to understand how to motivate knowledge workers whilst bearing in mind that no two people are exactly the same. Their needs would also not be the same, but there may be similarities.

The aim of the research is therefore to understand the requirements for motivating knowledge workers and specifically to understand whether there is a motivational impact linked to management and team relationships, independence, reward preferences and what dynamics are required to retain this type of worker.

The outcomes of this research will be useful in assisting management to identify the appropriate methods required to successfully manage knowledge workers. Apart from the expected benefits of a better understanding and approach to knowledge workers i.e. improved value add and retention; a further benefit lies in knowledge sharing that will lead to improved knowledge management performance and thus continuity of the organisation.

1.3 Conclusion

Attracting and retaining the best knowledge workers in the market are seen to be amongst the key needs and requirements for understanding how to motivate and manage this type of worker. This is due to the numbers of this category of worker, according to Erne (2011), being insufficient to keep up with the growing demand.

The next chapter sets the scene for the research as prior work on the topic of motivation and management of knowledge workers is discussed. The chapter is written from an argumentative view; looking for similarities and disagreements in the research that has been reviewed.

Chapter 2: Literature Review

2 Introduction

The purpose of this research is to identify and understand the impact of the key factors required to motivate knowledge workers. Developing an understanding of knowledge worker motivation and de-motivation is a critical success factor in the performance of modern day businesses. People are all different and it is understood that categorisation of people, in this case, knowledge workers, is not easy, however, a better understanding of knowledge worker motivation in general will equip managers to achieve more through their knowledge workers. By equipping managers it is meant that they would be better able to identify, assess and respond to what drives/motivates their team members who fall into the category of knowledge workers.

In the following literature review, the scene is set for the proposed research into knowledge worker motivation. The review commences with the identification of some of the types of leadership as well as the definitions of knowledge workers and knowledge management; flowing into the methods of managing knowledge workers and problem identification with regard to performance and the risk of losing the knowledge worker.

2.1 Types of Leadership

Leadership is the key to the success or failure of an organisation. Leadership decision-making at the respective levels in the organisation have an impact on how employees respond to their leaders and whether or not they are happy in their jobs. It is common knowledge that when employees are unhappy in their jobs, the good ones may leave resulting in various losses to the organisation. These losses include skills, experience, customer and supplier relationships, and knowledge. The employees left behind after the talented ones were gone, either left or were more likely to stay; becoming a problem to the business and/or their leaders. Lewin (1999) lists three different leadership styles:

- Autocratic – the leader or the one with the strongest personality imposes their will on the rest of the group. This approach may not be sustainable or applicable and successful in all work environments.

- Democratic – decisions are made by the group based on the criteria that they agreed upon for decision-making. This involves the empowerment of team members and are sustainable, but may fail should the leader not realise that accountability rests with them and therefore, they still have to manage their teams.
- Laissez faire – everyone does what they consider to be the best for the situation. The potential risks associated with this approach are that those allowed this freedom may not be mature or competent enough to flourish and achieve as expected.

Furthermore, Lewin (1999) states that autocracy is a state that is brought upon an individual and that they find it easy to become accustomed to this state, but that democracy is something that has to be learned. The need for learning democracy stems from the individual's ability or inability to work with each other and to be able to resist the need to be in control of a situation, but instead to receive and value the input of others.

In the Merriam Webster online dictionary, delegation is defined as “the act of empowering to act for another”. Thompson (2012) states that staff problems may be experienced due to poor delegation skills and also discusses Kouzes and Posner's (2007-2009) practices of exemplary leadership. The most relevant practice for the purpose of this research is the one named “enabling others to act”. Thompson (2012) discusses this practice further in relation to task and training management.

Stephen, David, Harold, Frank and Fannie (2010) assert that delegation is at the core of management and maintain that through delegation, authority is given down the organisational hierarchy and that at each level, there is responsibility for the delegated action. Furthermore, they propose that as authority is delegated down the hierarchy, it diminishes, leaving a gap between authority and responsibility. Given this reduced authority, the employee needs to use a different approach in order to still be successful as the one that has been delegated to. Stephen et al. (2010, p10) refers to this approach as “personal power”, which is developed through different methods, including networking in the organisation and helping others, in order to facilitate reciprocity.

Managers use the results of task execution in this scenario of diminished authority as a signal of future success of the employee and therefore determine potential for promotion. This research is focussed on the motivation of knowledge workers and the link between motivation and amongst other factors, leadership.

2.2 The Knowledge Worker and Knowledge Management Defined

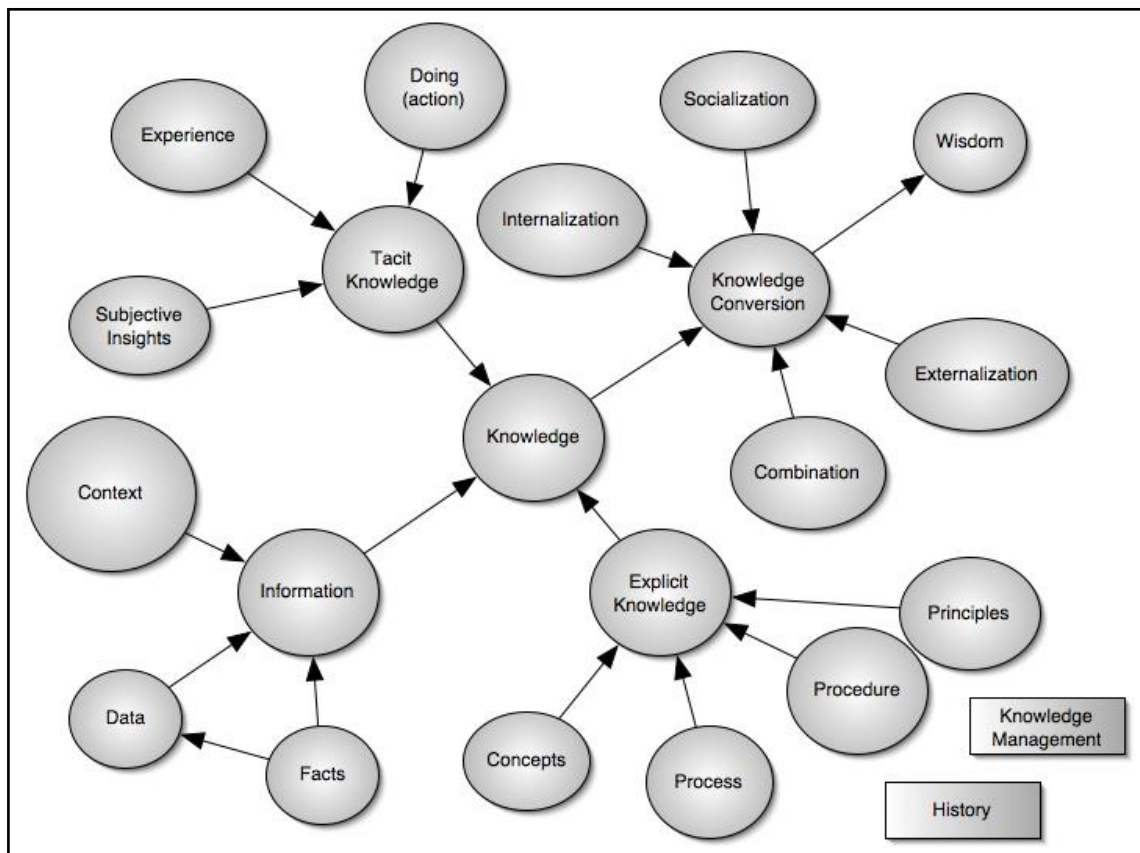
Carleton (2011) cites the work of Esque (1999) who stated that knowledge worker was not a unique description of a certain class of worker, but that all workers required continuous learning. With this work, Esque is therefore denying the existence of a category of labour called the knowledge worker. In contrast to this, the category of worker was acknowledged by Carleton (2011) who asserts that knowledge workers are highly educated, have superior interpersonal communication skills and are able to digest and process information better than most. Carleton (2011) also believes that knowledge workers are more inclined to want to add value to the organisation than to be concerned about their earnings. Erne (2009) (as cited in Erne, 2011) disagrees with this as it was found that task related payments, possibly performance bonuses, were successful in motivating knowledge workers. The work of Carleton (2011) further suggests that knowledge workers need to be treated differently and that they are not necessarily remunerated in line with their educational levels and value to the organisation. They are described as being unique from each other in terms of knowledge, experience and ability. This compared to the work of Erne (2011) means that knowledge workers' managers are possibly missing a very important element in motivating and retaining their knowledge workers. In order to further evaluate the importance of reward and recognition, this research investigates the link between knowledge worker age and reward preference.

Rowley (2000); Hunter et al., (2002) and Newell et al., (2002) (all cited in Kumar, 2011) state that knowledge workers are employees with autonomy and who are empowered to make decisions that have a large impact on the company in which they are employed. In the absence of this autonomy, management will have to spend time monitoring the knowledge worker more closely than the empowered state requires. This monitoring comes at a high cost of management time which would be better spent on other value adding activities. Pinto, Slevin and English (2009) affirm this when they state that the trust between employee and employer facilitates information exchange, a

reduced need for management control and therefore a reduced monitoring cost. While the cost of monitoring by a manager is not easily calculated, it forces the manager to delay or postpone other important functions that may have had negative effects on the organisation.

Knowledge management is explained by the illustration in Figure 2.1 below.

Figure 2.1: Knowledge Typology Map



Source: http://www.nwlink.com/~donclark/knowledge/knowledge_typology.html:

Interpreting Figure 2.1 briefly, data, facts and context lead to information which becomes knowledge which through different actions and elements forms the area of knowledge management. In essence, the combination of information, external influences in the form of, for example, socialisation, tacit knowledge (experience) and explicit knowledge (learning) constitute knowledge management.

Chen, Hwang and Raghu (2010) state that knowledge has a life cycle which has to be managed as part of an organisation's knowledge management programme. The competitive advantage that stems from specific items of knowledge or skill and shown by the knowledge life cycle are determined by the rate at which this knowledge or skills are acquired by others as well as by the demand for said knowledge.

A key element of knowledge management that requires mentioning is the issue of knowledge transfer. According to Lamb et al. (2010, p. 301) "Career capital grows through transfer, experience and exposure". Failure of knowledge workers to share their knowledge and groom or mentor others will thus have a negative impact on the organisation. Further to this, failure on the part of knowledge workers to develop themselves, will negatively affect their career capital. Carleton (2011) cites the work of Papacharalambus and McCalman (2004) who unfortunately state that not all knowledge workers are keen on transferring their knowledge to others. Yan, Peng and Francesco (2011) cite the work of Allee (1997) who assert that knowledge workers master and share organisational knowledge. From these conflicting opinions, the conclusion is that more research into the issue will be required. The issue of knowledge worker motivation and interpersonal relationships is therefore investigated with a view to identifying whether there is a relationship between their motivation level regarding interpersonal relationships and their willingness to share their knowledge and expertise.

2.3 How to Manage Knowledge Workers

Employees need to be managed in order for the organisation to be successful. The level and intensity of management depends on the employee and the nature of their work. Employees recruited for their ability to do physical labour and especially those working on tasks that are related to fixed processes for example production lines, need to be managed more closely than those employees hired for their knowledge or creativity. As such, knowledge workers fall into the latter category and need to be managed in terms of their overall performance as well as their personal development.

Knowledge worker development management is important in order to ensure that the knowledge and skills of the knowledge worker do not become obsolescent according to Chen et al. (2010). Further to this, Chen and Edgington (2005) (as cited in Chen et al., 2010, p.21) state that knowledge management involves a number of elements including “maintaining a proper level of inventory among the existing workforce”. They also state that it is sometimes better for employers to delegate responsibility for personal development to the knowledge workers. In order to ensure that knowledge worker development in fact takes place, however, it is important to ensure that their learning and training, is not only left to them, but monitored and deviations addressed proactively. Chen et al. (2010, p.26) proposes that the strategies for training are “(i) breadth, (ii) depth, (iii) value, and (iv) age strategies”. The different strategies are explained as follows:

- Breadth – This strategy entails the multi-skilling of employees in order to maintain flexibility in the organisation.
- Depth – This strategy entails ensuring that the number of employees who are experts in a field are as high as is feasible or possible.
- Value – With this decentralised strategy, employees are empowered with skills that are in high demand in the market and improve their marketability, earnings and flexibility.
- Age – With this decentralised strategy, employees are developed in an area of expertise that is new to the market.

For the continued meaningful development of knowledge workers, Carleton (2011) emphasises the importance of learning as opposed to training for the sake of training. Resultant from Drucker’s statement with regard to knowledge workers knowing more about their jobs than their bosses do, as mentioned in 2.4 below, this is an area where delegation/empowerment may not be a motivator nor beneficial to the knowledge worker. In order to ensure that development and learning takes place, it may be better for a development plan to be drawn up and agreed to with the knowledge worker. The monitoring of performance against this plan as well as the correction of deviations is crucial to the successful execution of the plan.

Wilson, Sin and Conlon (2010) cite the work of Gerstner and Day (1997) who stated that Leader-Member Exchange (LMX) gives insight into and could be used as a tool to

measure employee commitment to the organisation and employee performance as well as providing information on employee perceptions and attitudes. Furthermore, they state that LMX evaluates the relationships between leaders and their team members and the levels of trust, respect and loyalty between them.

Given the time that knowledge workers tend to spend on the job, the potential for burnout is a real consideration. Fritz, Lam and Spreitzer (2011) state that a key consideration is how to improve employee energy and reduce employee fatigue. A number of options were explored to this end with the traditional methods of, for example, switching to surfing the internet for a break, proving futile. Fritz et al. (2011) found that learning oriented activities were more successful in improving employee vitality and reducing fatigue. This may be due to a need for continued learning being satisfied. This factor is not covered in the research.

Carleton (2011) states that involving knowledge workers in designing the mission statement of their organisation as well as giving purpose and meaning to work, as with workers in voluntary organisations, are important elements in successfully managing and motivating these workers. The former is not easy to put into practise whilst the latter is, but requires management flexibility. In line with this Yan et al. (2011) found that enriched job content is a factor in knowledge worker satisfaction and performance. As mentioned previously Carleton (2011) states that it is important for organisations to retain knowledge workers by attending to their unique characteristics and motivational needs. The latter statement resonates well with the above findings.

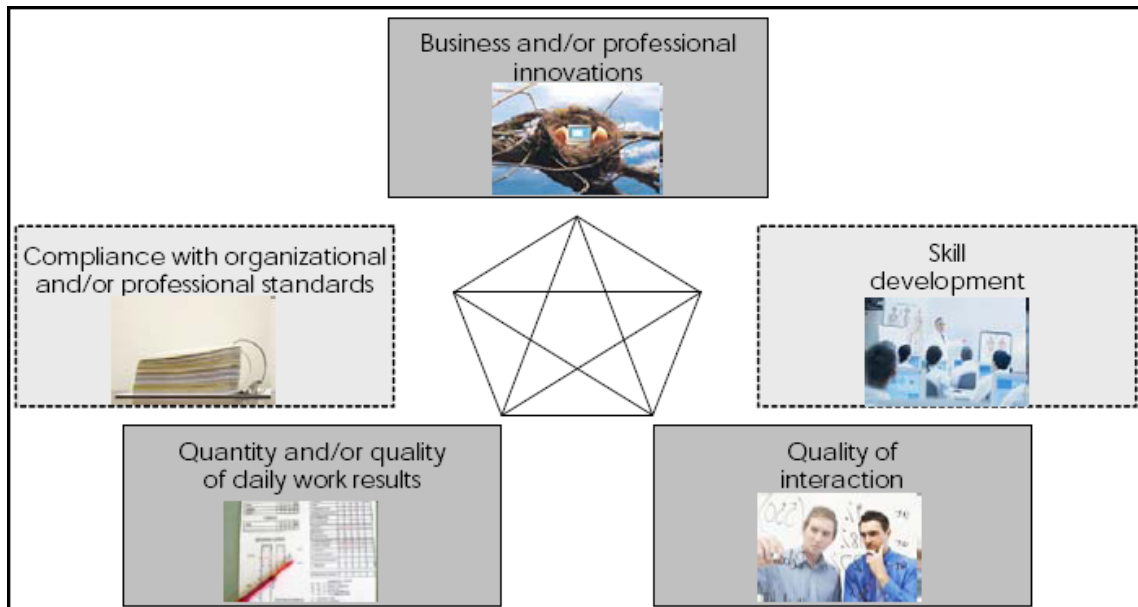
In understanding the knowledge worker, management may need to consider the use of personality profile tests. The outcomes of the test will identify some of the potential needs and preferences of the individual which will assist in formulating the relevant management approach for optimised productivity and retention. Drucker (1999) (as cited in Erne, 2011, p.59) states that “The most important contribution management needs to make in the 21st century is similarly to increase the productivity of knowledge work and the knowledge worker”. Given the total cost of employing knowledge workers, optimised productivity is essential.

Erne (2011) states that the traditional calculation for productivity being the relationship between inputs and outputs, does not hold true for knowledge workers. He identified three approaches to knowledge worker productivity measurement and management. The three approaches are:

- Performance concepts – Also referred to as the psychology concept, this concept is related to the difference between top performing knowledge workers and average performers. The main difference is said to be the manner in which the top performers store, evaluate and use data in decision-making and operating. Two performance measures were related to this concept i.e. time spent on solving a problem and the quality of the results.
- Authoritative concepts – The measures in the above concept may have been subjective when measured and hence the authoritative concept comes into play. Also referred to as the sociology concept, this concept involves the authority or expertise of an individual in a given field. In this concept productivity is thus measured by recognition of the superior knowledge or expertise of the employee.
- Contribution concepts – This concept does not focus on perceived performance and expertise of the knowledge worker, but instead focuses on what Erne (2011, p.62) termed “acquisition, generation, dissemination, application, retention and/or assessment of knowledge”. The key issue with this concept is the contribution to organisational success of the knowledge worker as opposed to the contribution to themselves or their departments. The result of this concept is the proposal of the contribution criterion to the efficiency and effectiveness criteria of “white collar workers” (Sumanth, Omachonu and Beruvides (1990) as cited in Erne, 2011, p.62).

Erne (2011) discussed the performance indicators for knowledge workers and illustrated these in Figure 2.2 below.

