Determinants of Packaged Software Discontinuance Intentions: An Empirical Study of South African Managers' Perceptions

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DECLARATION

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ABSTRACT

Information systems discontinuance at the organisational level is an underrepresented research topic. However, it is an important problem in practice. The managerial decision to discontinue an existing information system by replacement, upgrade or abandonment requires extensive justification and evaluation. The timing of a system's discontinuance is of strategic concern as the cost and impact of a packaged software application can be extensive. If the decision is made too early in the system's life cycle, it can negatively affect the return on investment, but if the decision occurs too late, the system may become a liability to an organisation as it continues to consume resources in maintenance and support.

A comprehensive framework is required that analyses the factors that determine discontinuance intentions of the decision makers within an organization. This study focuses on managerial perceptions of selected factors considered most important to discontinuance decisions. The study applies and extends the discontinuance framework proposed by Furneaux and Wade (2011) to develop a research model of the effects of these selected factors on organisational intentions to discontinue packaged software. Specifically, the research model hypothesizes the effects of 'change' forces that include the manager's perceptions of system performance, system suitability and system supportability, as well as 'inertia' forces such as sunk cost, mimetic isomorphism and degree of the application's integration into the enterprise architecture. The organisation's ability to innovate, the age of the system and the presence of the initial sponsor are included as additional factors.

To test the model, a survey methodology was employed to collect data from South African IT decision makers. The survey made use of a structured questionnaire instrument administered online. Useable data was collected from decision makers representing 103 organisations. Hypotheses were tested using regression and partial least squares structural modeling.

Results showed that poor software performance, a lack of suitability and low levels of business and technical integration, were the strongest determinants of discontinuance intentions. The control effect of the software's age relatively to the organisation's portfolio of applications was proven to be significant in this research. This study has contributed by consolidating the effects of a number of factors drawn from the literature and developing an integrated framework of discontinuance. Results will help IT decision makers when considering a discontinuance decision by showing the relative effects of each factor and may be helpful to IT managers to determine the timing of the decision.

Keywords: Discontinuance, packaged software, manager's intentions, systems replacement, organisational study, partial least squares.

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CHAPTER 1. INTRODUCTION TO PACKAGED SYSTEM DISCONTINUANCE

1.1 Background

The information system life cycle and in particular the packaged software system cycle, starts with planning and requirements gathering and moves through phases of customisation, integration and implementation before moving into a period of operational stability (Heales, 2002). Environmental and technological changes will necessitate ongoing maintenance of the system and its underlying IT infrastructure. Overtime employees gain technical and user skills in the operating the packaged software. This period of operation not only requires maintenance of the system, but it also includes managing the system by continually reviewing the benefits provided (Rubin, 2004). Based on the outcome of this review process, managers balance their maintenance effort to be in proportion to how long they believe the system will continue to be of benefit (Swanson and Dans, 2000).

The value that an information system brings to an organisation is difficult to quantify (Murphy and Simon, 2002). The tangible benefits can be measured using a cost-benefit ratio such as return on Investment (ROI) (Rubin, 2004), net present value (NPV) and internal rate of return (IRR) (Martinsons, Davis and Tse, 1999). The intangible benefits from an information system are more difficult to identify and measure (Murphy and Simon, 2002). The intangible or non-financial benefits measured at the organisational level include customer service benefits, improved internal information flow, scalable business processes and IT readiness for business opportunities.

All information systems however have a finite lifespan and at a point in every information system's life cycle, an end-of-life decision must be made. Senior executives and IT managers must routinely decide whether to continue using the system or to make a discontinuance decision.

Discontinuance is defined as the organisational decision to complete a major software upgrade; or to replace the software with an information system providing the same functionality; or to abandon the software entirely (Furneaux and Wade, 2011). A major system upgrade is where an installed version of software is replaced with a newer version of the same product and this requires a data migration and does not leave existing customer preferences intact (Microsoft Support, 2011).

An example of a typical discontinuance decision includes when an ageing packaged system becomes unreliable, the software is no longer supported, the system may be unable to fulfill changing business requirements and it may be difficult to integrate the system with newer systems in the organisation. A discontinuance decision on an integrated enterprise-wide system, such as an ERP system, may necessitate a change in other systems and related business processes (Beatty and Williams, 2006). Moreover, information systems are usually defined in relation to a portfolio of

other systems and business processes. Discontinuance decisions are therefore difficult and complex decisions on which organisations need guidance (Swanson and Dans, 2000). These discontinuance decisions may often be based only on senior management's intuition or simplified financial calculations (Saarelainen, Ahonen, Lintinen, Koskinen, Kankaanpää, Sivula, Juutilainen and Tilus, 2006).

The timing of a system's discontinuance is of strategic concern. If the decision is made too early in the system's life cycle, it can negatively affect the return on investment (Heales, 2002) and user change management (Coakes and Elliman, 1999), but if the decision occurs too late, the system may become a liability to an organisation and future IT development will be constrained by resources being consumed by maintenance and support (Zmud, 1999). For example, American Comair Airline delayed the upgrade of an existing crew management system which eventually crashed, causing a $20 million loss and stranding over two hundred thousand travelers in December of 2004 (Overby, 2005).

Sawyer (2000) defines packaged software as 'all software licensed (or sold) as a tradable product' and proprietary software as 'made-to-order systems and are typically built for specific users'. Proprietary software maybe developed in-house or outsourced to an external development house. Packaged software and proprietary software should be considered separately as there is a distinct difference in the maintenance activities for the two software types and differences with the role players. In the case of packaged software, the software version is replaced during a major upgrade event while proprietary software receives ongoing corrective, adaptive and perfective maintenance throughout its lifespan (Khoo and Robey, 2007). Proprietary software maintenance usually only targets specific software functions with each iteration, while packaged changes include the entire software version. The role players differ in that only packaged software has IT vendors who are a strong driver for system upgrades and for standardisation of software across industries (Beatty and Williams, 2006). Richmond, Nelson and Misra (2006) found that packaged software solutions have an expected remaining life span significantly longer than that of proprietary software.

The focus of this research is packaged software. For the purposes of this study however, references to information systems is synonymous to packaged software. Discontinuance of proprietary systems and for that matter rented software, software components of enterprise systems and software as a service (SaaS) may be subject to different factors.

Unfortunately, while there is a large body of information systems research on the adoption of new information systems by organisations (e.g. Teo, Wei and Benbasat, 2003), organisational system discontinuance is an underrepresented topic within Information Systems research (Furneaux and

Wade, 2011). This study addressed this gap by examining the factors that determine managerial intentions to discontinue a packaged software system.

1.2 Research problem

Senior managers in organisations require assistance in planning the discontinuance of key information systems to ensure the return on investment is maximized and discontinuance occurs prior to the system becoming a liability to the organisation. A key factor of success is when to take the decision to discontinue and replace an information system to prevent the situation of 'application sprawl' and high maintenance costs on unreliable legacy systems.

The study of information systems discontinuance is currently under-represented in the literature where most efforts are focused on identifying factors relevant to discontinuance and where many of these are focused on the technical perspective of the systems that cause discontinuance and replacement decisions (e.g. Foster, 1993). However, there are few empirical efforts examining business and managerial factors for their effects on discontinuance intentions. A comprehensive framework is thus required that analyses the factors that determine discontinuance intentions of the decision makers within an organisation. For example, the business value of a packaged information system is key to determining the optimum time to discontinue the system so as to derive maximum benefit from it. User feedback on system suitability is likely to be another important factor. Furneaux and Wade's (2011) framework represents the most comprehensive effort in this area. Their framework describes both the forces that drive discontinuance and promote change and the forces that undermine discontinuance and promote inertia. Organisational decision makers must balance these opposing forces when making a discontinuance decision. However, Furneaux and Wade's framework does not consider the factors of organizations conforming to software industry standards , the system's age, the presence of the original sponsor and the organisation's propensity to innovate, which are argued could be important. These additional factors require empirical validation and this is where the present study comes in.

1.3 Aims and objectives

This study aims to draw on and extend the discontinuance framework proposed by Furneaux and Wade (2011). It develops and tests a set of hypotheses of the effects of selected organisational and IS related determinants of South African managers' discontinuance intentions towards packaged software. These factors are divided into the organisation's internal and external 'change forces' and the 'inertia' forces promoting system continuance.

The research hypotheses are tested using a survey methodology. This required that the variables hypothesized in the research model were operationalised from the literature drawing on known theories and frameworks and a questionnaire instrument developed. The research model was tested by collecting data via the questionnaire instrument from a sample of IT decision makers in South African Organisations. Regression and partial least squares analysis were used to determine if a significant relationship exists between the dependent discontinuance measure and the independent variables representing various 'change' and 'inertia or continuance' factors.

1.4 Importance and contributions of the research

1.4.1 Importance to academic research

The value of the report for academia includes the advancement of the understanding of discontinuance intentions. As far as the author is aware there has not been a study on discontinuance of package software in a South African context. The paper extends the Furneaux and Wade's (2011) framework and thereby extending or expanding the understanding of the factors influencing end-of-life decisions. In particular, factors drawn from Institutional Theory (DiMaggio and Powell, 1983), Information Systems Success Model (Delone and Mclean, 2003) and Diffusion of Innovation Theory (Roger, 1995) are used to extend the framework.

In so doing, this study addresses an under-researched topic as most information systems' organisational studies have focused on adoption and less is known about discontinuance (Furneaux and Wade, 2010). This study considers the additional factors to determine whether discontinuance intentions are mostly rational and tdriven by: considerations of performance and suitability relative to the availability and cost of software support; business and technical architecture (e.g. business process and system integration); political forces (e.g. driven by the presence of the initial sponsors); or based on external pressures (e.g. mimetic pressures to conform to industry standards).