Figure 2.2: Performance Indicators for Experts in Different Business Segments



Examples of these indicators in Figure 2.2 above are:

- Compliance with organisational and/or professional standards – In the case of the accounting profession, this includes compliance with the requirements of amongst others, Sarbanes Oxley.
- Skill development – For the knowledge worker this entails being au fait with best practice and the latest technology. Executing learning and not just training is essential.
- Quality of interaction – This includes quality of presentations and interpersonal interactions. The better the quality of these interactions, the better the marketability of the employee as well as productivity because buy in into concepts is gained easier than with poor quality interactions.
- Quantity and/or quality of daily work results – This refers to performance against goals as well as performance of allocated tasks. Good quality output will engender confidence in the employee, improve the likelihood of promotion and result in greater responsibility being given with more important tasks.

- Innovation behaviour – This indicator refers to delivery of new and/or improved solutions. In terms of output and value for money to the organisation, greater innovation from the employee results in their value to the organisation increasing while the organisation extracts value.

2.4 Knowledge Worker Motivation

In Collins' book (as cited in Frick, 2011) it is said that passion is not something that can be motivated, but rather, ignited; i.e. one has to find out what someone is passionate about and find ways of using that to motivate them. This speaks to identifying ways of unlocking the path to employee satisfaction. Furthermore, Poornima (2009) proposes the concept of motivation through satisfaction and thus that it is not only important to retain talent, but to retain them in a good condition i.e. healthy in terms of body, mind and soul. It is also proposed that these individuals need to be motivated to think of the organisation and work towards its success as opposed to only furthering their own agendas.

Hong, Yang, Wang, Chiou, Sun & Huang (1995) cited Herzberg's motivation-hygiene theory. The work-motivation element of this theory is measured by factors including absenteeism, staff turnover and timekeeping. While important to control and manage, work-motivation is not covered by this research.

Drucker (2001) (as cited in Frick, 2011) also asserts that knowledge workers are said to be in a position where they need to and do know more about their jobs than their managers do, in order to be useful. It is concluded that factors bearing most influence are the intangible and emotional issues including growth in the organisation and relationships with peers. Furthermore, Frick (2008) states that relationships with supervisors stand out as a low contributor to positive factors for staff, but high as a negative factor, meaning that a good relationship with a supervisor is not as beneficial to an organisation as a bad relationship is detrimental to that organisation.

Gargiulo, Ertug and Galunic (2009) state that knowledge worker performance is driven by information quality and access as well as autonomy in implementing solutions. For this situation to be possible, management needs to be able to trust their employees. According to Pinto et al. (2009) trust is critical to successful relationships. Failure by a manager to set the scene for a relationship based on mutual trust, until proven wrong, is a key element in motivating knowledge workers. Unfortunately, McWilliams (2011) found that management behaviour was a key reason for knowledge workers leaving their organisations. The challenge remains for managers to know when to empower and when to monitor employees closely in order to maximise motivation. This is due to knowledge workers, in certain instances, requiring monitoring and approval from their managers.

Giauque, Resenterra and Siggen (2010) assert that the human resource practices that develop and motivate knowledge workers are related to organisational support and include flexible working conditions, empowerment and empathy. A further contributor to knowledge worker motivation and performance is cited as being work area design and resource availability, by Carleton (2011). An environment that does not support creativity and productivity is thus a risk to the performance of the individual and possibly the organisation. According to Rousseau (as cited in Kumar, 2011, p. 28) “job characteristics and job satisfaction among employees have substantial positive relations with job motivation”. Further to this Dewhurst, Guthridge and Mohr (2010) state that whilst non-monetary incentives are effective in motivating employees, they are not popular as they require time and effort from management which if not applied, damaged employee engagement. A lack of engagement with employees may result in them leaving the organisation or performing at suboptimal levels.

Hebda, Vojak, Griffin and Price (2012) continued their work of 2007 on the motivation of a type of knowledge worker referred to as technical visionaries and quote the findings on the categories of mechanisms that motivated these types of employees. An important aspect of this research is that it did not only focus on the responses of the employees, but also on the responses of their immediate managers and human resource managers. The key mechanisms recognised by them were formal corporate structures, formal reward and recognition structures and informal management techniques. These mechanisms are described as:

- Formal corporate structures – This refers to formal policies and the formal organisational structure. The structures described by Hebda et al. (2012) include:
 - Dual ladders,
 - Third career orientation – accelerated promotion opportunities, and
 - Prestigious in-house technology societies – prestige and higher salaries are provided.
- Formal reward and recognition structures – The key elements of these structures include base salary, financial merit awards, team financial awards, company awards and recognition, and promotions and career development.
- Informal management techniques – Examples of these techniques include the provision of better equipment and the allocation of high profile assignments.

The latter mechanism mentioned above is similar to that as stated by Dewhurst et al. (2010) and requires a deliberate effort on the part of management in order to be successful in motivating knowledge workers and in the case of Hebda et al. (2012) technical visionaries. Carleton (2011) describes this as supportive management and gives examples as being centred around recognition.

Apart from an organisational setting with supportive management, the value of teamwork in motivating knowledge workers is not to be underestimated. Hebda et al. (2012) state that there are two other motivators that needs to be mentioned. These are intrinsic motivators and organisational culture. By definition, the intrinsic factor is described as applying knowledge, and creating and seeing the creation implemented. Further to this, organisational culture and specifically having support for innovation and being surrounded by a team of like-minded/creative individuals is described as being the second motivator. Yan et al. (2011) affirms this by stating that knowledge worker cooperation and interdependence in a setting of teamwork is a motivator through collaboration and ultimately praise for goal achievement. This is in line with Hebda et al. (2012) above, who went as far as describing formal reward and recognition structures in order to motivate knowledge workers.

2.5 Why Knowledge Workers Leave the Organisation

The role of human resources is described as including attracting and retaining the best talent to satisfy the needs of the organisation in McWilliams (2011) citing Wooldridge (2006). Failure to attract this talent will compromise the continuity of the organisation and failure to retain this talent will not only compromise the business as with the former failure, but will also bring with it a number of other negatives. According to McWilliams (2011) these include:

- Direct costs of:
 - Recruitment
 - Loss of skills
 - Loss of experience
 - Disruption
- Indirect costs of:
 - Loss of tacit knowledge
 - Loss of intellectual property to competitors

Carleton (2011) asserts that learning and engagement are important for knowledge worker retention. The abbreviated employment contract is raised in Carleton's work as a way of referring to mobile knowledge workers and it is asserted that whilst some organisations are reluctant to invest in developing these employees for fear of losing them, the work of O'Driscoll (2003) is quoted as stating that retention of knowledge workers is actually compromised by the absence of learning interventions. In line with this, Poornima (2009) states that employees require non-financial rewards to be attracted to and retained by the relevant organisations. Examples of this include awards, professional club membership and a learning environment. Giauque et al. (2010) asserts that the successful recruitment of knowledge workers requires a number of factors, but most important when referring to this situation is the ability to grow loyalty towards the organisation, in the knowledge worker. In making these assertions, Giauque et al. (2010) are aligned to the structures proposed by Hebda et al. (2012).

McWilliams (2011) quotes studies that state that job satisfaction only contributes to a small percentage of knowledge worker departures, which by definition means that focus needed to be diverted to other alternatives for motivating these employees. In

contrast to McWilliams, Giancola (2011) asserts that the nature of work is a key contributor to knowledge worker dissatisfaction and that job redesign is required when this happens. He goes on to quote Herzberg in Lufthans (2005) as saying, "If you want people to do a good job, give them a good job to do". By implication, job dissatisfaction may cause knowledge workers to leave the organisation. Giancola (2011) also cites the work of Sibson Consulting in 2009 where it was found that work content is a greater motivator for knowledge workers than earnings and benefits. In contradiction to this, Giancola (2011) cites Lawler (2000) as stating that pay for performance remains a key requirement for motivating professionals as intrinsic motivational factors alone are not enough. Carleton (2011) states that certain duties and functions would not attract volunteers were it not for the reward attached to them. These rewards are said to include personal satisfaction and fulfilment as opposed to monetary rewards.

McWilliams (2011) cites the work of Holtom et al. (2005) which stated that at least 60% of voluntary exits are related to a shock experienced by the employee. He asserts that shocks are the result of three main issues, (1) time for reflection, (2) being head hunted, and (3) managerial behaviour. Factors that influence the impact of shocks are job embeddedness and organisational identification. Job embeddedness is described as referring to a link with the organisation and the surrounding community. McWilliams (2011) quotes a number of authors who say that job embeddedness is influenced by:

- Fit between the organisation and employees values, goals and plans,
- The link between the employee and other people or activities, and
- The ease with which these links could be sacrificed.

He also quotes a number of authors in explaining that organisational identification is what happens when employees link their identities to that of the organisation. The ultimate outcome of McWilliams's work on why knowledge workers leave, as stated in section 2.5 above, is management behaviour.

McWilliams (2011) makes reference to a number of studies with different outcomes related to LMX as a tool that predicts staff turnover. The majority of the authors quoted in McWilliams (2011) found a relationship between LMX and staff turnover while one found none and another found a "curvilinear relationship" McWilliams (2011, p.85-6)

The fifth need of Maslow's hierarchy of needs as described by Sadri and Bowen (2011) is the need for self actualisation. Given that knowledge workers are likely to have higher qualifications and receive a higher level of remuneration, failure to achieve these needs may result in a further factor as to why knowledge workers leave their organisations. Management needs to build professional relationships based on trust in order to identify the expectations of self actualisation of their respective team members in order to counter the departure of key employees.

2.6 Conclusion

This literature review discussed the literature in existence around a number of issues that impact knowledge worker motivation. As far as possible, the literature covered was peer reviewed. The issues covered were targeted towards the constructs of management relationships, independence, age and reward preference, retention and interpersonal relationships.

Summarising the literature and its relation to the constructs:

- Management relationships – The impact of management of relationships on knowledge worker motivation includes the management of career capital and therefore development plans. Failure to stay up to date will result in the obsolescence of skills, but has to be about learning and not just training. Furthermore, it is important for managers to understand their knowledge worker personality, expectations, wants and needs. Through this knowledge, they will be able to leverage knowledge worker productivity.
- Independence – Autonomy and the impact of decisions has a high impact on the success of the organisation and thus independence must be based on experience and skill set, but without abdicating accountability on the part of management.
- Age and reward preference – Knowledge workers do not necessarily prefer financial rewards. While these are important, work life balance, memberships of professional societies and appropriate management attention through amongst others, recognition programmes, may be more powerful as motivators than just financial rewards.
- Retention/Turnover – The impact of poor knowledge worker retention levels has both direct and indirect cost implications for the organisation. Further to this, failure to develop knowledge workers when instinct says that they will leave for greener

pastures anyway, Carleton (2011) cites O'Driscoll (2003) where it is stated that the absence of learning interventions may compromise knowledge worker retention.

- Interpersonal relationships – Knowledge transfer is an important requirement for organisational continuity and success. Should relationships with peers, team members and others not be on a healthy footing, knowledge transfer would not be the only casualty. Collaboration and cross functional teams would also not be efficient.

The hypotheses that were investigated for this study, are stated in the following chapter.

Chapter 3: Research Hypotheses

3 Introduction

The purpose of this study is to understand how knowledge worker motivation is influenced by different variables in the workplace. For the purposes of this research, five hypotheses will be studied under the following constructs:

- Independence,
- Interpersonal relationships,
- Management relationships,
- Retention, and
- Rewards.

3.1 Hypothesis 1

Hypothesis 1 – There is no correlation between knowledge worker motivation and management relationships (H_0). The alternative hypothesis is that there is a correlation between worker motivation and management relationships (H_1).

3.2 Hypothesis 2

Hypothesis 2 – There is no correlation between knowledge worker motivation and the independence construct (H_0). The alternative hypothesis is that there is a correlation between worker motivation and independence (H_1).

3.3 Hypothesis 3

Hypothesis 3 – There is no correlation between knowledge worker age and reward preference (H_0). The alternative hypothesis is that there is a correlation between worker age and reward preference (H_1).

3.4 Hypothesis 4

Hypothesis 4 – There is no correlation between knowledge worker motivation and the retention (later renamed turnover) construct (H_0). The alternative hypothesis is that there is a correlation between knowledge worker motivation and retention (H_1).

3.5 Hypothesis 5

Hypothesis 5 – There is no correlation between knowledge worker motivation and the interpersonal relationships construct (H_0). The alternative hypothesis is that there is a correlation between knowledge worker motivation and interpersonal relationships (H_1).

3.6 Conclusion

Five hypotheses have been identified for analysis of the relationship between motivation and the respective constructs. The methodology to be employed in researching and analysing the information in order to make conclusions around these hypotheses, is discussed in the following chapter.

Chapter 4: Research Methodology

4 Introduction

Saunders and Lewis (2012) state that a descriptive study is aimed at giving accurate information on people, organisations and other subjects of research. In order to achieve this, a quantitative research was undertaken with a survey questionnaire as the tool. A further reason for using the quantitative approach was the assumption that numerical output is easy to interpret and communicate. The questionnaire attached under Appendix 1 covered socio-demographic variables as well as the constructs as listed below:

- Independence,
- Interpersonal relationships,
- Management relationships,
- Retention, and
- Rewards.

The survey constructs were not shown on the questionnaire.

4.1 Theoretical Support of the Hypotheses

4.1.1 Hypothesis 1

The motivation-hygiene theory was developed by Herzberg (as cited in Giancola, 2011) from the work of Luthans (2005). According to this theory, motivation is based on the challenge of the job and less so on hygiene factors which are stated to be company policy and management relationships. In contrast to this, McWilliams (2011) found that management behaviour is a key reason for knowledge workers leaving their organisations. Dewhurst et al. (2010) cite the McKinsey Quarterly Survey (2009) in concluding that non-monetary incentives as highly successful motivators. These non-monetary incentives include praise, attention and empowerment from their management. They assert that good leadership does not only help motivate employees, but also to recruit new ones.

4.1.2 Hypothesis 2

Giancola (2011) cites the Towers Watson *2007-2008 Global Workforce Study* as identifying 10 drivers of employee engagement amongst professionals in the United States of America. One of the key drivers was identified as being autonomy i.e. the appropriate amount of decision-making authority relevant to the job. Further to this, Carleton (2011) cites the work of the DLS Group Inc. (2007) as stating that it is important for management to allow knowledge workers to propose and plan the method for achieving the output required of them. In line with this, Yan et al. (2011) cite Drucker (1999b) as saying that autonomy is an inherent requirement for knowledge worker management and motivation as they do not like to be told what to do and how to do it.

4.1.3 Hypothesis 3

Hong et al. (1995) cite the expectation theory of Vroom (1964). This theory asserts that everyone works for reward whether it be spiritual, financial or in another form. It is thus maintained that the degree of reward influences output. The outcome of the research of Hong et al. (1995) was that monetary benefits had a greater perceived benefit on employees below 35 years of age. Carleton (2011) cites the work of Kamrog (2004) in stating that knowledge workers require instant gratification due to amongst other factors, witnessing their parents receiving relatively low loyalty from employers in return for their sacrifice.

4.1.4 Hypothesis 4

Carleton (2011) states that regardless of knowledge worker motivation, qualification and dedication, they are doomed to fail in a poor organisational setting. She further cites the work of Rummler and Brache (1995) in stating that good performers will almost always lose in a poor organisational setting. A setting like this compromises knowledge worker motivation and possibly retention i.e. staff turnover is impacted.

4.1.5 Hypothesis 5

Hedba et al. (2012) state that there is a difference in the factors that motivate technical visionaries and scientists. They specifically mention that unlike scientists, technical visionaries are motivated by a culture and atmosphere of teamwork; specifically that the team motivates them to be creative.

4.2 Design Chosen and Reasons for Design Chosen

In research, one may adopt either a quantitative or a qualitative approach. A qualitative approach is seen to be more complex than quantitative which is where numbers and calculations are involved. The output of quantitative research may, therefore, be seen as more absolute or definite. Saunders and Lewis (2012) assert that further benefits of quantitative research involve ease and a relatively low cost of administration.

Quantitative research design is either descriptive or causal and is more easily presented and understood. This study design employed a quantitative approach and specifically, a descriptive approach in an attempt to establish how knowledge workers are motivated. The research attempted to describe a correlation between knowledge worker motivation and management relationships, independence, interpersonal relationships and further to this, a correlation between knowledge worker age and reward preferences. The research also attempted to establish whether there is a correlation between knowledge worker motivation and retention. It is important to note that according to Rouse, Boff, Sanderson, Hoffman, Klein and Miller (2011) while correlation suggests and is necessary for causality, it does not indicate causality.

4.3 Population and Reasons for Population

Saunders and Lewis (2012) state that the sample is subject to knowledge of access to a full list of what makes up the relevant population or sample frame. The definition of knowledge workers includes accountants, analysts, engineers, software developers and so forth. Based on the criterion for a sample and the definition of a knowledge worker, accessibility for the researcher to corporate and mainly listed companies was most achievable. The population for the research was thus defined as all listed

companies in the South African economy with head offices located in Johannesburg while the sample focussed on institutions employing accountants, analysts and engineers that are based in the Johannesburg area; and specifically those employed by financial institutions. As a result of the sample size, the responses were aggregated and analysis based on total knowledge workers surveyed. The companies envisioned for this study were accessible and were utilised to highlight other possible respondents as the research methodology theory of snowballing suggested.

4.4 Unit of Analysis and Reasons for Unit of Analysis

The unit of analysis for this research was the responses of knowledge workers employed at the head offices of companies located in Johannesburg. Departments and institutions suggested for review from the initial surveys were pursued for inclusion in the research.

4.5 Sampling

According to Saunders and Lewis (2012) a sample is a part of the entire population being researched. The targeted sample was 100 responses with the objective of having 50 or more useful surveys to analyse. The sample was drawn from companies located in Johannesburg as well as departments or organisations recommended by the initial sample. The total responses analysed were 91.

4.5.1 Sampling Technique and Reasons for Technique Chosen

A purposive sampling approach was used which according to Saunders and Lewis (2012) is a form of non-probability sampling which is used by researchers to target respondents that are anticipated to be equipped to answer the questions that the researcher has prepared. This approach was combined with elements of the snowball sampling technique as it was cost and time effective as well as presenting an opportunity for access to additional respondents.

4.6 Scope and Reasons for Scope

The targeted sample i.e. knowledge workers employed by companies with head offices located in the Johannesburg area, was spread across different institutions in order to pursue a balance in culture and practices as surveying only one institution might result in homogeneity in the terms of feedback on the respective constructs.

4.7 Research instrument

Descriptive research instruments may take the form of surveys, experiments, secondary data or observation. According to Saunders and Lewis (2012) surveys are a popular research tool that are easily understood and the results of such, easily accepted. The research instrument chosen was a questionnaire with a Likert scale, employing the constructs mentioned in paragraph 4.1 above. The choice of the survey as a research instrument was due to its ease of use as well as it being cost effective and efficient.