Geri and Naor-Elaiza (2008) point out that understanding the factors that affect continued use or discontinuance of an information system beyond initial adoption is one of the most challenging issues in information systems research.

1.4.2 Importance in practice

In the modern era of technological and communication advancements the adoption of new packaged software systems is dependent on the discontinuance of an existing system. Therefore the results of this study may benefit senior IT managers who face increasing pressure to consider whether to discontinue systems. The proposed model highlighted which factors managers should consider in their decision processes.

The discontinuance intention study could be viewed from the system perspective as the intention to discontinue an 'unsuccessful' system, which in the terms of this study means evaluating the software's performance and suitability. This study considers further practical factors including the availability and cost of support, software integration into the business and systems' architecture, pressure to conform to software industry standards and the effects of spent implementation and operating cost. Results of this study provided managers with an understanding of the relative effects of these different factors on the discontinuance decisions within their organisations.

The proposed discontinuance framework guides stakeholders to determine the optimal timing of a discontinuance decision. The stakeholders are defined as IS Managers, Business Managers and IT Vendors (Furneaux and Wade, 2011). Business Managers require an understanding of the framework to value the IT impact of a business strategy change and to plan for long term IT flexibility as systems age and the volatility index increases (Heales, 2002). IS Managers can use the framework to identify and evaluate the factors within and outside of their control. The proposed model of discontinuance intentions forms a framework that can aid decision makers in reducing the complexity of determining a system's life expectancy. IS Vendors can use this framework to ensure they predict when a customer may discontinue a system early and when to sell an upgrade or a replacement system into a customer's environment.

1.5 Delimitations and assumptions

The study focuses on discontinuance intentions and not actual discontinuance. Swanson and Dans (2000) found that an organisation's management makes judgments on the remaining life expectancy of a system. This in turn changes the organisation efforts to maintain a system, inevitably leading to a discontinuance decision. The discontinuance intention is therefore the focus of this study as it precedes the discontinuance decision.

The type of the proposed end-of-life or discontinuance decision may however have an influence on the discontinuance intention. This study requested the manager's proposed discontinuance decision.

1.6 Structure of the report

This first chapter has described the background to the research into manager's package software discontinuance intentions. The research problem is that discontinuance is an under-researched topic and this study aims to test a set of hypotheses based on an extended Furneaux and Wade (2011) Discontinuance Framework. The chapter discussed both the practical and academic implications of the research and the details of the dependent variable, discontinuance intentions.

The second chapter commences with definitions of the key discontinuance terms. It reviews the background of reviewed literature of related case studies at an individual and an organisational level. Chapter 2 concludes with a detailed review of the empirical studies on discontinuance in order to provide context of the framework to be tested.

The theoretical underpinnings of the proposed discontinuance framework will be discussed in Chapter 3. This includes the detail of Furneaux and Wade's (2011) discontinuance framework including seven extensions for this research based on Institutional Theory Information Systems Success Model and Diffusion of Innovation Theory. Chapter 3 discusses each construct and dimension in detail and concludes each section with the discontinuance hypotheses that are to be tested in the empirical research.

Chapter 4 presents the research design and methodology for testing the study's hypotheses. This includes population sampling, the research instrument design, the data collection process and limitations of the study.

Chapter 5 presents the data analysis and findings of the research. Chapter 5 commences with the overall analysis of the empirical data, followed by the descriptive statistics. The chapter discusses exploratory and confirmatory factor analysis and concludes with the data analysis using partial least squares.

Chapter 6 discusses the findings and formulates conclusions, including recommendations for future research.

CHAPTER 2. LITERATURE REVIEW AND BACKGROUND

This chapter defines information systems discontinuance and the discontinuance outcomes of replacement, upgrade and abandonment. The chapter presents the software engineering view of discontinuance before discussing case studies of IS discontinuance at the individual and organisational levels. Past empirical studies of organisational discontinuance and the factors influencing discontinuance are discussed and gaps in the literature are identified.

2.1 Defining information systems discontinuance

Discontinuance is defined as 'the cessation of the use of an organisational information system' (Furneaux and Wade, 2011). Discontinuance intention is defined as 'a belief by those who are responsible for the decision to terminate ongoing use of a system that such use should, in fact, be terminated' (Furneaux and Wade, 2010).

The focus in this study is on the discontinuance intentions of decision makers with regards to a packaged or 'commercial off-the-shelf' software application. Khoo and Robey (2007) state that packaged software is a way for corporations to re-engineer their organisations without having the time and expense of developing proprietary software. Included in this study are systems with software that may have been purchased 'off-the-shelf' which may or may not have been customised or configured. The focus on packaged software is for three main reasons. Firstly, packaged software unlike other software types has defined events at intervals in its life-cycle, allowing IT decision makers to clearly identify the software being discontinued rather than the system functionality. Secondly, packaged software is relatively common so it will allow for a broad sample for this relatively new research topic. Thirdly, as packaged software is the most standardized category of software, this will allow for comparison to other packaged software studies.