4.7.1 Reliability and Validity

According to Saunders and Lewis (2012) reliability is defined as the extent to which the results of the research may be duplicated when using the same data collection method or methods while validity is defined as the accurate measurement of the data collection method or methods of what is supposed to be measured. The research instrument was a survey questionnaire and therefore the ability to reassess using the questionnaire and get the same or a similar result is possible with the exception of statistical errors as covered under the limitations in section 4.11 below.

4.7.1.1 Reliability

This study sought to employ data collection methods and analysis procedures which ensured consistent results. A standardised online questionnaire was used for all respondents. This ensured that the same measurements were used with each respondent and that there would be no observer error. The questionnaire was anonymous and confidentiality guaranteed. There was, therefore, a low likelihood that

subject's responses would be unreliable in order to preserve and protect their reputations.

4.7.1.2 Validity

Steps were taken in order to ensure that validity was achieved. These steps were two-fold. One, in order to ensure face validity, or the extent to which the measures make sense to those conversant with the subject matter, the questionnaire was reviewed by the researcher's supervisor and pre-tested with knowledge workers. Secondly, in order to ensure content validity, or that the measures accounted for all the elements of the concepts under investigation, a thorough literature review was undertaken and all potential construct elements included in the questionnaire.

Further to this, Cronbach's alpha coefficient of reliability was used as a measure of internal consistency of the multiple-item construct measurements. The range of the coefficient is between 0 and 1 with a coefficient closer to 1 indicating greater reliability. A low Cronbach's alpha indicates that the data from a specific question is not consistent with what the construct is measuring. In contrast to this, a high Cronbach's alpha reveals that the items are measuring the correct underlying construct. Based on the work by Streiner (2003) a coefficient of approximately 0.7 or higher is considered a sign of high internal consistency in this analysis; with an upper limit of 0.9. The Cronbach's alpha scores are shown in section 5.2

4.7.2 Pre-Testing

Prior to the launch of the survey to the full sample, pilot surveys were administered to six respondents who fell within the knowledge worker definition and whom are colleagues of the researcher, in order to ensure that any teething errors or other problems were corrected in time. As time was a constraint for the researcher, the pre-test sample was small, but the respondents carefully chosen for their attention to detail and analytical thinking. Problems tested for included the understanding of questions as well as to ensure that the questionnaire was not laborious to complete as was suggested by Saunders and Lewis (2012). The responses to the open ended questions were combined with responses from the pre-test questionnaire to produce closed questions and rankings in order to facilitate easier analysis of the survey results.

4.8 Data Analysis

The research was conducted using the www.freeonlinesurveys.com survey tools for data collection and then exported into MS Excel where data cleansing was conducted. The responses to the survey questions were assigned a value of one for each response and the totals per response used for the analysis.

Data was then analysed in Stata version 12 where descriptive statistics and the establishment of correlations between the variables were calculated. According to Saunders and Lewis (2012) it is important to establish whether any correlation between variables is incidental or real. Establishing a correlation, or not, resulted in the hypotheses either being confirmed or refuted.

4.8.1 Factor analysis

Factor analysis was used to identify the correlation of the constructs within the respective hypotheses. The survey covered 33 items including the demographic and ranking questions. In order to reduce the elements to be focussed on for the analysis, Eigen values were calculated as shown under the analysis output in Appendix 2. This was based on Kaiser Rule of Eigen values greater than one.

4.9 Factor Retaining and Naming

To confirm the targeted and anticipated constructs that retained factors i.e. with an Eigen value greater than one measure, retained factors in the original factor solution were studied and named using the following criteria.

1. A factor loading greater than or equal to 0.4 indicates that the variable has significant correlation with the factor and belongs to the construct. In order to produce better interpretable factors, original factor loadings were rotated using the oblique rotation technique which produces correlated factors.
2. No multiple loadings of variables across factors was allowed. Where a variable had significant (≥ 0.4) multiple loadings, the highest loading was used.
3. A factor could not be determined if only one variable had significant factor loading with that factor. Factors with only one significant factor loading were dropped.

4. Negative factor loadings on a factor indicated what the factor does not measure.
5. Internal consistency of the scale, parsimony and knowledge of the subject were also used.

The factors are described below under 5.3 and the full output from analysis is presented in Appendix 2.

4.10 Factors for Analysis

In 4.7.1.2 above, Cronbach's alpha was discussed as a measure of reliability ensuring internal consistency of the assessed items. A low Cronbach's alpha was discussed as being an indication that the data from a specific question was not consistent with what the construct was measuring while a high Cronbach's alpha revealed that the measured items were related to the correct construct. A coefficient of approximately 0.7 or higher was considered a sign of high internal consistency. The top four factors are reviewed in 5.3 below along with their coefficient of reliability.

4.10.1 Hypothesis Testing

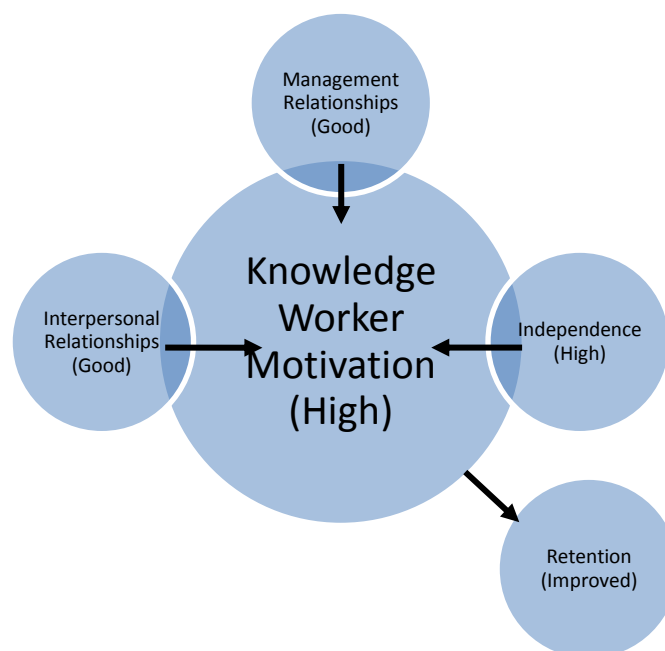
As the factors were normally distributed quantitative variables, Pearson's correlation and regression analysis were carried out for hypotheses 1, 2, 4 and 5. Coefficient of correlation measures the relative strength of a linear relationship between two normally distributed, numerical variables. According to Albright, Winston and Zappe (2009) the values of the coefficient correlation range between -1 for a perfect negative correlation and +1 for a perfect positive correlation with a correlation closer to zero indicating little or no relationship. Hypothesis 3 was tested using the chi-square test for independence. For this test, the variables are required to be categorical. Further to this Albright et al. (2009) state that one of the uses of the chi-square test is to establish whether "two attributes are *independent* in a probabilistic sense" (p. 541) and therefore whether the difference between the observed value and expected value is statistically significant. Hypothesis testing was restricted to respondents who indicated that they were knowledge workers (n=91).

The hypotheses were:

- Hypothesis 1 – There is no correlation between knowledge worker motivation and management relationships (H_0). The alternative hypothesis is that there is a correlation between worker motivation and management relationships (H_1).
- Hypothesis 2 – There is no correlation between knowledge worker motivation and the independence construct (H_0). The alternative hypothesis is that there is a correlation between worker motivation and independence (H_1).
- Hypothesis 3 – There is no correlation between knowledge worker age and reward preference (H_0). The alternative hypothesis is that there is a correlation between worker age and reward preference (H_1).
- Hypothesis 4 – There is no correlation between knowledge worker motivation and the retention construct (H_0). The alternative hypothesis is that there is a correlation between knowledge worker motivation and retention (H_1).
- Hypothesis 5 – There is no correlation between knowledge worker motivation and the interpersonal relationships construct (H_0). The alternative hypothesis is that there is a correlation between knowledge worker motivation and interpersonal relationships (H_1).

The hypotheses with the exception of Hypothesis 3 are summarised in Figure 4.1 below and show the proposed relationships between the constructs.

Figure 4.1: Proposed Relationships between the Constructs



When interpreting the proposed relationships in Figure 4.1, they are stated as; good management relationships combined with good interpersonal relationships and high independence, result in high knowledge worker motivation and ultimately improved retention.

4.11 Research Limitations

The limitations of the research that were identified are explained below. As it was noted above, whilst correlation was necessary for causality, it did not indicate that causality would be determined. The sample was limited in its scope and hence, no inferences may be made beyond these outcomes. Due to the nature of the data collection method i.e. inviting respondents and asking them to invite others to participate, the response rate could not be calculated.

The industries and positions covered in the research were limited and thus it followed that inferences may not be made beyond these. Further to this, only surveys completed by knowledge workers were analysed meaning that outcomes may only be linked to this category of worker.

Due to the sample size, inference is not industry related either, but only aggregated for knowledge workers who participated in the survey. Also due to the final sample size, certain data was collapsed into larger ranges and therefore wider categories i.e. Age which presents a limitation in terms of comparing the research outcomes to information having a more detailed range of age groups.

Geography was a further limitation as the research was limited to the Johannesburg area. The final sample was limited in extent, due to the number of surveys completed, including referrals. Furthermore, response bias may present a limitation because responses may contain errors and especially acquiescence bias whereby respondents indicate positive responses to all questions. Finally, non-response bias may occur due to people surveyed not responding or not being invited to participate.

4.12 Conclusion

The following constructs were the key areas of the research:

- Management relationships,
- Independence,
- Rewards,
- Retention, and
- Interpersonal relationships.

The research design used was quantitative due to its ease and cost-effective administration. The targeted sample was initially knowledge workers employed by financial institutions, but due to the final sample size, the responses were aggregated for all respondents who indicated that they were knowledge workers.

The research instrument was a questionnaire which was administered electronically via e-mail using a purposive sampling technique with an element of the snowball sampling technique. Prior to launching the survey, pre-testing was completed and after input from the researcher's supervisor and statistician, the final questionnaire was launched. The responses to the questionnaire were tested for reliability and validity with factor analysis used to identify the most important factors for further analysis. Subsequent to this, the four highest ranking factors were identified and statistical analysis performed on them.

The following chapter states the descriptive statistics from the research as well as the outcomes of the analysis of the raw data. The analysis reveals the outcomes of:

- Normality tests performed on the data,
- Outcomes of the Cronbach's alpha coefficient of reliability,
- Details of the factor analysis, and
- Results of the statistical tests administered to the constructs.

Chapter 5: Results

5 Introduction

This research was initially aimed at knowledge workers employed in financial services. Ultimately, however, the results were analysed based on the responses from a spread of knowledge workers, but not limited to a specific industry and instead aggregated for knowledge workers in general. Responses to the survey were not restricted due to anonymity and there was, therefore, the inability to link responses to respondent identifiers including e-mail addresses.

The survey was structured using a Likert scale and forced rankings. The Likert scale was based on:

- 1 – Strongly Disagree
- 2 – Disagree
- 3 – Neither Agree or Disagree
- 4 – Agree
- 5 – Strongly Agree

The ranking questions were based on four factors per question and respondents had to arrange these according to their preference. The data was analysed based on the Likert scale and forced ranking question responses. This chapter presents the results of the research with particular focus on the factor analysis and the outcomes of the hypotheses.

5.1 Response Rate

The invitation to complete the survey was sent to 100 potential respondents. This was done via personalised e-mails requesting participation as well as for the survey to be sent on to colleagues and others who would possibly fit into the knowledge worker category of employees. A total of 91 useful responses, including referrals, were received and analysed. As the survey was anonymous, the split between original

invitees and referrals is not identifiable and response rate cannot be calculated. There were, however, indications from the invitees that they had invited colleagues to participate in the survey.

5.2 Sample Description

The sample used for descriptive statistics was 93. One respondent completed the survey twice. Even though the surveys were completely anonymously, it was evident from the responses i.e. being completed back to back and all answers including demographics being identical, that this was the same respondent. One of the two surveys was thus omitted from the analysis resulting in the 93 surveys. The final sample that was used for hypothesis testing had 91 respondents. This was as a result of two of the respondents indicating that they were not knowledge workers; whilst indicating that they had a tertiary education. Consequently, their responses were omitted from the analysis. The demographics of the sample are discussed below.

The participant age distribution is shown in Table 5.1 below. The majority of respondents were in the 18-29 and 30-39 age groups at cumulative level of 75%. The remaining age groups i.e. 40-49, 50-59 and 60+ were collapsed into one age group of 40+ in order to improve statistical value in calculations.

Table 5.1: Distribution of respondents by Age

Age Group	Frequency	Percentage	Cumulative %
18-29	20	21.51	21.51
30-39	50	53.76	75.27
40+	23	24.73	100.0
Total	93	100	

In terms of education as shown in Table 5.2 below, the majority (63.44%) of respondents reported having either a Bachelors or Honours degree.

Table 5.2: Distribution of Respondents by Highest Level of Education Completed

Level of Education	Frequency	Percentage	Cumulative %
Diploma	6	6.45	6.45
Bachelors	27	29.03	35.48
Honours	32	34.41	69.89
Masters	24	25.81	95.70
Doctorate	1	1.08	96.78
No Formal Qualification	3	3.23	100.0
Total	93	100.0	

A summary of current positions held is shown in Table 5.3 below. A total 73.91% of respondents placed themselves into the management and senior management categories.

Table 5.3: Distribution of Respondents by Current Position

Position	Frequency	Percentage	Cumulative %
Accountant	12	13.04	13.04
Engineer	2	2.17	15.21
Management	30	32.61	47.82
Senior Management	38	41.30	89.12
Other	10	10.87	100.0
Total	92	100.0	

The remuneration bands for the research were set on a reasonably wide basis. Together with the guarantee of anonymity, this served to ensure that respondents would be prepared to complete this question. Table 5.4 below, shows that 66.67% of respondents reported an annual cost to company ranging between R300k and R900k.

Table 5.4: Remuneration

Remuneration	Frequency	Percentage	Cumulative %
<R300k	5	5.38	5.38
R301-600k	26	27.96	33.34
R601-900k	36	38.71	72.05
R901-1200k	11	11.83	83.88
R1200k+	15	16.13	100.0
Total	93	100.0	

Of the respondents surveyed, 74.19% had been in full time employment for five to 19 years, as shown in Table 5.5 below.

Table 5.5: Years of Full Time Work Experience

Full Time Work Experience	Frequency	Percentage	Cumulative %
<5 Years	9	9.68	9.68
5-9 Years	29	31.18	40.86
10-14 Years	18	19.35	60.21
15-19 Years	22	23.66	83.87
20+ Years	15	16.13	100.0
Total	93	100.0	

As a possible indication of loyalty to company, Table 5.6 below shows that 35 respondents have been with their current employer for six years or more. This is closely followed by the 3-5 year category which is the largest single category with 35.48% of respondents.

Table 5.6: Years with Current Employer

Years with Current Employer	Frequency	Percentage	Cumulative %
Up to 2 Years	25	26.88	26.88
3-5 Years	33	35.48	62.36
6-10 Years	21	22.58	84.94
11-15 Years	7	7.53	92.47
15+ Years	7	7.53	100.0
Total	93	100.0	

As a possible indicator of job mobility and propensity to change jobs through either changing companies or internal moves, Table 5.7 shows that 62.37% of respondents have only been in one to two positions with their current employer.

Table 5.7: Number of Job Titles Held with Current Employer

Job Titles Held	Frequency	Percentage	Cumulative %
1-2	58	62.37	62.37
3-4	23	24.73	87.1
5-6	8	8.60	95.7
7-8	3	3.23	98.93
9+	1	1.08	100.0
Total	93	100.0	

The number of companies worked for question was asked with a view to linking this to the retention construct. In Table 5.8 below, it is shown that 77.42% of respondents had been employed by two to five companies.

Table 5.8: Number of Companies Worked For

Companies Worked For	Frequency	Percentage	Cumulative %
1	10	10.75	10.75
2-3	36	38.71	49.46
4-5	36	38.71	88.17
6-7	8	8.6	96.77
8+	3	3.23	100.0
Total	93	100.0	

In Table 5.9 below, the leading industries represented were Financial with 34 respondents and Manufacturing and Mining with a combined number of 25 respondents. One respondent left out this information when completing the survey.

Table 5.9: Industries Represented

Industries Represented	Frequency	Percentage	Cumulative %
Financial	34	36.96	36.96
Engineering	3	3.26	40.22
IT	8	8.70	48.92
Legal	3	3.26	52.18
Manufacturing	15	16.30	68.48
Mining	10	10.87	79.35
Other	19	20.65	100.0
Total	92	100.0	

A total of 93 surveys were completed and Table 5.10 shows the split between those who indicated that they considered themselves knowledge workers and those who did not. Of the total, 97.85% (n=91) of respondents indicated that they were knowledge workers and their responses became the subject for further analysis.

Table 5.10: Knowledge Worker Identification

Knowledge Worker	Frequency	Percentage	Cumulative %
Yes	91	97.85	97.85
No	2	2.15	100
Total	93	100.0	

5.2.1 Factor Analysis/Scale Reliability

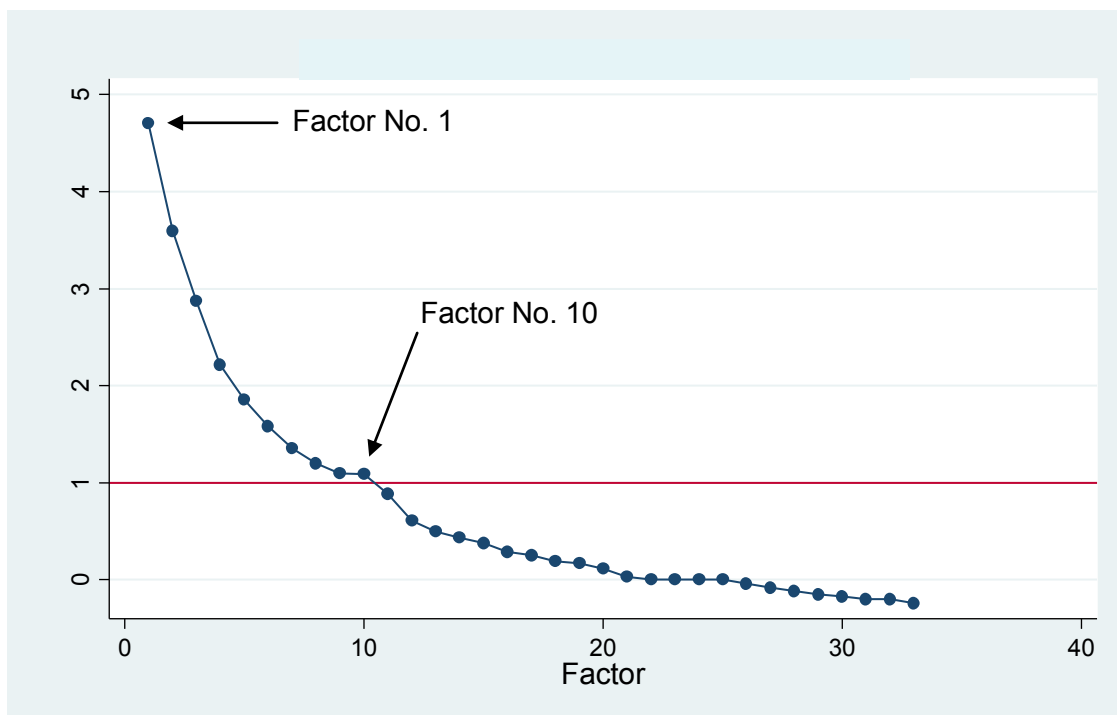
Using Kaiser Rule of Eigen values that are greater than one from the factor analysis exercise, 10 elements emerged with Eigen values in excess of one. The first factor had an Eigen value of 4.7 and explaining 19.42% of the variance in the data while the 10th factor showed an Eigen value of 1.086 thus explaining 4.49% of the variance in the data. Together these top 10 factors explained 89.06% of the variability in the data as shown in Table 5.11 below.