Roger (1995) noted that there are two types of discontinuance namely replacement and disenchantment which occur at the last confirmation stage of innovation-decision processes. Replacement discontinuance is a decision to reject an idea in order to adopt a better idea and disenchantment discontinuance is a decision to reject an innovation as a result of dissatisfaction with its performance (Wangpipatwong, Chutimaskul and Papasratorn, 2008).

Furneaux and Wade (2011) have taken this further stating that there are three types of discontinuance decision, which are replacement, abandonment or upgrade of an existing information systems application.

Replacement as a form of discontinuance is defined for the purposes of this study as a situation where packaged software is discontinued and a replacement software application is brought in to provide for the lost functionality.

Abandonment as a form of discontinuance is defined by Furneaux and Wade (2011) as the clearest form of discontinuance (i.e. a situation within which the use of a software application is halted entirely without introducing a replacement).

Upgrade as a form of discontinuance is defined as situation within which an installed version of a software application is updated to a newer version of the same product but where such upgrade requires data migration and where user preferences are lost. These upgrades also often entail both technical upgrades as well as functional upgrades designed to deliver major improvements. Upgrades are therefore distinct from more frequent updates or patches that may be released to fix a specific problem (Microsoft Support, 2011). Ng (2001) also distinguishes between these two types of updates where a small scope update is simply within the series (i.e. 3.1 to 3.2) whilst a major upgrade is to a different series.

The initial literature relating to discontinuance focused on the software engineering factors determining the information system maintenance and replacement decision. These factors were within the control of the organisation's IT department and related to the system's software design, implementation and maintenance (Forster, 1993). Later research appears to have moved into qualitative studies at the individual and organisational level of factors that are external to the information system artifact (not within IT's control). These factors are external to the organisation and include competitive changes, the impact of regulation, system conformity pressures, software support, technology changes and changes in business strategy (Furneaux and Wade, 2010).

2.2 Software engineering view of discontinuance

Swanson and Beath (1989) found that the life expectancy of software can be more than 10 years. During this lifespan the application must be constantly maintained. Software maintenance is defined as the 'set of activities involved in making any change to operational software, for whatever reason' (Foster, 1993). These changes are needed to ensure software meets changing organisational requirements that arise, for example, from changes in business strategy. Frequent changes increase the maintenance complexity and decrease the maintenance productivity over time, eventually leading to a replacement decision.

The link between maintenance and software application's life span was investigated in two papers by Foster (1991 & 1993). Foster tested the view that software costs are high and rising as a proportion

of software expenditure. The widely held concept was that managers will remove old systems from their portfolio of systems to balance their maintenance expenditure as a proportion of total software expenditure. Foster's (1993) research found that the proportion of maintenance costs collected from various publications from 1969-1990, should be considered to be a constant at between 50 to 55% of software expenditure. Foster did not find enough publications to test the hypothesis that if there are improvements in the cost efficiency of the maintenance, this would lead to an increase in the life span of the software. Foster assumed that at a high level managers would make a rational decision based on the cost versus benefit of the software.

Chan, Chung and Ho (1996) reviewed ten applications for a period of seven years to understand the life expectancy of the software based on the premise that software deteriorates and maintenance productivity declines as the software ages. They examined the software deterioration and how this was influenced by factors that were within the control of the organisation. Chan et al. (1996) found that the rate of system deterioration can be slowed if the effort expended by a programmer to maintain code quality is high, a programmer's level of knowledge and skills is comprehensive and the absolute and marginal effort per unit of maintenance does not increase.

Six papers within a special issue of Communications for the Association of Information Systems, July 1999, focused attention on legacy systems and business process change. These papers reviewed legacy systems in terms of costs of maintenance, the technical problems of migrating complex legacy systems to new technology and the difficulties of designing and implementing novel business processes in the context of legacy systems (Holland and Light, 1999; Randall, Hughes, O'Brien et al., 1999). These studies showed through a number of case studies that 'legacy' issues are as much organisational issues as software engineering issues.

Kelly, Gibson, Holland, Light and Kawalek (1999) in their legacy system research appear to be the first to categorise the interaction between the legacy forces within a business model; the IT infrastructure; the strategic vision of the organisation and the business environment. Their research framework was used in the formulation of Furneaux and Wade's (2011) IS Discontinuance Framework, which in turn is the used as the basis of this research study. Kelly et al. (1999) define a replacement event being a misalignment between the strategic vision of the company and the old business processes and procedures that are built in to the legacy IT.

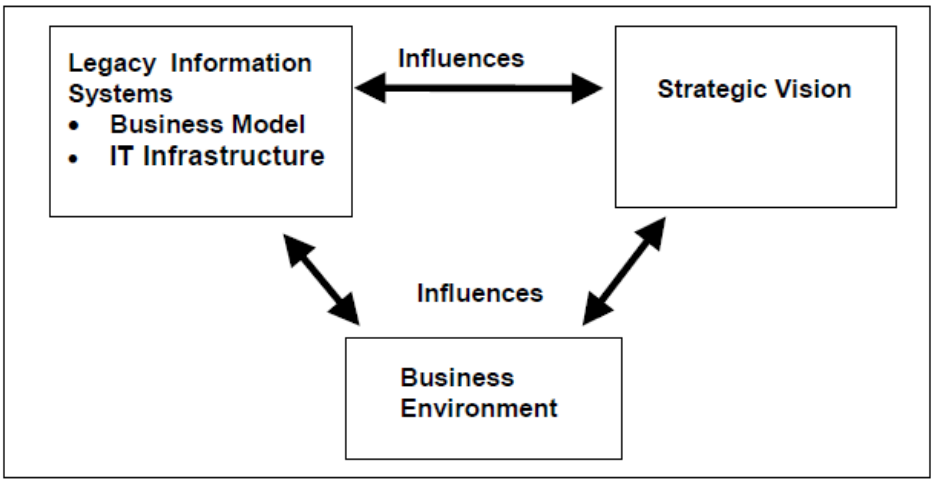

Figure 1: Legacy system research framework (Kelly et al., 1999)

Kelly et al. (1999) framework failed to incorporate the perspective of the stakeholders that have interest in that system. Coakes and Elliman (1999) highlight the influences of power, politics, resistance and influence within the organisation. Therefore, stakeholder views play an important role when organisations are evaluating system replacement and revision decisions.

Ng (2001) synthesized a decision framework for maintenance or upgrade (MU) decisions. This was using a case study of an enterprise resource planning (ERP) system in an Australian firm. The framework shows that decision to maintain, upgrade or even patch software is a tradeoff between the current cost and a future benefit realisation (termed user opportunity costs) of not maintaining the system. As an example, in the instance where a vendor removes support for a particular software version, the user opportunity costs increases dramatically, which can be reduced by upgrading to the newer version.

Saarelainen et al. (2006) in their qualitative interviews of 29 IT decision makers in 8 Finish organisations indicated that in their sample software modernisation or replacement decisions were not made using rational decision making processes. They found that formal software engineering decision frameworks were not used and the only formal decision process that was commonly used was return-on-investment calculations. Managers generally used intuition in their software decisions where the rational for the decision was untraceable, making learning from past decisions impossible.

The first papers (Swanson and Beath, 1989; Foster, 1991 & 1993; Chan et al. 1996) focus on the link between software maintenance, changing business strategies and system discontinuance. The newer researched papers show that there is an apparent trend in the literature to include additional factors such as business model and environment (Kelly et al., 1999); influence of stakeholder's power and politics (Coakes and Elliman, 1999); and the trade off with current cost and future benefit (Ng, 2001). Before examining other organisational case studies on discontinuance, the next section

reviews literature on the continuance and discontinuance concepts at the individual level. This is relevant for three main reasons. Firstly, IT decision maker's replacement decision will at some stage require users to adopt a new system. Secondly, an organisation being a collective group of individuals would be influenced at some level by user's continuance and discontinuance intentions. This holds true even in settings of mandatory use, where discontinuance intentions manifests with individuals underutilisation, inappropriate or inefficient use of the system (Sørebø and Eikebrokk, 2008). Thirdly, as there is little a priori organisational research, the concepts highlighted in individual research could be salient in organisational research.

2.3 IS Discontinuance at the individual level

The concept of discontinuance of a technology at an individual level was included in Roger's (1995) model of Innovation Diffusion. Roger's model spawned a large number of studies that reviewed factors that lead to technology adoption at an individual decision making level in mandatory organisational settings (Karahanna, Straub and Chervany, 1999).

Cho (2008) identifies that the discontinuance decision for complex information systems differs from the adoption decision in that the adoption decision is prior to the actual technology usage experience. Discontinuance is deemed as the opposite of continuance (Cho, 2008). Cho (2008) goes further to state the reason for the lack of discontinuance studies at an individual level has been the assumption that innovation diffusion theory implicitly assumed that adopters will continue to use an innovation for the length of its life cycle, which in the case of technology discontinuance, proves not to be the case. There is little literature concerning regarding discontinuance, retirement or end-of-life decisions. The research that is available for individuals in an organisational setting focuses on system continuance rather than discontinuance studies.