Table 5.11: Factors with Top 10 Eigen Values

Factor	Eigen Value	Portion of the Variance Explained	Cumulative %
1	4.70047	19.42	19.42
2	3.59776	14.86	34.29
3	2.87039	11.86	46.14
4	2.21666	9.16	55.30
5	1.85283	7.66	62.96
6	1.58276	6.54	69.50
7	1.35386	5.59	75.09
8	1.20006	4.96	80.05
9	1.09605	4.53	84.58
10	1.08557	4.49	89.06

Auer and Gervini (2008) cite Cattell (1966) when discussing the elbow in the scree plot; and its interpretation. Illustrating all of the factors surveyed graphically in Figure 5.1 below, the scree plot clearly reveals the “elbow”, which as indicated in the theory is often not easily visible. The horizontal red line shows the Kaiser criterion cut off i.e. an Eigen value greater than one. This is the elbow where all factors below the red line are considered outside of the scope for further analysis. The arrows in the scree plot highlight the highest and lowest of the top ten factors.

Figure 5.1 Scree Plot of Eigen Values for All Factors

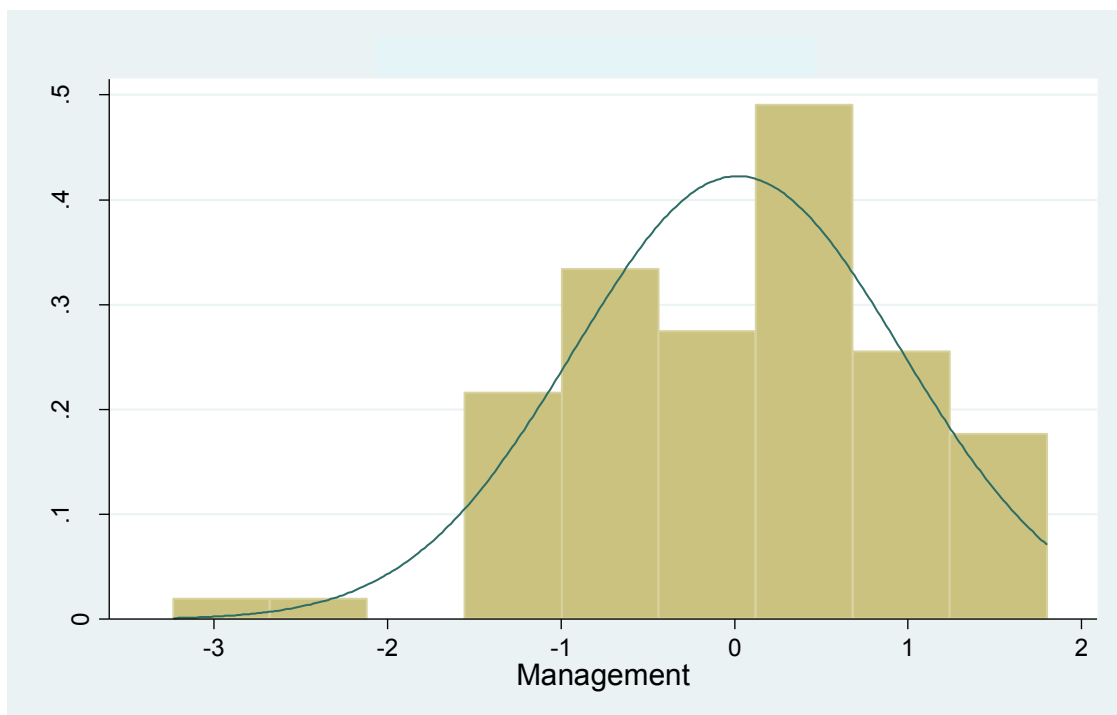


Through statistical rotation of the top ten factors and reviewing their factor loadings, the top four factors were retained for further analysis, and named. The other six factors did not show detectable dimensions as they generally had only one significant factor loading, and were thus excluded. The four factors that were retained encapsulated either in full or in part, the constructs that were formulated through the research hypotheses.

5.2.2 Management

Section 18 of the survey questionnaire covered this factor. Responses were first tested to ensure normally distributed quantitative variables. Pearson’s correlation and regression analysis were then carried out. The high factor loadings were evident on all management variables in the questionnaire with the exception of question 18.5 which had no correlation with any factor. The factor therefore maintained the name of the original construct i.e. management. The probability distribution for the factor is shown in Figure 5.2 below.

Figure 5.2: Probability Curve - Management



The probability curve for the management construct is fairly normally distributed. Furthermore, the Shapiro-Wilk test for normality produced a p-value of 0.1049; confirming that the data is normally distributed and with this outcome failed to reject the null hypothesis as the p-value is greater than 0.05. It was therefore concluded that the data is normally distributed and the Pearson’s correlation and regression analysis were completed for this factor. Cronbach’s alpha coefficient of scale reliability for this factor was very high at 0.86.

The variables for the management construct and their loadings are illustrated in Table 5.12 below.

Table 5.12: Cronbach’s Alpha of Scale Reliability for Management

Variable	Factor Loading	Cronbach’s Alpha
18.1	0.6477	0.86
18.2	0.9255	
18.3	0.7227	
18.4	0.8566	
18.6	0.6445	

5.2.3 Independence and Interpersonal Relationships

The third factor had high loadings on all questions in section 14 of the questionnaire which measured the construct called interpersonal relationships as well as two questions in section 11 which measured the construct called independence. Resulting from this, the factor was named “independence and interpersonal relationships”. The probability distribution for the factor is shown in Figure 5.3 below. It bears mentioning that the data is skewed by only one outlier to the left and has a p-value less than 0.01. Without that one value the data is normally distributed as is illustrated in Figure 5.4.

Figure 5.3: Probability Curve – Independence and Interpersonal Relationships

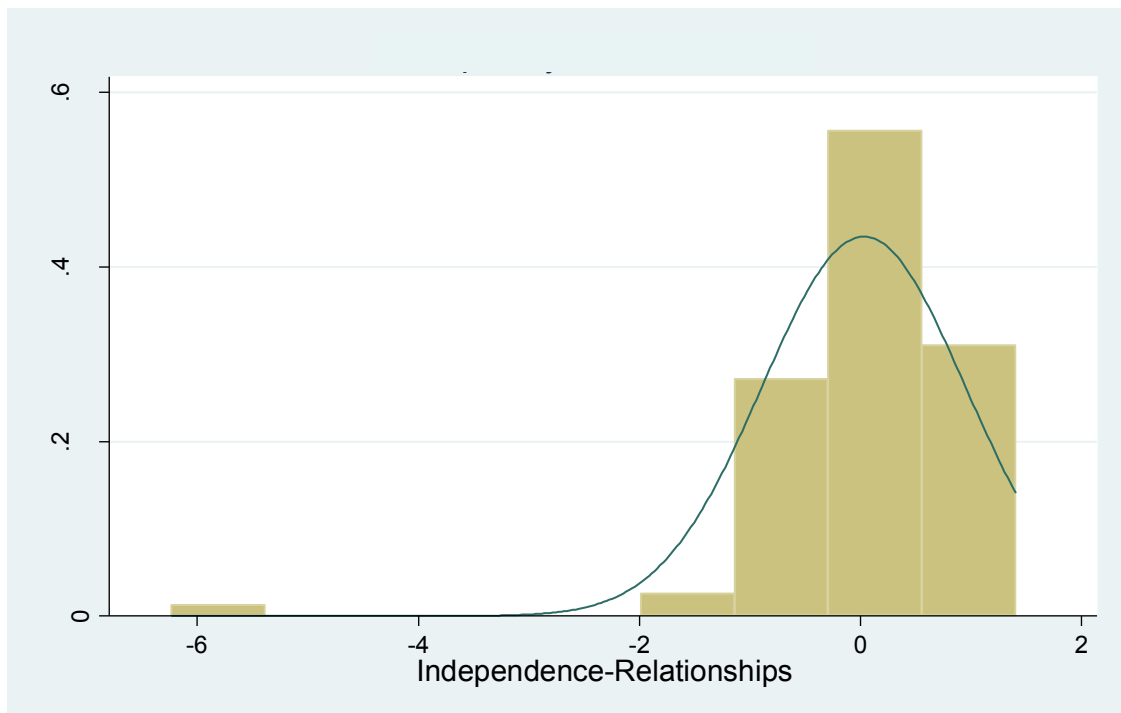
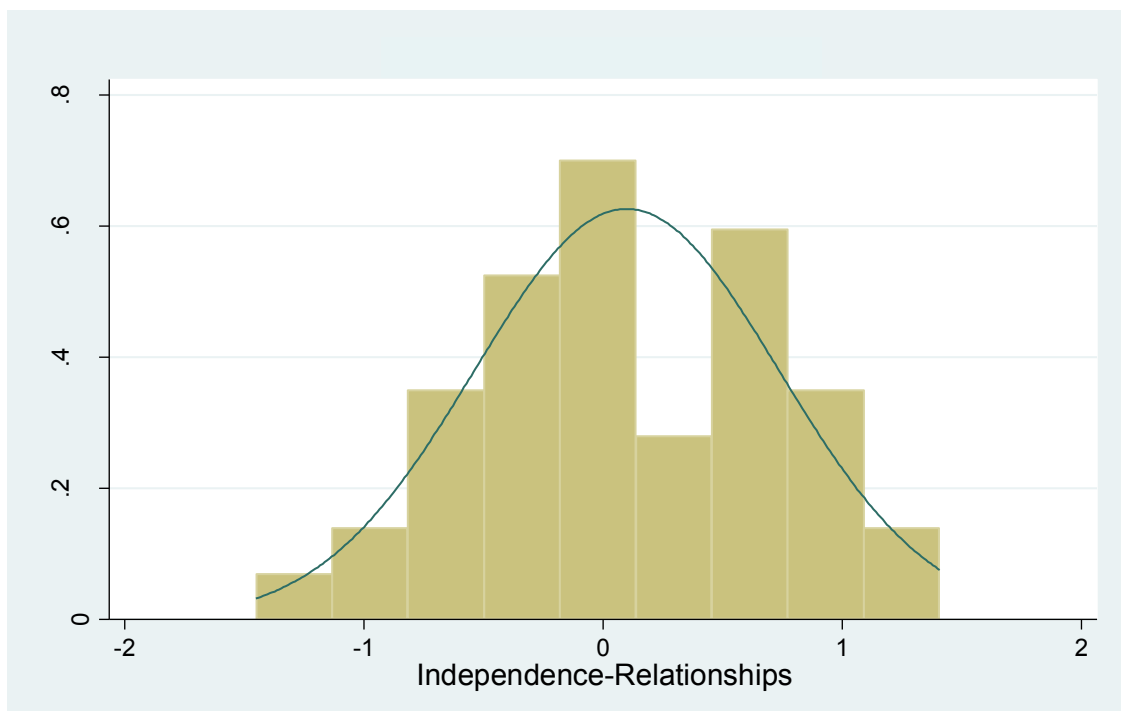


Figure 5.4: Probability Curve – Independence and Interpersonal Relationships (Excl. Outlier)



The p-value resulting from excluding the outlier is 0.5353 which results in failure to reject the null hypothesis. Cronbach's alpha coefficient of scale reliability for this factor was high at 0.78. The variables and their loadings are illustrated in Table 5.13 below.

Table 5.13: Cronbach's Alpha of Scale Reliability for Independence and Interpersonal Relationships

Variable	Factor Loading	Cronbach's Alpha
11.1	0.6823	0.78
11.3	0.6192	
14.1	0.7314	
14.2	0.4939	
14.3	0.6003	

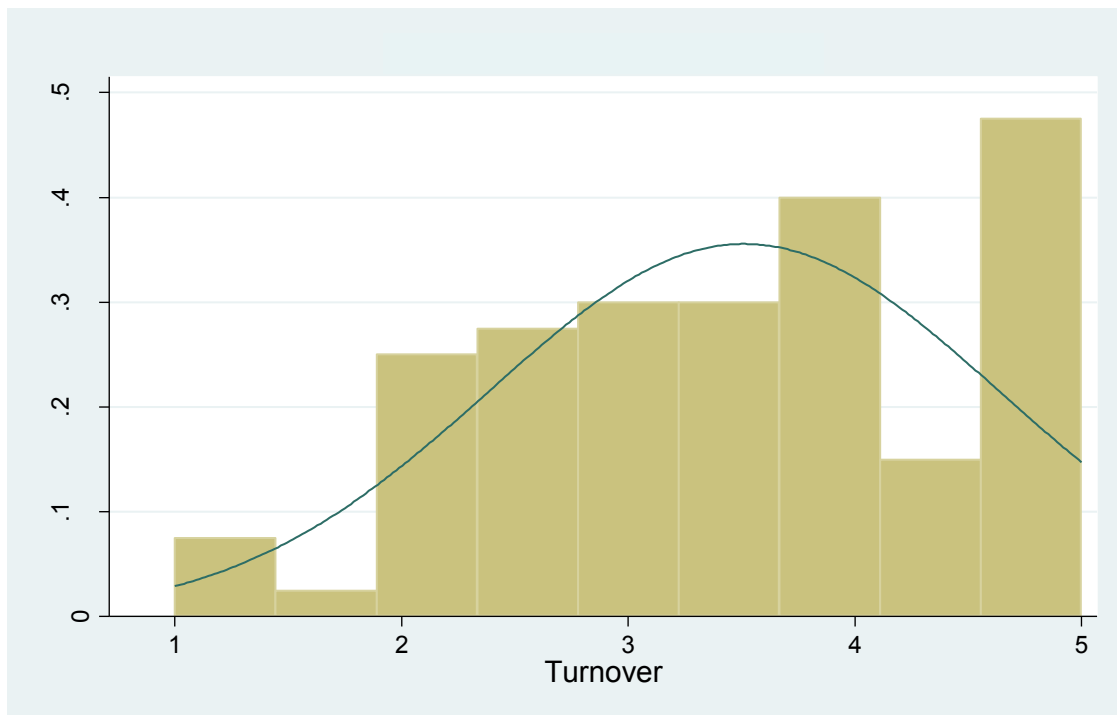
5.2.4 Turnover (Previously Retention)

Four variables showed high loadings on this factor, but only two variables were retained because:

- The two variables construct had a higher internal consistency (0.80) than the four variables construct (0.72), and
- The two variables construct corresponded better to the retention construct in the questionnaire.

This factor was re-named turnover as this better describes the output. The data is normally distributed and with this outcome failed to reject the null hypothesis as the p-value is greater than 0.05 at 0.4085 and shown in Figure 5.4 below.

Figure 5.4: Probability Curve – Turnover



Cronbach's alpha coefficient of scale reliability for this factor was high at 0.80. The variables and their loadings are illustrated in Table 5.14 below.

Table 5.14: Cronbach's Alpha of Scale Reliability for Turnover

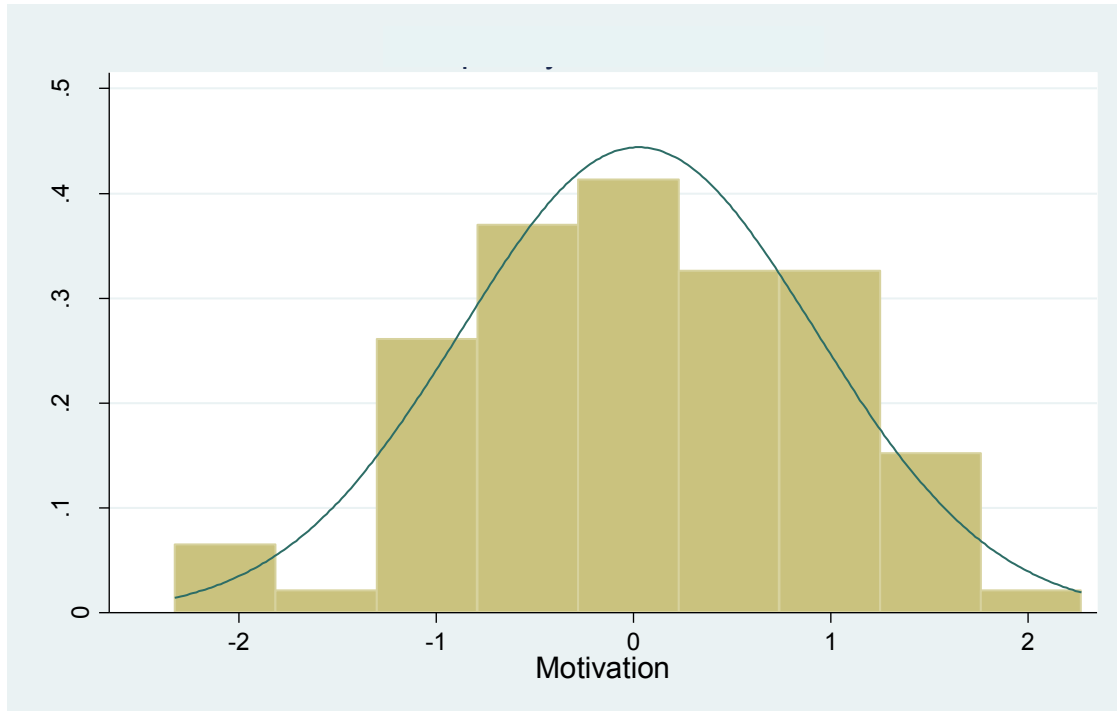
Variable	Factor Loading	Cronbach's Alpha
15.1	0.7401	0.80
15.2	0.6967	

5.2.5 Motivation

This factor showed high factor loadings on all variables that measured motivation due to growth opportunities i.e. all the questions in section 12 of the questionnaire, except for the first two; 12.1 and 12.2. Therefore the factor was proposed to be named differently from the original construct of motivation to growth motivation. The decision was, however, taken to maintain the original name i.e. motivation for this research. The data is normally distributed and with this outcome failed to reject the null

hypothesis as the p-value is greater than 0.05 at 0.3250 and shown in Figure 5.5 below.