Bhattacherjee (2001) defined IS continuance as the intention to continue using the information system. Bhattacherjee (2001) uses expectation-confirmation theory from social psychology literature to be one of the first to develop a model that splits acceptance of technology and the continued usage of the technology. User's continuance intention is primarily driven by user's satisfaction with prior use, which in turn is driven by the users' confirmation of expectation from prior use and secondarily by perceived usefulness. Based on expectation-confirmation theory Bhattacherjee concluded that disconfirmation and dissatisfaction with an information system may lead to its eventual discontinuance, even though users have positive perceptions of its usefulness.

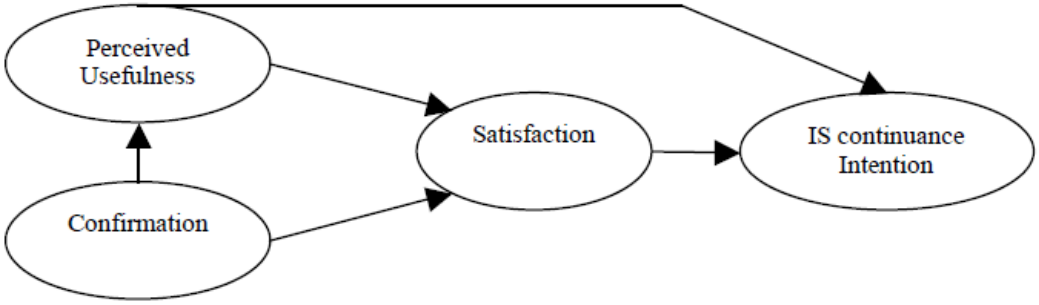

Figure 2: Bhattacherjee (2001) model of IS continuance

Furneaux and Wade (2011) show that the basis of studying organisational discontinuance is at the level of the system decision maker. The organisational decision makers have numerous factors to consider when making a discontinuance decision and this may or may not take into account the user's discontinuance intentions. This leads to the conclusion that there appears to be little value in prior research or theory that organisational discontinuance research can gain from individual continuance and discontinuance research. There are however, two points from the individual literature that could be of interest. Firstly that organisations can improve user continued use by providing a dedicated software champion (Pollard, 2003). Secondly, continuance and discontinuance decisions at an individual level have different determinants. For example, discontinuance is likely when a system does not meet critical functional requirements of a user, whilst the presence of standard functionality may be enough to motivate continuance (Cho, 2008).

This leads into reviewed literature of case studies of IS discontinuance at an organisational level.

2.4 Case studies of IS Discontinuance at the organisational level

Gill (1995) examined the factors related to expert system longevity and use in an organisation. It was found that technical factors in the system were not the main considerations for discontinuance of use. Gill (1995) noted the reasons for why 97 systems were discontinued were as follows:

- Change in task
- Costs of ongoing maintenance too expensive
- The system became misaligned with the company computing environment
- Change in company focus or industry outlook
- Failure to recognize size of task domain
- Solved a problem that wasn't perceived as critical by users
- Subjected developer to potential liability

- User resistance to externally developed systems (e.g., Not-invented-Here syndrome)
- Unwillingness to take on development responsibilities
- Loss of key development personnel

This uncategorized, rudimentary list of discontinuance reason is noteworthy as being one of the first papers in the evolution of the discontinuance framework. The first four items show the start of determining if the technology is suitable for the task (i.e. task-technology fit and misalignment to environment) and the ongoing costs of system support.

Heales (2002) took the concept of system support further in conducting a comprehensive case study of the change requests of 40 systems over a 10 year period in a South African mining house. It was found that an increasing number of users were associated with an increasing number of changes at the core knowledge base of a system. Further conclusions were that the more complex the system change, the less stable the system becomes. This suggests that continued maintenance of larger and more complex systems will eventually lead to instability and a discontinuance decision.

The final section reviews factors examined in past studies for their effects on discontinuance.

2.5 IS Discontinuance factors from empirical research

One previous review of empirical research into the topic of discontinuance is found in Eden, Sedera and Tan (2012). They focused their review on enterprise systems and classified past studies based on the stage of system lifecycle on which those studies had focused. Their reviewed literature for the 'retirement phase' in the ERP lifecycle showed referred to only one article, namely Furneaux and Wade's (2011) Framework for IS Discontinuance. Despite the finding and suggestions by Khoo and Robey (2007) that there is little literature about packaged software replacement decisions, it was none-the-less important to carry out an additional review to better understand any gaps in past empirical work on discontinuance.

To carry out the review, literature was sourced from English academic journals located using the following electronic databases:

- Electronic Databases: Google Scholar (www.scholar.google.com).
- EBSCO Host Business Source Complete
- ProQuest ABI/INFORM Global

Scholarly journals were selected as they are subject to peer review by experts in the field, the journals are not influenced by advertising, the journals are clearly referenced and the names of the authors are listed. The above three search engines were used as electronic search engines as they

were found by Swartz and Russo (2004) to be in the top two indexes (besides Google Scholar) that cover a high number of the top journals.

The study selection used an adapted population, study setting, outcomes framework as outlined in Smith, Devane, Begley and Clarke (2011) to structure the search strings and ensure that each search followed a consistent logic to remove selection bias.

The key terms from the framework are as follows:

Table 1: The framework for study selection

Framework	Terms to be used in search strings
Population / Participants	"organisation" OR "organization"
Study setting	"Information systems"
Outcomes	"discontinuance decision" OR "replacement decision" OR "upgrade decision" OR "end of life decision"

This review found only four relevant empirical studies involving discontinuance of software applications. These are Swanson and Dans, 2000; Heales, 2002; Richmond et al., 2006; and Furneaux and Wade, 2011. These studies are summarized in Table 2.

Swanson and Dans (2000) surveyed 54 organisations. Their main finding was that managers determine equilibrium between maintenance effort and remaining life expectancy - particularly later in a system's life cycle. Life expectancy was estimated in their study using both the internal system factors (the system's attributes, the IT department and its staff) and factors affecting the broader organisation (including business scale, scope and profitability). Interestingly organisation's information system complexity was found to influence the maintenance effort but not the estimation of life expectancy and larger systems were found in their study to be longer lived. Older systems were found to be associated with shorter remaining life expectancy, as the older the system, the more likely it was for replacement or retirement reasons to have become evident. However, they did not find that older systems necessarily required more maintenance.

Heales' (2002) detailed study on system maintenance included the findings that decisions regarding the system at the design, implementation and enhancement stages can influence future discontinuance decisions. In particular, the purchasing flexible system to allow for ease of maintenance (i.e. programming language) and limit the number of deep structure changes (or knowledge level changes) will increase the life span of the software. By increasing the life span of the software the organisation will increase its overall return on investment.

In the same theme, Richmond et al. (2006) developed a model to estimate system lifespan at the feasibility analysis stage of new software. They found that the decisions made at the time of system

implementation determined the lifespan of the software. For example, the less customized a software package, the greater the software's longevity. Moreover, the approach to implementing a system is also important, as a team of both internal and external resources leads to longer system lifespan. Infrastructure played a role and increased longevity if kept constant and surprisingly systems that are sponsored by senior executives are potentially shorter lived. However, the breath of functionality supported by the system (application scope) was not related to system lifespan.

Furneaux and Wade's (2011) IS Discontinuance Framework, is based on the Technology-Organisation-Environment Framework. It was tested using a multi-method technique (qualitative and quantitative) using a large sample of IS decision makers. The derived model hypothesizes that 'change' forces include the manager's perceptions of system capabilities and system reliability; and the environmental change forces of system support availability and cost.

Taken together, the discontinuance literature reviewed has lacked strong theoretical underpinnings. The factors included in prior studies are not clearly derived from theory and the comprehensiveness and integrative nature of these studies is in question. One exception is Furneaux and Wade (2011). Their framework represents the most comprehensive attempt to date from which to approach the study of discontinuance. There are however still shortcomings in past research, including shortcomings with Furneaux and Wade's framework. These shortcomings and contributions of the literature will be detailed next.

Below is a summary of the reviewed research that is categorized as empirical discontinuance research at an organisational level.

Table 2: Factors from selected literature

Relevant References and Methods Used	Constructs and Variables	Findings
Swanson, E., Dans, E. (2000) Maintenance Effort: Exploring their Equilibration. Exploratory Model designed by the authors tested using quantitative research survey of 758 systems among 54 organisations. The model shows that managers "equilibrate" (balance) their allocation of maintenance effort with their remaining life expectations.	The dependent variables are: • Degree of maintenance effort • Remaining life expectancy of the system. The independent variables are demographic factors including: System age, size (measured in lines of code) and the 'portfolio familial complexity'. The most important being system age followed by system size (defined by the number of support personnel allocated to the system).	• Business functional complexity has no impact on remaining system lifespan. • Managers do balance maintenance effort with expected life expectancy. • Familial Portfolio effect increases maintenance effort. • Older systems have a shorter remaining life expectancy, as should be expected. • Older systems don't have a greater maintenance effort, or potentially maintenance is becoming more effective.
Heales, J. (2002) A model of factors affecting an information system's change in state. A longitudinal case study of a large South African Mining House's IT department using detailed data from some 3000 user change requests covering 40 systems over a 10-year period. This is a study on a single organisation and the findings cannot be generalised to other organisations.	Independent variables are Language Level, Size, Age and Period (length in three month increments of change). The dependent variables are volatility index (stability of a system) and the state of the software (i.e. either evolution or revolution).	• Later generation languages decrease the change effort required on system changes, to a greater extent than peripheral changes. • More users, means more changes and a greater system complexity (LoC) results in a more volatile system. • It appears that the system change process is becoming more effective.