Figure 5.5: Probability Curve – Motivation



Cronbach's alpha coefficient of scale reliability for this factor was fairly high at 0.65. The variables and their loadings are illustrated in Table 5.15 below.

Table 5.15: Cronbach's Alpha of Scale Reliability for Motivation

Variable	Factor Loading	Cronbach's Alpha
12.3	0.4450	0.65
12.4	0.5414	
12.5	0.7053	
12.6	0.6312	

5.3 Factor Summary Statistics – Standardised Values

In factor analysis, factor scores provide information on how high or low an individual scores on the constructs. The factors scores were calculated from the values of the original data that calculate the factor loadings, using a regression method in Appendix 2. The distribution of each factor score is a standard normal distribution with a mean of 0 and a standard deviation of 1. The factors' summary statistics for knowledge workers with a sample of 91 are shown in Table 5.16 below.

Table 5.16: Factor Summary Statistics

Variable	Observations	Mean	Std. Dev.	Minimum	Maximum
Management	91	0.018	0.944	-3.235	1.801
Independence & interpersonal relationships	91	0.029	0.917	-6.234	1.407
Retention	91	0.008	0.944	-3.404	1.713
Growth motivation	91	-0.001	0.926	-2.325	2.271

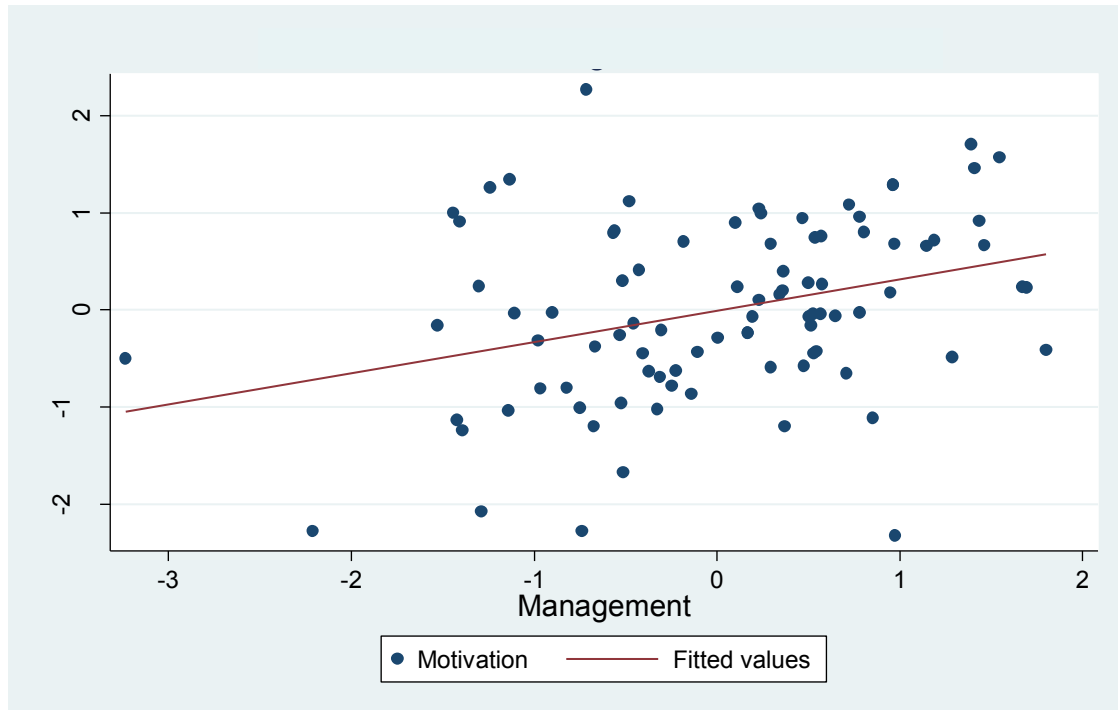
5.4 Hypothesis Testing

The factors were normally distributed quantitative variables and therefore the Pearson's correlation and regression analysis were carried out. The coefficient of correlation measures the relative strength of a linear relationship between two normally distributed, numerical variables and the values of the coefficient correlation range from -1 for a perfect negative correlation and +1 for a perfect positive correlation according to Albright et al. (2009) as mentioned in the previous chapter.

5.4.1 Hypothesis 1 – Knowledge Worker Motivation and Management Relationships

The responses to the survey questions for this hypothesis are plotted in Figure 5.6 below.

Figure 5.6 Scatter Plot of Eigen Values for Management and Motivation



The results are summarised in Table 5.17 as:

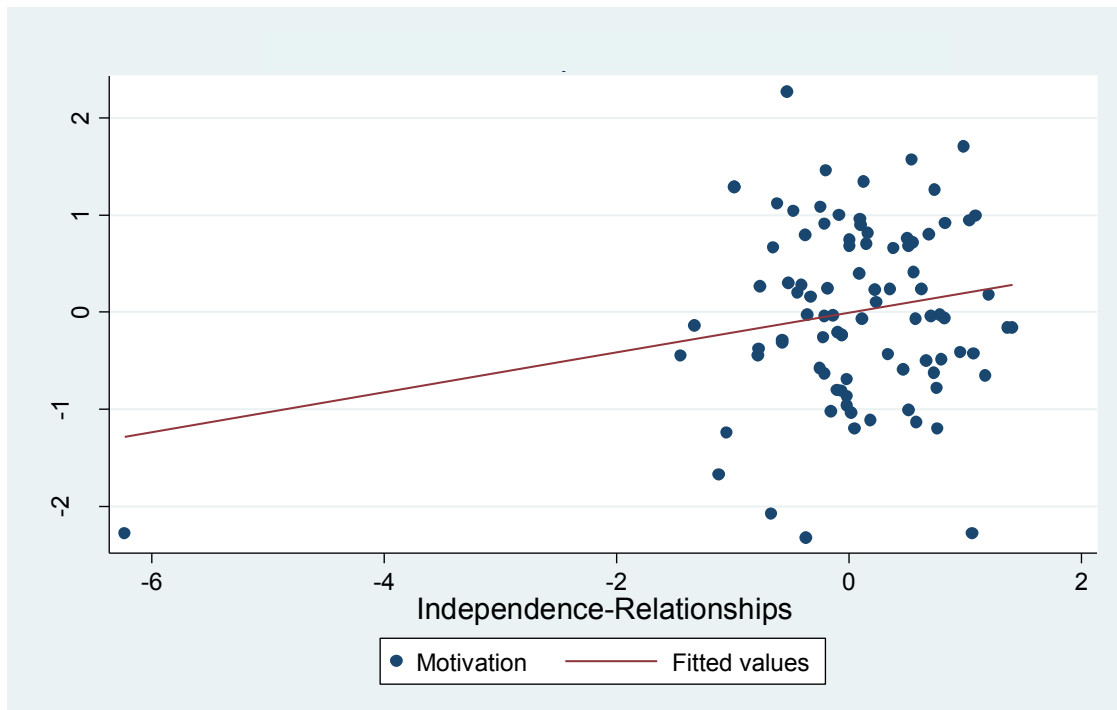
Table 5.17: Management Statistics

R-Value	R-Squared	B-coefficient	P-Value
0.33	0.11	0.32	0.001

5.4.2 Hypothesis 2 – Knowledge Worker Motivation and Independence/Interpersonal Relationships

As explained in the factor analysis in section 5.3.2, the third factor loaded highly on all questions in section 14 of the questionnaire which measured *interpersonal relationships* as well two questions in section 11 which measured *independence*. Therefore the factor was named “independence and interpersonal relationships” and therefore combined into one hypothesis. The responses to the survey questions for this hypothesis are plotted in Figure 5.7 below.

Figure 5.7: Scatter Plot of Eigen Values for Interpersonal Relationships, Independence and Motivation



The results are summarised in Table 5.18 as:

Table 5.18: Independence/Interpersonal Relationships Statistics

R-Value	R-Squared	B-coefficient	P-Value
0.2	0.041	0.2	0.054

5.4.3 Hypothesis 3 – Knowledge Worker Age and Reward Preference

Reward preference was measured using question 13. Respondents were asked to rank in order of importance of what would motivate them to perform at a higher level compared to their current performance level, with 1 being the highest ranking and 4 the lowest. Responses were categorised into most and least important reward preferences and a Chi squared test used to determine whether or not there was an association between age and reward preference. The results from the rankings based on the most important reward are shown in Table 5.19 below.

Table 5.19: Most Important Reward

Most Important Reward	Into which age group do you fall			Total
	18-29	30-39	40+	
Growth	11	25	9	45
	55.00	51.02	40.91	49.45
Financial Reward	6	7	3	16
	30.00	14.29	13.64	17.58
Leadership	2	11	9	22
	10.00	22.45	40.91	24.18
Added Responsibility	1	6	1	8
	5.00	12.24	4.55	6.79
Total	20	49	22	91
	100.0	100.0	100.0	100.0

The Pearson Chi-square result for this was 8.4391 with a p-value of 0.208. The results from the rankings based on the least important reward are shown in Table 5.20 below.

Table 5.20: Least Important Reward

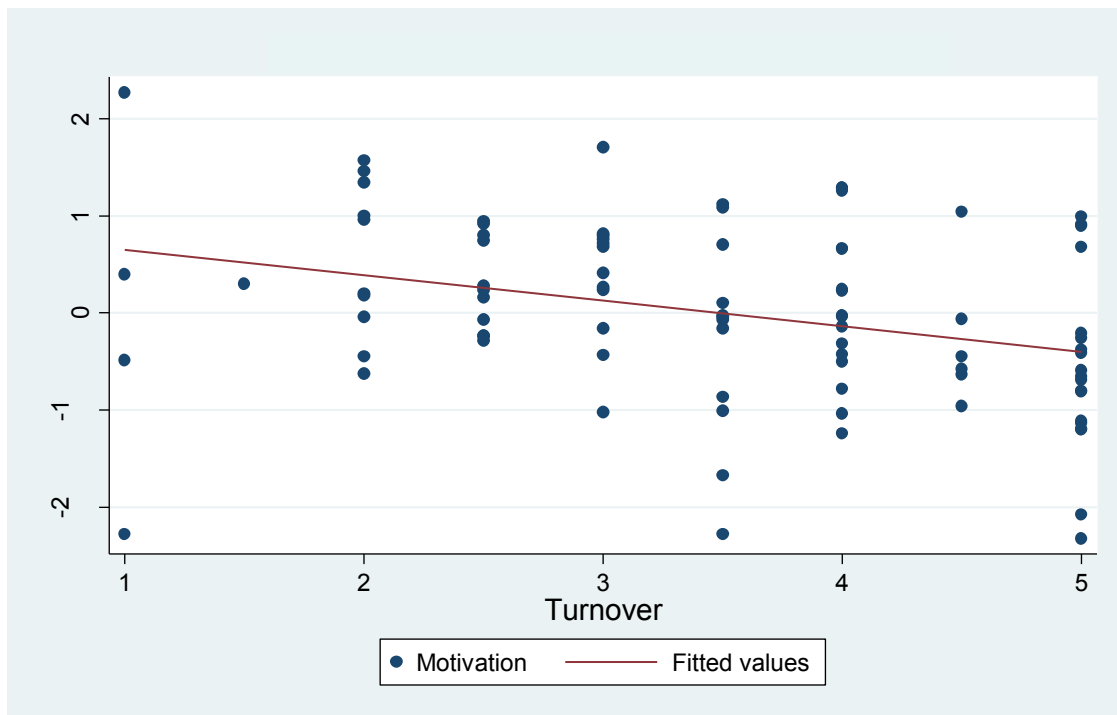
Least Important Reward	Into which age group do you fall			Total
	18-29	30-39	40+	
Growth	2	6	1	9
	10.00	12.24	4.55	9.89
Financial Reward	2	9	2	13
	10.00	18.37	9.09	14.29
Leadership	4	5	3	12
	20.00	10.20	13.64	13.19
Added Responsibility	12	29	16	57
	60.00	59.18	72.73	62.64
Total	20	49	22	91
	100.0	100.0	100.0	100.0

The Pearson Chi-square result for knowledge worker age and reward preference was 3.6656 with a p-value of 0.722.

5.4.4 Hypothesis 4 – Knowledge Worker Motivation and Turnover

The initial wording for this hypothesis referred to “retention”. Based on the analysis of the survey results, this has been changed to turnover as in “*staff turnover*” as it fits better with the results. The responses to the survey questions for this hypothesis are plotted in Figure 5.8 below.

Figure 5.8: Scatter Plot of Eigen Values for Turnover



The results are summarised in Table 5.21 as:

Table 5.21: Turnover (Previously Retention) Statistics

R-Value	R-Squared	B-coefficient	P-Value
-0.33	0.106	-0.26	0.002

5.4.5 Hypothesis 5 – Knowledge Worker Motivation and Interpersonal Relationships

As described in the section 5.4.2 above, independence and interpersonal relationships were combined into one construct and tested accordingly under hypothesis 2.

5.5 Conclusion

The statistical analysis revealed some unexpected results. The following chapter discusses and combines the relevant theory from the literature review with the results of this analysis.

Chapter 6: Data Analysis and Interpretation of Findings

6 Introduction

Research was conducted using an online survey questionnaire aimed at gaining insight into the impact of the identified constructs on knowledge worker motivation. The survey included demographic data which was collected in order to assist with analysis as well as to gain context. Chapter 5 showed the results of the research in terms of descriptive statistics, testing of data for normality, establishing that the right measures were being analysed and then establishing whether there was a correlation between the factors in the hypotheses. The analysis to determine whether the survey questionnaire was measuring the correct constructs included the requirement of a medium to high Cronbach's alpha coefficient i.e. one that was approximately 0.7 but not higher than 0.9.

The literature review under Chapter 2 started by discussing the different leadership or management styles. Whilst the leadership style is important, of greater importance is the response of the knowledge worker to the employed style. Furthermore, the literature review covered definitions of knowledge workers and knowledge management; the methods of managing knowledge workers; knowledge worker motivation and retention. The theory and the hypotheses are discussed in the sections below with a view to gaining a deeper understanding of knowledge worker motivation. This chapter covers the outcomes of the research hypothesis and compares this to the existing literature on the same topics.

6.1 The Research Instrument

6.1.1 Introduction

The research instrument was designed with the intention of investigating the constructs of (1) independence, (2) interpersonal relationships, (3) management relationships, (4) retention, and (5) rewards. Based on the outcomes of the statistical analysis, important changes were suggested as to how the constructs would be named and used.

6.1.2 Factor Analysis

6.1.2.1 Management

The analysis of the management construct is shown under section 5.2.2. High factor loadings were evident on all management variables in the questionnaire with the exception of question 18.5. The factor therefore retained the name of the original construct i.e. management. The probability curve for the management construct as shown in Figure 5.2, was fairly normally distributed and with this outcome failed to reject the null hypothesis as the p-value was greater than 0.05. It was therefore concluded that the data is normally distributed and the Pearson's correlation and regression analysis was completed for this factor. Cronbach's alpha coefficient of scale reliability for this factor is shown in Table 5.12 and was very high at 0.86 meaning that the correct construct was measured.

6.1.2.2 Independence and Interpersonal Relationships

Independence and interpersonal relationships were seen as separate constructs and thus treated accordingly in both the questionnaire and the initial analysis. The analysis of the independence and interpersonal relationships construct is shown under section 5.2.3. High factor loadings were found on all questions in section 14 of the questionnaire which measured the construct called interpersonal relationships as well as the questions in section 11 which measured the construct called independence. As a result of the outcomes of the analysis, the factors were combined and renamed "independence and interpersonal relationships".

The probability curve for the independence and interpersonal relationships construct as shown in Figure 5.3, was fairly normally distributed with one outlier. After removing the outlier, the probability curve, as shown in Table 5.4, was normally distributed. The p-value resulting from excluding the outlier is 0.5353 which results in failure to reject the null hypothesis. It was therefore concluded that the data is normally distributed and the Pearson's correlation and regression analysis was completed for this factor. Cronbach's alpha coefficient of scale reliability for this factor is shown in Table 5.13 and was high at 0.78, meaning that the correct construct was measured.

6.1.2.3 Turnover (Previously Retention)

The analysis of the turnover construct is shown under section 5.2.4. From the analysis, four variables showed high loadings on this factor, but only two were retained because using the two variables construct had a higher internal consistency (0.80) than the four variables construct (0.72), and the two variables construct corresponded better to the retention construct in the questionnaire. This factor was re-named “turnover” as this better describes the output. As shown in Figure 5.4 the data was normally distributed and with this outcome failed to reject the null hypothesis as the p-value is greater than 0.05 at 0.4085. The Pearson’s correlation and regression analysis was completed for this factor. Cronbach’s alpha coefficient of scale reliability for this factor, as shown in Table 5.14, was high at 0.80 meaning that the correct construct was measured.

6.1.2.4 Motivation

The analysis of the motivation construct is shown under section 5.2.5. This factor showed high factor loadings on all variables that measured motivation due to growth opportunities i.e. all the questions in section 12 of the questionnaire, except for the first two; 12.1 and 12.2. Therefore the factor was proposed to be named differently from the original construct of motivation to growth motivation. The decision was, however, made to maintain the original name; motivation. As shown in Figure 5.5 the data is normally distributed and with this outcome failed to reject the null hypothesis as the p-value is greater than 0.05 at 0.3250. It was therefore concluded that the data is normally distributed and the Pearson’s correlation and regression analysis was completed for this factor. Cronbach’s alpha coefficient of scale reliability for this factor, as shown in Table 5.15, was fairly high at 0.65 meaning that the correct construct was measured.

6.2 Knowledge Worker Motivation and Management Relationships

The first hypothesis was “There is no correlation between knowledge worker motivation and management relationships (H_0). The alternative hypothesis is that there is a positive correlation between worker motivation and management relationships (H_1).”.

6.2.1 The Relevant Literature – Management Relationships

Reviewing the theory that relates to this hypothesis, Drucker (2001) (as cited in Frick, 2011) asserts that knowledge workers are said to be in a position where they need to and do know more about their jobs than their managers do, in order to be useful. It is concluded that factors bearing most influence are the intangible and emotional issues including growth in the organisation and relationships with peers. From this the importance of good relationships with supervisors/management is shown and also the link to continuity of the business as the knowledge worker is said to know more than his manager does. This also refers to the importance of good interpersonal relationships. Furthermore, Frick (2008) states that relationships with supervisors stand out as a low contributor to positive factors for staff, but high as a negative factor, meaning that a good relationship with a supervisor is not as beneficial to an organisation as a bad relationship is detrimental to that organisation.

McWilliams (2011) found that management behaviour was a key reason for knowledge workers leaving their organisations and importantly under this hypothesis, the challenge remains for managers to know when to empower and when to monitor employees closely in order to maximise motivation. This is due to knowledge workers, in certain instances, requiring monitoring and approval from their managers. Knowledge worker development management is important in order to ensure that the knowledge and skills of the knowledge worker do not become obsolescent according to Chen et al. (2010). Left to their own devices for the wrong reasons or at inappropriate times may thus have a negative impact on the knowledge worker. In section 2.5 above, McWilliams's work on why knowledge workers leave also points towards management behaviour.

McWilliams (2011) cites the work of Holtom et al., (2005) which stated that at least 60% of voluntary exits were related to a shock experienced by the employee. He asserted that shocks are the result of three main issues, (1) time for reflection, (2) being head hunted, and (3) managerial behaviour. The latter factor, albeit not specifically due to a shock, is covered under this hypothesis.

6.2.2 The Statistical Findings – Management Relationships

The reliability of the study into the relationship between knowledge worker motivation and management relationships was calculated to be a Cronbach's alpha coefficient of 0.86 as was illustrated in Table 5.12 under section 5.2.2. This outcome indicates that the survey questions measured the correct construct. *Further to this, the results show that there is a medium significant positive relationship between management relationships and motivation.*

The outcome of the research is therefore that the null hypothesis is rejected. In this scenario a Type 1 error is possible, but unlikely with $p = 0.001$. A Type 1 error happens when the null hypothesis is rejected whilst being true. The alternative hypothesis is therefore accepted which means that there is a correlation between knowledge worker motivation and management relationships. This correlation is positive.

6.3 Knowledge Worker Motivation and Independence and Interpersonal Relationships

The second hypothesis was “There is no correlation between knowledge worker motivation and the independence construct (H_0). The alternative hypothesis is that there is a positive correlation between worker motivation and independence (H_1).”; and the fifth hypothesis was “There is no correlation between knowledge worker motivation and the interpersonal relationships construct (H_0). The alternative hypothesis is that there is a positive correlation between knowledge worker motivation and interpersonal relationships (H_1).”.

6.3.1 The Relevant Literature – Independence

Rowley (2000), Hunter et al. (2002) and Newell et al., (2002) (all cited in Kumar, 2011) state that knowledge workers are employees with autonomy and who are empowered to make decisions that have a large impact on the company in which they are employed. Without autonomy or independence, management would have to spend additional time and resources to manage or monitor these workers. This may result in a further impact whereby additional time on managing the knowledge worker, may frustrate the latter thus affecting motivation negatively and even affecting the desire of

the worker to remain with the organisation. This increased management time may also make knowledge workers feel that they are not trusted and thus lead to them either becoming difficult to manage and/or exiting the organisation. A balanced approach to this is thus necessitated.

Gargiulo, Ertug and Galunic (2009) state that knowledge worker performance is driven by information quality and access, as well as autonomy in implementing solutions. For this situation to be possible, management needs to be able to trust their employees or face the consequences as stated in the previous paragraph of these workers becoming difficult to manage and/or leaving the organisation.

McWilliams (2011) found that management behaviour was a key reason for knowledge workers leaving their organisations. The challenge remains for managers to know when to empower and when to monitor employees closely in order to maximise motivation. This is due to knowledge workers, in certain instances, requiring monitoring and approval from their managers. As previously stated, an example of this scenario would be the management of the knowledge worker's personal development plan.

6.3.2 The Relevant Literature – Interpersonal Relationships

A key element of knowledge management that requires mentioning is the issue of knowledge transfer. According to Lamb et al. (2010, p. 301) "Career capital grows through transfer, experience and exposure". Failure of knowledge workers to share their knowledge and groom or mentor others will thus have a negative impact on the organisation as well as the team. Further to this, failure on the part of knowledge workers to develop themselves, will negatively affect their career capital. Apart from possible insecurities keeping knowledge workers from sharing their knowledge and expertise, a further issue to consider may also be negative interpersonal relationships. When team members do not get along, they may find it difficult to help and/or grow each other.

The value of teamwork in motivating knowledge workers is not to be underestimated. Hebda et al. (2012) state that there are two other motivators that needs to be mentioned. These are intrinsic motivators and organisational culture. By definition, the intrinsic factor is described as applying knowledge, and creating and seeing the creation implemented.

Hedba et al. (2012) also state that there is a difference in the factors that motivate technical visionaries and scientists. They specifically mention that unlike scientists, technical visionaries are motivated by a culture and atmosphere of teamwork; specifically in that the team motivates them to be creative.

6.3.3 The Statistical Findings – Independence and Interpersonal Relationships

The analysis of the relationship between knowledge worker motivation and knowledge worker independence and interpersonal relationships resulted in a Cronbach's alpha coefficient of 0.78 as shown in Table 5.13 In section 5.2.3. This outcome indicates that the survey questions measured the correct construct. *The results of the correlation analysis show that there is a weak non-significant positive relationship between the constructs of independence/interpersonal relationships and motivation.*

The relationship is positive because an increase in independence/interpersonal relationships is associated with an increase in growth motivation. The strength of the relationship is, however, weak with a b-coefficient of 0.2 as shown in Table 5.18 under section 5.4.2. These findings are not significant at the 0.05 level, but *when controlling for age, education and years of full time work, the b-coefficient changes to 0.25 and thus a better fit. The findings are then significant at the 0.05 level with a p-value of 0.021.*

The outcome of the research is therefore that the null hypothesis is rejected. In this scenario a Type 1 error is possible as a Type 1 error happens when the null hypothesis is rejected whilst being true. The alternative hypothesis is therefore accepted which means that there is a correlation between knowledge worker motivation and independence/interpersonal relationships. This correlation is positive.

6.4 Knowledge Worker Age and Reward Preference

The third hypothesis was " There is no correlation between knowledge worker age and reward preference (H_0). The alternative hypothesis is that there is a correlation between worker age and reward preference (H_1).".

6.4.1 The Relevant Literature – Age and Reward Preference

In the literature review, the work of Carleton (2011) who also cited the work of Erne (2009); as well as the work of Erne (2011) was discussed. Carleton (2011) believes that knowledge workers are more inclined to want to add value to the organisation than to be concerned about their earnings. Erne (2009) (as cited by Erne, 2011) disagreed with this as it was found that task related payments, possibly performance bonuses, were successful in motivating knowledge workers.

The outcome of the research of Hong et al. (1995) was that monetary benefits had a greater perceived benefit on employees below 35 years of age. Carleton (2011) cites the work of Kamrog (2004) in stating that knowledge workers require instant gratification due to amongst other factors, witnessing their parents receiving relatively low loyalty from employers in return for their sacrifice. In line with these two pieces of research, the hypothesis was formed as it appeared logical in suggesting a relationship between knowledge worker age and knowledge worker reward preference.

6.4.2 The Statistical Findings – Age and Reward Preference

In assessing the reward rankings from the survey, the results of the analysis revealed that the most important reward as ranked by knowledge workers was career growth and the least important reward was added responsibility. The p-values for both analyses do not support or refute the assertions of either of the research outcomes; Hong et al. (1995) or Kamrog (2004).

Summarising the age and reward preference analysis, Table 6.1 below shows that there was no statistically significant relationship ($p > 0.05$) between age and reward preference and therefore the outcomes of the analysis failed to reject the null hypothesis.

Table 6.1: Summary of Age and Reward Preference Analysis

Rating	Pearson's Chi-square	P-value
Most Important	8.4391	0.208
Least Important	3.6656	0.722

6.5 Knowledge Worker Motivation and Turnover (Initially Retention)

The fourth hypothesis was “There is no correlation between knowledge worker motivation and the turnover construct (H_0). The alternative hypothesis is that there is a correlation between knowledge worker motivation and turnover (H_1).”.

6.5.1 The Relevant Literature – Turnover (Initially Retention)

Carleton (2011) states that it is important for organisations to retain knowledge workers by attending to their unique characteristics and motivational needs. The role of human resources is described as including attracting and retaining the best talent to satisfy the needs of the organisation in McWilliams (2011) citing Wooldridge (2006). Failure to attract this talent will compromise the continuity of the organisation and failure to retain this talent will not only compromise the business, but will also bring with it a number of other negatives. According to McWilliams (2011) these include:

- Direct costs of:
 - Recruitment
 - Loss of skills
 - Loss of experience
 - Disruption
- Indirect costs of:
 - Loss of tacit knowledge
 - Loss of intellectual property to competitors

Whilst some organisations are reluctant to invest in developing knowledge workers for fear of losing them, the work of O'Driscoll (2003) is quoted as stating that retention of knowledge workers is actually compromised by the absence of learning interventions. It is therefore suggested that development of knowledge workers is not just about preserving their career capital, but about retaining their skills.

Giancola (2011) goes on to quote Herzberg in Lufthans (2005) as saying, "If you want people to do a good job, give them a good job to do". By implication, job dissatisfaction may also cause knowledge workers to leave the organisation. McWilliams's (2011) work on why knowledge workers leave, as stated in section 2.4 above, is management behaviour. McWilliams (2011) makes reference to a number of studies with different outcomes related to LMX as a tool that predicts staff turnover. The majority of the authors quoted in McWilliams (2011) found a relationship between LMX and staff turnover while one found none and another found a "curvilinear relationship" McWilliams (2011, p.85-6).

The fifth need of Maslow's hierarchy of needs as described by Sadri and Bowen (2011) is the need for self actualisation. Given that knowledge workers are likely to have higher qualifications and receive a higher level of remuneration, failure to achieve these needs may result in a further factor as to why knowledge workers leave their organisations.

6.5.2 The Statistical Findings – Turnover (Initially Retention)

The analysis of the relationship between knowledge worker motivation and retention, renamed turnover, resulted in a Cronbach's alpha coefficient of 0.80. This outcome indicates that the survey questions measured the correct construct.

The results show that there is a medium significant negative relationship between the constructs of motivation and turnover. The relationship is negative because a decrease in motivation is associated with an increase in turnover. The strength of the relationship is medium due to a b-coefficient of -0.26 as shown in Table 5.21 In section 5.4.4. These findings are significant at the 0.002 level and when controlling for age,

education and years of full time work, the b-coefficient changes to -0.28 and thus a better fit. *The findings are then significant at the 0.001 level.*

The null hypothesis would thus be rejected. In this scenario a Type 1 error is possible, but unlikely with $p = 0.001$. A Type 1 error happens when the null hypothesis is rejected whilst being true. The alternative hypothesis is therefore accepted which means that there is a correlation between knowledge worker motivation and turnover. This correlation is negative.

6.6 Knowledge Worker Motivation and Interpersonal Relationships

The construct for this hypothesis was combined with independence and the results discussed in 6.3 above.

6.7 Conclusion

The study into knowledge worker motivation focussed on five key constructs and their correlation to knowledge worker motivation. Of the five, one showed no correlation, two had a correlation and two others were combined into one due to the outcomes of the statistical analysis. This left a total of three constructs and therefore hypotheses to discuss as shown in Table 6.2 below.

Table 6.2: Summary of Outcomes of Analysis of Constructs

	Management Relationships	Turnover (Initially Retention)	Independence and Interpersonal Relationships	Age
Knowledge Worker Motivation	Correlation exists	Correlation exists	Correlation exists	
Reward Preference				No correlation exists

Of the three hypotheses in Table 6.2 above, the name of one was changed due to statistical fit. The three hypotheses of management relationships, turnover and independence and interpersonal relationships in the table, all showed a correlation to knowledge worker motivation. The fourth hypothesis measuring age and rewards, showed no correlation.

The following chapter concludes the research by highlighting the key findings, discussing recommendations for knowledge workers and their managers as well as recommendations for future research.

Chapter 7: Conclusion

7 Introduction

This chapter concludes the research into knowledge worker motivation which was conducted in relation to the constructs below:

- Management relationships,
- Interpersonal relationships,
- Independence,
- Rewards, and
- Turnover.

The key research findings, recommendations for knowledge workers and their managers as well as recommendations for future research will be discussed in this chapter.

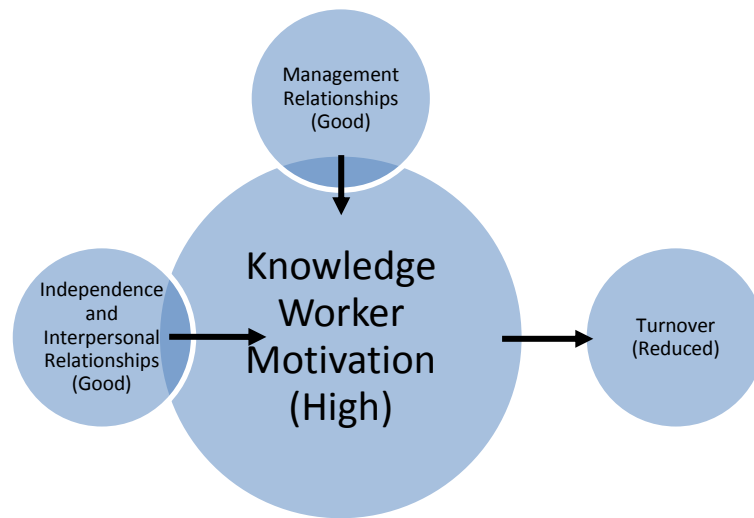
7.1 Key Findings

In summarising the outcomes of the hypotheses:

- Management was positively associated with the motivation construct,
- Independence and interpersonal relationships were positively associated with the motivation construct,
- Turnover was negatively associated with the motivation construct, and
- There was no association between age and reward preference.

When reviewing the proposed relationships between the constructs (excluding Hypothesis 3) first introduced in section 4.10.1, the diagram changes as shown in Figure 7.1 below.

Figure 7.1: Proposed Relationships between the Constructs after Research



When interpreting the proposed relationships in Figure 7.1, they are defined as; good management relationships combined with the new construct of high independence and good interpersonal relationships, result in high knowledge worker motivation and ultimately reduced turnover of knowledge workers.

7.2 Recommendations to Knowledge Workers

Mohanta and Thooyamani (2010) proposed that motivation has three foundational elements with these being (1) “a need, vision, dream or desire to achieve”; (2) a learning culture encompassing risk and the pursuit of new opportunities, and (3) the ability to overcome setbacks and be resilient (as mentioned in Chapter 1). For knowledge workers to be motivated, they first need to understand what drives them as well as what their needs and wants are on both a personal and professional basis. They also need to be honest with themselves as to what is fair to expect of their managers and organisations.

Growth of career capital through formal training has benefits. Development plans need to be agreed with managers and managed closely in order to ensure their execution. Further to this, without building good interpersonal relationships and therefore growth

from dealing with team members who advise and assist them, knowledge workers may miss out on experiential learning opportunities.

While knowledge workers are an asset to their organisations, relationships built on mutual respect and trust with their managers are necessary for both them and their organisations to grow. The knowledge worker has an important role to play to facilitate these relationships, and it is recommended that strategies towards improved relationship building are implemented.

7.3 Recommendations for Managers

Erne (2011) stated that there may be a shortage of higher qualified employees and managing them in order to ensure attracting and retaining the best suited candidates is a key factor in the successful management of organisations that wish to secure continuity and ongoing performance improvements. In order for managers to achieve this, they need to understand knowledge worker expectations and what motivates them. Further to this they need to understand their own management style and how it is received by their team members. Failure to do this may result in knowledge worker motivation being hampered and turnover increasing.

Knowledge worker empowerment and independence are earned through consistent performance and are a function of the type of manager that is leading the knowledge worker. Failure on the part of managers to recognise the relationship between knowledge worker motivation and independence, and acting on this knowledge, will greatly compromise the relationship as well as having a negative impact on staff turnover.

Whilst the outcomes of this research did not provide direction regarding reward systems, it is important for managers to identify the appropriate rewards that attract and retain knowledge workers. These rewards need not be financial, but instead, are dependent on the profile and therefore needs of the knowledge worker and organisational policies.

7.4 Recommendations for Further Research

After concluding the research and statistical analysis, a number of areas for future research were established. Conducting research into these areas will further assist with understanding how to motivate and manage knowledge workers both for their benefit as well as that of the organisation and other stakeholders. The areas for future research are discussed below:

- No relationship between knowledge worker age and reward preference was found, however, the issue of reward preference and knowledge worker age requires further investigation.
- The new construct of independence and interpersonal relationships may require further research into whether one is a precursor for the other i.e. the question should be asked whether good interpersonal relationships is a requirement for management to give a level of independence to the knowledge worker.
- Carleton (2011) cites the work of Papacharalambus and McCalman (2004) who state that not all knowledge workers are keen on transferring their knowledge to others. Yan, Peng and Francesco (2011) cite the work of Allee (1997) who assert that knowledge workers master and share organisational knowledge. From these conflicting opinions, it is concluded that more research into the issue is required.
- Fritz et al. (2011) found that learning oriented activities were more successful in improving employee vitality and reducing fatigue which may be due to a need for continued learning being satisfied. This factor was not covered in the research.
- Poornima (2009) proposes the concept of motivation through satisfaction and thus that it is not only important to retain talent, but to retain them in a good condition. This does not only refer to physical health, but healthy in terms of body, mind and soul.
- Hong, Yang, Chiou, Su and Huang (1995) cited Herzberg's motivation-hygiene theory. The work-motivation element of this theory is measured by factors including absenteeism, staff turnover and timekeeping. While important to control and manage, work-motivation was not covered by this research and may present an opportunity for future research.
- A contributor to knowledge worker motivation and performance is cited in Carleton (2011) as being work area design and resource availability. An environment that does not support creativity and productivity is thus a risk to the performance of the individual and possibly the organisation. According to Rousseau (as cited in

Kumar, 2011, p. 28) “job characteristics and job satisfaction among employees have substantial positive relations with job motivation”.

- Dewhurst, Guthridge and Mohr (2010) state that whilst non-monetary incentives are effective in motivating employees, they are not popular as they require time and effort from management which, if not applied, may damage employee engagement. A lack of engagement with employees may result in them leaving the organisation or performing at suboptimal levels.
- Giancola (2011) asserts that the nature of work is a key contributor to knowledge worker dissatisfaction and that job redesign is required when this happens. He goes on to quote Herzberg in Lufthans (2005) as saying, “If you want people to do a good job, give them a good job to do”.

7.5 Conclusion

In Chapter 1, knowledge workers were identified as a scarce resource. Whilst it may be difficult to accept or believe, unmatched supply and demand of knowledge workers means that organisations have to compete for the best in order to have a opportunity of building a competitive advantage. Given the ease of travel that exists, the competition for scarce skills is no longer contained within a geographical territory, but borders have opened up to either attract these skills or lose them to other geographical areas.

Knowledge workers need to keep growing their career capital in order to avoid the obsolescence of their skills as well as to stay relevant. In conclusion, failure on the part of managers and their organisations to seek to understand and address the needs, expectations, wants and needs of knowledge workers, may lead to them either losing these employees or to said employees performing at suboptimal levels and planning a delayed exit. If nothing else; let the issue of the direct and indirect costs of the loss of the skills, knowledge and experience that resides with these workers be an encouragement for managers and their organisations to sit up and pay attention to their knowledge workers.

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Appendix 1 – Survey Questionnaire Knowledge Worker Motivation

Consent

Dear Respondent,

I am conducting research in order to identify the factors that contribute to the motivation of knowledge workers. The survey should take approximately 5 minutes of your time. Your participation is voluntary and you may withdraw at any time without penalty. Please note that all data collected, including the individual responses to the questionnaire, will remain confidential. No names or personal details will be recorded and the overall outcomes used only for the purpose of research in partial fulfilment of the GIBS MBA. Should you have any concerns, please contact me or my research supervisor. Our details are provided below.

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1. Into Which Age Group Do You Fall?

- 18-29 yrs 30-39 yrs 40-49 yrs 50-59 yrs 60+ yrs

2. What is Your Highest Level of Education Completed?

- Diploma Bachelors Honours Masters Doctorate No Formal Qualification

3. How Many Years of Full Time Work Experience Have You Completed?

- 5 yrs 5-9 yrs 10-14 yrs 15-19 yrs 20+ yrs

4. For How Many Years Have You Worked for Your Current Employer?

- Up to 2 yrs 3-5 yrs 6-10 yrs 11-15 yrs 15+ yrs

5. How Many Companies Have You Worked For on a Full Time Basis?

- 1 2-3 4-5 6-7 8+

6. In Which Industry are You Employed?

- Audit Banking Engineering IT Legal Manufacturing

Mining

Other (Please Specify):

7. What is Your Current Position?

Accountant
 Analyst
 Engineer
 Management

Senior Management
 Other (Please Specify):

8. How Many Different Job Titles Have You Held With Your Current Employer?

1-2
 3-4
 5-6
 7-8
 9+

9. What is Your Current Cost to Company Remuneration (R'000s) p.a.?

R300k
 R300-R600k
 R601-R900k
 R901-R1200k
 R1200k+

10. Carleton (2011) asserts that knowledge workers are highly educated, have superior interpersonal communication skills and are able to digest and process information better than most. Carleton (2011) also believes that knowledge workers are more inclined to want to add value to the organisation. The definition of knowledge workers includes, but is not limited to, accountants, analysts, engineers and software developers. Based on this definition, do you consider yourself a knowledge worker?

Yes
 No

11. Please indicate whether you agree with the following statements according to the scale below:

	1. Strongly Disagree	2. Disagree	3. Neither Agree or Disagree	4. Agree	5. Strongly Agree
I take responsibility for the execution of my personal development plan	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I prefer to work independently	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I understand the expectations of my job	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My job is mostly structured	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

12. Please indicate whether you agree with the following statements according to the scale below:

	1. Strongly Disagree	2. Disagree	3. Neither Agree or Disagree	4. Agree	5. Strongly Agree
Pay and Benefits are the things that motivate me most	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My current remuneration motivates me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Opportunities for growth motivate me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My current opportunities for growth motivate me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There are opportunities for promotion within my company	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I desire to be promoted in my current organisation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

13. Please rank the following in order of importance of what would motivate you to perform at a higher level compared to now, with 1 being the highest ranking and 4 the lowest.

Growth	<input type="text"/>
Financial Reward	<input type="text"/>
Leadership	<input type="text"/>
Added Responsibility	<input type="text"/>

14. Please indicate whether you agree with the following statements according to the scale below:

	1. Strongly Disagree	2. Disagree	3. Neither Agree or Disagree	4. Agree	5. Strongly Agree
I enjoy good interpersonal relationships with my colleagues	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My current interpersonal relationships motivate me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I share my knowledge with others	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

15. Please indicate whether you agree with the following statements according to the scale below:

	1. Strongly Disagree	2. Disagree	3. Neither Agree or Disagree	4. Agree	5. Strongly Agree
I desire a career change	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have considered leaving my current employer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

16. Please rank the following in order of importance of what would make you remain with the organisation, with 1 being the highest ranking and 4 the lowest.

Opportunities for Growth	<input type="text"/>
Stability	<input type="text"/>
Challenge	<input type="text"/>
Opportunities to Add Value to the Organisation	<input type="text"/>

17. Please rank the following in order of importance of what would make you leave the organisation, with 1 being the highest ranking and 4 the lowest.

Lack of Work Life Balance	<input type="text"/>
Lack of Growth Opportunities/Stagnation	<input type="text"/>
Lack of Security	<input type="text"/>
Lack of Recognition	<input type="text"/>

18. Please indicate whether you agree with the following statements according to the scale below:

	1. Strongly Disagree	2. Disagree	3. Neither Agree or Disagree	4. Agree	5. Strongly Agree
I am motivated by a good working relationship with my manager	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My current relationship with my manager motivates me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My manager is competent in his/her job	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My manager is a good leader	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I possess more knowledge in my area of expertise than my manager does	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My manager empowers me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Appendix 2 – Outputs of Analysis

***Initial factor solution - common factors from all variables

```
. factor q11_1- q18_6
(obs=93)
(collinear variables specified)
```

```
Factor analysis/correlation          Number of obs   =      93
Method: principal factors            Retained factors =      22
Rotation: (unrotated)                Number of params =    495
```

Beware: solution is a Heywood case
(i.e., invalid or boundary values of uniqueness)

Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor1	4.70047	1.10272	0.1942	0.1942
Factor2	3.59776	0.72737	0.1486	0.3429
Factor3	2.87039	0.65373	0.1186	0.4614
Factor4	2.21666	0.36384	0.0916	0.5530
Factor5	1.85283	0.27006	0.0766	0.6296
Factor6	1.58276	0.22890	0.0654	0.6950
Factor7	1.35386	0.15380	0.0559	0.7509
Factor8	1.20006	0.10400	0.0496	0.8005
Factor9	1.09605	0.01048	0.0453	0.8458
Factor10	1.08557	0.20033	0.0449	0.8906
Factor11	0.88524	0.27783	0.0366	0.9272
Factor12	0.60741	0.11376	0.0251	0.9523
Factor13	0.49366	0.05737	0.0204	0.9727
Factor14	0.43629	0.05441	0.0180	0.9907
Factor15	0.38188	0.09618	0.0158	1.0065
Factor16	0.28570	0.03385	0.0118	1.0183
Factor17	0.25185	0.05801	0.0104	1.0287
Factor18	0.19384	0.02462	0.0080	1.0367
Factor19	0.16922	0.05856	0.0070	1.0437
Factor20	0.11067	0.08187	0.0046	1.0483
Factor21	0.02880	0.02785	0.0012	1.0495
Factor22	0.00095	0.00095	0.0000	1.0495
Factor23	0.00000	0.00000	0.0000	1.0495
Factor24	0.00000	0.00000	0.0000	1.0495
Factor25	-0.00000	0.04010	-0.0000	1.0495
Factor26	-0.04010	0.03900	-0.0017	1.0479
Factor27	-0.07910	0.03392	-0.0033	1.0446
Factor28	-0.11302	0.03899	-0.0047	1.0399
Factor29	-0.15201	0.02072	-0.0063	1.0336
Factor30	-0.17273	0.02391	-0.0071	1.0265
Factor31	-0.19664	0.00481	-0.0081	1.0184
Factor32	-0.20145	0.04208	-0.0083	1.0101
Factor33	-0.24354	.	-0.0101	1.0000

LR test: independent vs. saturated: chi2(528) = . Prob>chi2 = .

Factor loadings (pattern matrix) and unique variances

Variable	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8	Factor9	Factor10	Factor11
q11_1	0.3567	0.3468	0.1405	0.0294	0.1746	0.0234	-0.0119	0.1099	-0.3617	-0.0342	0.0228
q11_2	0.1192	0.2986	0.3209	-0.1185	0.0060	0.1346	-0.0059	0.0056	0.0163	0.2067	0.0573
q11_3	0.4478	0.1695	0.1934	0.0653	0.1783	0.0364	-0.0010	-0.1230	-0.2945	-0.2020	-0.0642
q11_4	0.1415	0.0287	0.2118	0.2796	0.3434	-0.0807	-0.2367	-0.0875	0.0798	0.1079	0.1544
q12_1	0.2267	0.3480	0.3411	0.1641	-0.0771	-0.0706	0.2690	0.0541	0.3177	0.2331	0.0032
q12_2	0.3897	-0.1641	-0.0277	-0.0088	0.0978	-0.0343	0.0906	-0.1089	0.1121	0.1077	-0.2077
q12_3	0.4236	0.3171	0.0722	0.0107	0.2731	-0.0549	0.2279	0.2533	-0.0108	0.2348	0.0812
q12_4	0.3632	-0.3140	-0.3894	0.2572	0.2605	0.0944	0.1298	0.0632	0.0882	0.0748	-0.0292
q12_5	0.4660	-0.1756	-0.0659	0.1960	0.4171	-0.0125	0.3453	0.0076	0.1051	0.0553	0.0274
q12_6	0.1666	0.0755	-0.1405	0.1000	0.4819	0.1563	0.2540	0.0009	0.1658	0.0214	-0.0652
q13_1	0.2141	-0.4415	0.3688	-0.4350	-0.0953	-0.0836	0.4937	-0.0009	0.2145	-0.1299	0.0239
q13_2	0.0624	-0.0979	-0.3850	-0.5945	0.2945	0.1390	-0.3135	-0.1532	-0.2311	0.1780	0.3465
q13_3	-0.1413	0.2446	0.3744	0.4821	0.0582	0.0269	-0.4964	-0.0095	0.1534	0.2448	-0.4399
q13_4	-0.1453	0.3174	-0.4023	0.5591	-0.2528	-0.0771	0.3006	0.1641	-0.1596	-0.2938	0.0868
q14_1	0.5274	0.3850	0.2606	0.1275	0.1080	0.0301	-0.0369	0.1035	-0.2733	-0.1055	0.0142
q14_2	0.6048	0.1924	0.1168	-0.0239	-0.0479	0.0974	-0.1643	0.0673	-0.0874	-0.2538	-0.0640
q14_3	0.4931	0.4209	0.2845	0.0203	0.2204	-0.0838	-0.0142	0.1614	-0.1157	0.0200	0.1295
q15_1	-0.0469	0.4976	0.4227	-0.1253	-0.3010	-0.0477	0.1136	-0.1714	0.0292	0.2142	0.1923
q15_2	-0.1532	0.4185	0.3892	-0.1548	-0.2961	-0.0087	0.1738	-0.0257	-0.0918	0.2426	0.0844
q16_1	0.0609	-0.5838	0.4627	-0.2871	0.2059	-0.3824	-0.0704	0.0629	-0.1005	0.0572	-0.1846
q16_2	0.1769	0.5863	-0.5673	-0.2553	-0.0877	-0.1713	0.1392	-0.1502	-0.1094	0.0673	-0.1931
q16_3	0.0292	-0.1561	0.0976	0.6720	-0.1469	0.2725	0.0631	-0.5236	0.0028	-0.0005	0.2733
q16_4	-0.3481	0.1257	0.0675	-0.0378	0.0196	0.4138	-0.1681	0.7039	0.2718	-0.1628	0.1910
q17_1	-0.0153	0.5436	0.1629	-0.3322	0.2668	0.2810	-0.0665	-0.3262	0.3540	-0.3452	-0.0007
q17_2	-0.0208	-0.5889	0.4794	0.2868	-0.0469	-0.3402	-0.0345	0.0957	-0.1820	-0.1320	0.2142
q17_3	-0.1018	0.4253	-0.5842	0.0807	-0.0187	-0.5672	-0.0618	0.1137	0.0943	0.1325	-0.0135
q17_4	0.1413	-0.4074	-0.1045	-0.0153	-0.2289	0.6173	0.1728	0.1479	-0.2960	0.3919	-0.2132
q18_1	0.4432	-0.1090	-0.0101	-0.0216	-0.2782	-0.3066	-0.1466	0.1012	0.1757	0.0856	0.1338
q18_2	0.8040	-0.1639	-0.1759	-0.0530	-0.2526	-0.0688	-0.2019	-0.0201	0.1876	-0.0608	0.0749
q18_3	0.5823	-0.0310	-0.1812	0.0050	-0.3557	0.0876	-0.1379	0.0389	0.0610	0.2073	0.1791
q18_4	0.7677	-0.1349	-0.1112	0.0170	-0.2750	0.1760	-0.1530	0.0140	0.1695	-0.0488	-0.0084
q18_5	0.1993	0.1695	0.2063	-0.1712	-0.3988	0.0569	0.0809	0.0202	-0.0853	-0.2760	-0.2712
q18_6	0.7592	-0.1559	-0.1049	-0.0082	-0.0630	-0.0404	-0.0833	-0.0344	0.0422	-0.0950	-0.0880

Variable	Factor12	Factor13	Factor14	Factor15	Factor16	Factor17	Factor18	Factor19	Factor20	Factor21	Factor22
q11_1	-0.2199	-0.0688	0.0049	-0.1006	-0.0516	-0.0603	0.1020	0.0180	0.0615	0.0548	-0.0005
q11_2	0.3319	-0.0455	0.0318	-0.0998	-0.0952	-0.1186	0.0926	0.0001	-0.0600	-0.0216	-0.0158
q11_3	0.0619	-0.0620	-0.0886	-0.0439	-0.1633	-0.0908	0.1710	-0.0154	-0.0240	0.0223	0.0072
q11_4	-0.0794	-0.1089	-0.0900	0.2775	0.0266	0.0870	0.0600	-0.1100	-0.0582	0.0126	0.0054
q12_1	0.0159	0.0140	0.0596	0.0818	-0.0056	-0.0576	-0.0819	-0.0638	0.0132	0.0661	-0.0047
q12_2	0.2261	0.1185	0.0831	0.2028	-0.1329	-0.0496	-0.0170	-0.1374	0.1074	-0.0079	0.0082
q12_3	-0.0650	0.1657	0.0713	-0.1272	-0.0303	-0.0429	-0.0717	-0.0112	0.1100	-0.0443	0.0004
q12_4	0.1261	0.1818	-0.0013	-0.2245	-0.0609	0.1377	-0.0291	-0.0621	-0.1290	0.0326	0.0006
q12_5	0.2103	-0.0431	-0.0177	-0.0892	0.1428	-0.0005	0.0528	0.0712	-0.0439	-0.0063	0.0090
q12_6	-0.0142	-0.2133	-0.0838	0.1177	0.1033	0.0641	0.0121	0.1562	0.1135	-0.0003	-0.0066
q13_1	-0.2343	-0.1824	0.0637	-0.0302	-0.1313	0.0144	0.0058	-0.0239	-0.0476	-0.0091	0.0012
q13_2	0.1941	0.0209	0.0914	0.0413	0.0417	-0.0019	-0.0599	0.0219	0.0341	0.0296	0.0012
q13_3	-0.0093	-0.0538	-0.0452	-0.1265	0.0157	-0.0087	-0.0256	0.0311	0.0066	-0.0097	0.0021
q13_4	0.0675	0.2315	-0.1128	0.1233	0.0831	-0.0044	0.0804	-0.0287	0.0103	-0.0097	-0.0047
q14_1	-0.0019	0.0097	0.1462	0.0826	-0.0745	0.0592	-0.0578	0.0105	-0.0164	-0.0790	0.0033
q14_2	-0.0313	-0.0536	0.1707	-0.0536	0.0497	0.2779	-0.0801	-0.0592	-0.0040	0.0050	-0.0054
q14_3	-0.1158	0.0255	0.0064	0.0847	0.1453	-0.1047	-0.0816	-0.0265	-0.0907	0.0269	-0.0040
q15_1	0.1422	0.0157	-0.1465	0.1125	-0.0588	0.1647	0.0334	0.0137	-0.0381	-0.0054	-0.0015
q15_2	0.0425	0.0787	-0.0650	-0.1238	0.0709	0.1637	0.0527	0.0895	0.0444	0.0126	0.0118
q16_1	-0.0518	0.3016	0.0032	0.0792	0.0533	0.0442	0.0861	0.0619	-0.0031	0.0033	-0.0054
q16_2	0.0150	-0.2057	-0.1912	-0.0774	0.0394	-0.0111	-0.0795	-0.1178	-0.0047	-0.0084	0.0006
q16_3	-0.0556	-0.0281	0.2367	-0.0281	-0.0309	-0.0358	-0.0203	0.0605	0.0123	0.0013	-0.0001
q16_4	0.1073	-0.0751	-0.0094	0.0347	-0.0864	-0.0016	0.0202	0.0127	-0.0034	0.0056	0.0061
q17_1	-0.0772	0.2090	-0.0548	-0.0538	0.0702	-0.0454	0.0221	-0.0221	-0.0094	-0.0155	0.0014
q17_2	0.1868	-0.1279	-0.1778	-0.1017	0.0013	-0.0108	-0.1320	-0.0430	0.0711	0.0068	-0.0008
q17_3	-0.0300	-0.0469	0.2262	0.0535	-0.1539	0.0490	0.0580	0.1056	-0.0259	0.0198	0.0005
q17_4	-0.0822	-0.0501	0.0229	0.1143	0.0747	0.0128	0.0573	-0.0357	-0.0390	-0.0099	-0.0012
q18_1	-0.0041	-0.0942	0.1438	-0.0692	0.2438	-0.0974	0.1143	-0.0486	-0.0305	-0.0175	0.0051
q18_2	0.0763	-0.0823	-0.0351	-0.0117	0.0223	0.0430	0.1302	-0.0179	0.0619	-0.0449	-0.0049
q18_3	-0.2193	0.1472	-0.1556	0.0046	-0.0561	-0.1090	-0.0886	0.0605	-0.0169	-0.0149	0.0044
q18_4	-0.0367	0.0821	-0.0699	-0.0352	-0.0347	0.0577	0.0573	-0.0141	0.0959	0.0627	-0.0030
q18_5	0.2521	-0.0142	0.1751	0.0834	0.1059	-0.0799	-0.0701	0.0760	-0.0084	0.0384	0.0049
q18_6	0.0663	-0.0106	-0.1797	0.1071	-0.0835	-0.0262	-0.0995	0.1902	-0.0820	-0.0040	0.0001

Variable	Uniqueness
q11_1	0.4691
q11_2	0.5559
q11_3	0.4663
q11_4	0.4953
q12_1	0.4133
q12_2	0.5581
q12_3	0.3841
q12_4	0.2955
q12_5	0.3163
q12_6	0.4646
q13_1	-0.0029
q13_2	-0.0041
q13_3	-0.0031
q13_4	-0.0032
q14_1	0.3314
q14_2	0.3380
q14_3	0.3162
q15_1	0.2490
q15_2	0.3605
q16_1	-0.0021
q16_2	-0.0018
q16_3	-0.0022
q16_4	-0.0017
q17_1	-0.0019
q17_2	-0.0017
q17_3	-0.0034
q17_4	-0.0037
q18_1	0.4119
q18_2	0.0992
q18_3	0.2725
q18_4	0.1831
q18_5	0.4022
q18_6	0.2472

**Extracting factors with eigen > 1 (factors = 10)

```
. factor q11_1- q18_6, factor(10)
(obs=93)
(collinear variables specified)
```

```
Factor analysis/correlation          Number of obs   =      93
Method: principal factors           Retained factors =      10
Rotation: (unrotated)              Number of params =     285
```

Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor1	4.70047	1.10272	0.1942	0.1942
Factor2	3.59776	0.72737	0.1486	0.3429
Factor3	2.87039	0.65373	0.1186	0.4614
Factor4	2.21666	0.36384	0.0916	0.5530
Factor5	1.85283	0.27006	0.0766	0.6296
Factor6	1.58276	0.22890	0.0654	0.6950
Factor7	1.35386	0.15380	0.0559	0.7509
Factor8	1.20006	0.10400	0.0496	0.8005
Factor9	1.09605	0.01048	0.0453	0.8458
Factor10	1.08557	0.20033	0.0449	0.8906
Factor11	0.88524	0.27783	0.0366	0.9272
Factor12	0.60741	0.11376	0.0251	0.9523
Factor13	0.49366	0.05737	0.0204	0.9727
Factor14	0.43629	0.05441	0.0180	0.9907
Factor15	0.38188	0.09618	0.0158	1.0065
Factor16	0.28570	0.03385	0.0118	1.0183
Factor17	0.25185	0.05801	0.0104	1.0287
Factor18	0.19384	0.02462	0.0080	1.0367
Factor19	0.16922	0.05856	0.0070	1.0437
Factor20	0.11067	0.08187	0.0046	1.0483
Factor21	0.02880	0.02785	0.0012	1.0495
Factor22	0.00095	0.00095	0.0000	1.0495
Factor23	0.00000	0.00000	0.0000	1.0495
Factor24	0.00000	0.00000	0.0000	1.0495
Factor25	-0.00000	0.04010	-0.0000	1.0495
Factor26	-0.04010	0.03900	-0.0017	1.0479
Factor27	-0.07910	0.03392	-0.0033	1.0446
Factor28	-0.11302	0.03899	-0.0047	1.0399
Factor29	-0.15201	0.02072	-0.0063	1.0336
Factor30	-0.17273	0.02391	-0.0071	1.0265
Factor31	-0.19664	0.00481	-0.0081	1.0184
Factor32	-0.20145	0.04208	-0.0083	1.0101
Factor33	-0.24354	.	-0.0101	1.0000

```
LR test: independent vs. saturated: chi2(528) = . Prob>chi2 = .
```

Factor loadings (pattern matrix) and unique variances

Variable	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8	Factor9	Factor10
q11_1	0.3567	0.3468	0.1405	0.0294	0.1746	0.0234	-0.0119	0.1099	-0.3617	-0.0342
q11_2	0.1192	0.2986	0.3209	-0.1185	0.0060	0.1346	-0.0059	0.0056	0.0163	0.2067
q11_3	0.4478	0.1695	0.1934	0.0653	0.1783	0.0364	-0.0010	-0.1230	-0.2945	-0.2020
q11_4	0.1415	0.0287	0.2118	0.2796	0.3434	-0.0807	-0.2367	-0.0875	0.0798	0.1079
q12_1	0.2267	0.3480	0.3411	0.1641	-0.0771	-0.0706	0.2690	0.0541	0.3177	0.2331
q12_2	0.3897	-0.1641	-0.0277	-0.0088	0.0978	-0.0343	0.0906	-0.1089	0.1121	0.1077
q12_3	0.4236	0.3171	0.0722	0.0107	0.2731	-0.0549	0.2279	0.2533	-0.0108	0.2348
q12_4	0.3632	-0.3140	-0.3894	0.2572	0.2605	0.0944	0.1298	0.0632	0.0882	0.0748
q12_5	0.4660	-0.1756	-0.0659	0.1960	0.4171	-0.0125	0.3453	0.0076	0.1051	0.0553
q12_6	0.1666	0.0755	-0.1405	0.1000	0.4819	0.1563	0.2540	0.0009	0.1658	0.0214
q13_1	0.2141	-0.4415	0.3688	-0.4350	-0.0953	-0.0836	0.4937	-0.0009	0.2145	-0.1299
q13_2	0.0624	-0.0979	-0.3850	-0.5945	0.2945	0.1390	-0.3135	-0.1532	-0.2311	0.1780
q13_3	-0.1413	0.2446	0.3744	0.4821	0.0582	0.0269	-0.4964	-0.0095	0.1534	0.2448
q13_4	-0.1453	0.3174	-0.4023	0.5591	-0.2528	-0.0771	0.3006	0.1641	-0.1596	-0.2938
q14_1	0.5274	0.3850	0.2606	0.1275	0.1080	0.0301	-0.0369	0.1035	-0.2733	-0.1055
q14_2	0.6048	0.1924	0.1168	-0.0239	-0.0479	0.0974	-0.1643	0.0673	-0.0874	-0.2538
q14_3	0.4931	0.4209	0.2845	0.0203	0.2204	-0.0838	-0.0142	0.1614	-0.1157	0.0200
q15_1	-0.0469	0.4976	0.4227	-0.1253	-0.3010	-0.0477	0.1136	-0.1714	0.0292	0.2142
q15_2	-0.1532	0.4185	0.3892	-0.1548	-0.2961	-0.0087	0.1738	-0.0257	-0.0918	0.2426
q16_1	0.0609	-0.5838	0.4627	-0.2871	0.2059	-0.3824	-0.0704	0.0629	-0.1005	0.0572
q16_2	0.1769	0.5863	-0.5673	-0.2553	-0.0877	-0.1713	0.1392	-0.1502	-0.1094	0.0673
q16_3	0.0292	-0.1561	0.0976	0.6720	-0.1469	0.2725	0.0631	-0.5236	0.0028	-0.0005
q16_4	-0.3481	0.1257	0.0675	-0.0378	0.0196	0.4138	-0.1681	0.7039	0.2718	-0.1628
q17_1	-0.0153	0.5436	0.1629	-0.3322	0.2668	0.2810	-0.0665	-0.3262	0.3540	-0.3452
q17_2	-0.0208	-0.5889	0.4794	0.2868	-0.0469	-0.3402	-0.0345	0.0957	-0.1820	-0.1320
q17_3	-0.1018	0.4253	-0.5842	0.0807	-0.0187	-0.5672	-0.0618	0.1137	0.0943	0.1325
q17_4	0.1413	-0.4074	-0.1045	-0.0153	-0.2289	0.6173	0.1728	0.1479	-0.2960	0.3919
q18_1	0.4432	-0.1090	-0.0101	-0.0216	-0.2782	-0.3066	-0.1466	0.1012	0.1757	0.0856
q18_2	0.8040	-0.1639	-0.1759	-0.0530	-0.2526	-0.0688	-0.2019	-0.0201	0.1876	-0.0608
q18_3	0.5823	-0.0310	-0.1812	0.0050	-0.3557	0.0876	-0.1379	0.0389	0.0610	0.2073
q18_4	0.7677	-0.1349	-0.1112	0.0170	-0.2750	0.1760	-0.1530	0.0140	0.1695	-0.0488
q18_5	0.1993	0.1695	0.2063	-0.1712	-0.3988	0.0569	0.0809	0.0202	-0.0853	-0.2760
q18_6	0.7592	-0.1559	-0.1049	-0.0082	-0.0630	-0.0404	-0.0833	-0.0344	0.0422	-0.0950

Variable	Uniqueness
q11_1	0.5567
q11_2	0.7184
q11_3	0.5534
q11_4	0.6500
q12_1	0.4427
q12_2	0.7654
q12_3	0.4657
q12_4	0.4407
q12_5	0.4017
q12_6	0.5877
q13_1	0.1112
q13_2	0.1719
q13_3	0.2135
q13_4	0.1048
q14_1	0.3790
q14_2	0.4677
q14_3	0.4027
q15_1	0.3740
q15_2	0.4401
q16_1	0.1480
q16_2	0.1426
q16_3	0.1396
q16_4	0.0613
q17_1	0.0619
q17_2	0.1618
q17_3	0.0956
q17_4	0.0765
q18_1	0.5498
q18_2	0.1443
q18_3	0.4256
q18_4	0.2185
q18_5	0.6070
q18_6	0.3637

. Oblique rotation showing only factor loadings greater than 40%
rotate, promax horst blank(0.4)

Factor analysis/correlation	Number of obs =	93
Method: principal factors	Retained factors =	10
Rotation: oblique promax (Kaiser on)	Number of params =	285

Factor	Variance	Proportion	Rotated factors are correlated
Factor1	4.10298	0.1695	
Factor2	3.26337	0.1348	
Factor3	2.84323	0.1175	
Factor4	2.52687	0.1044	
Factor5	2.43990	0.1008	
Factor6	2.08855	0.0863	
Factor7	1.99094	0.0823	
Factor8	1.95101	0.0806	
Factor9	1.79955	0.0744	
Factor10	1.56595	0.0647	

LR test: independent vs. saturated: chi2(528) = . Prob>chi2 = .

Rotated factor loadings (pattern matrix) and unique variances

Variable	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8	Factor9	Factor10
q11_1		0.6823								
q11_2				0.4367						
q11_3		0.6192								
q11_4								0.5052		
q12_1				0.6139						
q12_2										
q12_3					0.4450					
q12_4					0.5414					
q12_5					0.7053					
q12_6					0.6312					
q13_1			-0.5244					-0.6036		
q13_2							-0.8890			
q13_3								0.8489		
q13_4			0.4637				0.7170			
q14_1		0.7314								
q14_2	0.4107	0.4939								
q14_3		0.6003								
q15_1				0.7401						
q15_2				0.6967						
q16_1			-0.9127							
q16_2			0.5983			-0.4558				
q16_3						0.4983				0.4505
q16_4										-0.9614
q17_1									-0.8801	
q17_2			-0.8046							
q17_3						-0.8676				
q17_4						0.6822			0.6695	
q18_1	0.6477									
q18_2	0.9255									
q18_3	0.7227									
q18_4	0.8566									
q18_5										
q18_6	0.6445									

Variable	Uniqueness
q11_1	0.5567
q11_2	0.7184
q11_3	0.5534
q11_4	0.6500
q12_1	0.4427
q12_2	0.7654
q12_3	0.4657
q12_4	0.4407
q12_5	0.4017
q12_6	0.5877
q13_1	0.1112
q13_2	0.1719
q13_3	0.2135
q13_4	0.1048
q14_1	0.3790
q14_2	0.4677
q14_3	0.4027
q15_1	0.3740
q15_2	0.4401
q16_1	0.1480
q16_2	0.1426
q16_3	0.1396
q16_4	0.0613
q17_1	0.0619
q17_2	0.1618
q17_3	0.0956
q17_4	0.0765
q18_1	0.5498
q18_2	0.1443
q18_3	0.4256
q18_4	0.2185
q18_5	0.6070
q18_6	0.3637

(blanks represent $\text{abs}(\text{loading}) < .4$)

Factor rotation matrix

	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8	Factor9	Fact~10
Factor1	0.8881	0.6279	-0.0633	0.1005	0.5050	0.0640	-0.0787	-0.1749	-0.0298	0.2261
Factor2	-0.0760	0.2152	-0.6499	0.5653	-0.1355	0.3549	0.1959	0.2307	-0.3775	-0.1487
Factor3	-0.1688	0.5004	0.5866	0.5251	-0.1341	-0.4130	0.0510	0.1127	-0.3463	-0.1522
Factor4	-0.0358	0.0480	0.1473	-0.2891	0.1211	0.1238	0.7813	0.6639	0.2743	0.2320
Factor5	0.0085	-0.0088	0.4058	-0.0079	0.0681	0.7800	-0.1599	0.0024	-0.0431	-0.3311
Factor6	-0.3135	0.2069	-0.1480	-0.1976	0.6114	-0.1027	-0.3284	0.2324	-0.2522	-0.0658
Factor7	-0.1628	-0.0528	0.0116	0.2494	0.4195	0.0472	0.2833	-0.5695	0.0872	0.1423
Factor8	0.0057	0.1557	-0.1112	0.0227	0.0767	-0.2355	0.0565	-0.0864	0.3761	-0.7991
Factor9	0.2256	-0.4426	-0.0725	0.1791	0.2806	-0.0526	0.1168	0.1112	-0.4344	-0.2712
Factor10	-0.0008	-0.2024	0.0586	0.4208	0.2342	-0.0682	-0.3345	0.2541	0.5081	0.0598

*****Calculating factor scores

predict factor1-factor10
(regression scoring assumed)

Scoring coefficients (method = regression; based on promax(3) rotated factors)

Variable	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8	Factor9	Factor10
q11_1	-0.02573	0.18756	0.00005	0.00872	-0.00074	0.01119	-0.00889	0.01284	-0.01336	-0.01421
q11_2	-0.01510	0.04374	-0.00928	0.09841	0.01693	-0.02141	0.03133	-0.05291	0.00352	0.02010
q11_3	-0.02553	0.16521	0.00211	-0.03772	-0.00841	0.02226	-0.02802	0.01097	0.01185	0.02514
q11_4	0.00275	0.02496	-0.02860	-0.02041	0.08437	-0.02185	-0.00449	0.05531	-0.04623	0.04889
q12_1	0.04309	0.00258	-0.00977	0.16317	0.11960	-0.02386	-0.03146	0.00574	0.02629	-0.01168
q12_2	0.01407	-0.02154	-0.01352	0.02810	0.08398	0.00014	0.04894	0.01028	-0.03235	-0.00257
q12_3	0.01031	0.10115	0.02111	0.12293	0.18450	-0.00267	-0.03589	0.00305	0.07711	-0.03929
q12_4	0.05823	-0.05554	-0.03872	-0.07145	0.22430	0.00681	-0.01705	0.00996	0.00450	0.00948
q12_5	0.00173	0.02953	0.00505	0.03476	0.33158	-0.02485	0.02157	0.02908	0.01876	-0.03226
q12_6	-0.04968	0.00814	-0.04930	-0.02372	0.18423	-0.02979	0.00442	0.02433	-0.04284	0.00693
q13_1	0.04574	-0.12187	-0.20690	0.09256	0.22993	0.00866	0.08110	-0.94522	-0.15822	0.04640
q13_2	-0.06871	0.07019	0.10852	-0.23586	0.00660	-0.00959	-0.54437	-0.50128	0.09553	0.14942
q13_3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
q13_4	-0.12702	0.16639	0.20518	-0.32508	-0.03423	-0.08226	0.38706	-0.68359	0.16259	0.12881
q14_1	0.03696	0.27957	-0.02824	0.03755	0.00377	-0.00699	-0.02414	-0.01965	-0.04400	0.00049
q14_2	0.01515	0.19040	0.02390	-0.06614	-0.07442	0.00760	0.06686	-0.02917	-0.00907	-0.04367
q14_3	0.05332	0.19379	-0.03345	0.11457	0.09776	-0.07767	0.02973	0.08469	0.02973	-0.06355
q15_1	-0.01038	-0.02710	-0.00710	0.35135	-0.06786	0.03773	-0.02787	0.08953	-0.01618	-0.00157
q15_2	-0.02029	0.01980	0.01733	0.19094	-0.07075	-0.03627	0.02460	-0.07931	0.04289	0.00154
q16_1	-0.01675	-0.06902	-0.54977	-0.07911	0.02947	0.04163	-0.03214	0.19851	0.02855	-0.13238
q16_2	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
q16_3	0.03107	-0.20810	-0.03168	-0.13390	0.03594	0.48248	0.32944	0.43416	-0.08061	0.22623
q16_4	-0.00945	-0.11177	-0.11984	-0.03648	0.02130	0.18117	0.10208	0.22335	-0.02525	-0.88701
q17_1	0.01990	-0.07020	0.39636	0.18092	0.17579	0.21083	-0.25115	-0.11984	-0.67964	-0.14066
q17_2	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
q17_3	0.04901	-0.20008	0.32396	0.14443	0.19693	-0.47066	-0.14284	0.03190	0.11310	-0.10134
q17_4	0.05786	-0.11139	0.49255	0.20726	0.21120	0.40963	-0.34457	-0.16752	0.39742	-0.18953
q18_1	0.04745	-0.01701	-0.02461	0.05105	-0.03995	-0.03543	0.01668	0.00080	0.00960	-0.04251
q18_2	0.47459	-0.02839	-0.05458	-0.04170	0.00352	0.02696	-0.02602	0.03410	-0.08520	0.04334
q18_3	0.11766	-0.02727	-0.03219	0.07098	-0.04783	-0.09156	0.00120	0.02313	0.08029	-0.02554
q18_4	0.22612	0.03917	0.04872	-0.02568	0.00723	0.01291	0.00801	-0.02206	0.02211	-0.01263
q18_5	0.07659	0.04073	-0.04636	0.04237	-0.14675	0.02539	0.03561	-0.11446	-0.09027	0.01442
q18_6	0.11636	0.07763	0.07476	-0.08697	0.05943	0.09919	0.02425	-0.03586	-0.03332	0.02304