Relevant References and Methods Used	Constructs and Variables	Findings
Richmond, W., Nelson, P., Misra, S. (2006) An empirical analysis of software life spans to determine the planning horizon for new software. An empirical investigation of 181 systems in a broad cross-section of organisation in a review in how factors both within and outside of an IT manager's control are related to the length of a software system's life. The paper provides a method to calculate the estimated life span of a system.	This paper focuses on the premise that factors in the design and development of a system determines its remaining expected life span (dependent variable). These independent factors include: • ROI (using the correct lifespan in the calculations); • The system's scope or complexity • The approach (insource vs. outsource and custom vs. package solution) • 'Blended' or mixed internal and external implementation team. • Fit to technical complexity and standards (measured as a number of databases per system). Control variables being the following binary codes: • Financial and non-financial systems • System's perceived strategic value • Sponsored by senior executives. • The rate of change of the system	• Scope - either multi-business functions or decision types did not predict life span. • Packaged software does have a longer lifespan and the more software is modified the more volatile and therefore the shorter its' lifespan. • A 'blended' implementation team does result in improved system lifespan's and evidence shows that the longest life span is on a packaged system with a blended implementation team. • Technical complexity and its fit with technology standards are related to system lifespan. • Regarding the control factors only the strategic value was significant. • A 'sponsored' system actually had a shorter lifespan.
Furneaux, B. Wade, M. (2011) An exploration of organisational level Information Systems discontinuance intentions. Qualitative (semi-structured interviews) of 21 informants. Secondly a survey based on the interviews was sent to 1,500 American and Canadian firms, with 222 responses. A derivation of the TOE framework was used including an additional context of 'continunace inertia'.	Independent variables include: • 'Continued Inertia' of a system with system capability shortcomings, availability and technical integration (or degree of embeddedness of the system). • Level of investment in existing systems and Institutional Pressures. • Organisational Initiative - defined as 'internal organisational effort directed toward altering where and how an organisation operates'. • Environmental Change - defined as 'change in the physical or social factors that lie outside of the boundaries of an organisation'. • Control variables were organisational size and system age.	• System Capability Shortcomings are the most significant factors in replacement intentions. A system shortcoming in one existing or new capability can cause replacement intentions. • There is no significant relationship between system support costs and replacement intentions. • Inadequate availability of system support significantly increases replacement intentions. • Replacement intentions are not significantly impacted by the magnitude of investments in the systems. • Technical integration is a significant factor in forming system replacement intentions.

Shortcomings and contributions of past literature

There are some inconsistencies and omissions in the prior studies at a factor level, including the power and politics influences; the effects of system age; the size of the system; the effects of innovativeness of the organisation; institutional pressures; previous 'sunk' costs; and support costs.

Power and politics has been noted as an influence in a number of case studies (including Coakes and Elliman, 1999; Armstrong and Sambamurthy, 1999; Khoo and Robey, 2007; Cho, 2008) what is required however, is an empirical measure or at least a dichotomous indicator of this influence. The influence of power and politics was omitted from Furneaux and Wade's (2011) framework.

System or software age is shown as having an effect on maintenance effort which in turn increases discontinuance intentions (Ng, 2001; Cho, 2008), but this was not the case with packaged software (Ng, 2001) as the maintenance is mainly the responsibility of the vendor. Swanson and Dans (2002) did not find this relationship and actually found that maintenance effort decreased rather than increase with system age. This ambiguity of increased supportability costs and with system age needs to be resolved.

Ng (2001); Heales (2002) Chan et al. (1996) and Swanson and Dans (2000) found that system size directly influences maintenance effort influencing replacement decision information systems. Furneaux and Wade research did not operationalise system size, so clearly the effect on discontinuance intentions relating to the size of packaged software, requires to further confirmation.

Fichman and Kemerer (1997) showed that organisations that have an IT department that has the structure to innovate (i.e. scale of activities to learn from, related knowledge and diversity of technical knowledge) are more likely to initiated and sustain complex technologies. Innovativeness can therefore be deduced as reducing discontinuance or replacement intentions (Giaglis, 1999; Kelly et al., 1999). Alternatively, more innovative organisations may not tolerate the restrictions to change and flexibility that may accompany the use of packaged software systems and this may in turn increase discontinuance intentions. Thus the implications of organisational innovativeness on discontinuance deserves empirical attention.

Institutional pressures and in particular mimetic isomorphism, can aid an organisation in making complex decision by imitating the perceived industry leader (Oliveira, 2011). Furneaux and Wade (2011) considered that mimetic pressure may be an important continuance force, but they excluded the factor from their empirical work based on responses of a small interview sample in the exploratory phase of their study. There is a need for mimetic pressures to be included in a large sample study of discontinuance to determine its importance.

Sunk costs are shown to influence a replacement decision (Keil, Mann and Rai, 2000). Implementation costs are only a portion of the total investment into a software application (Gill, 1995). Furneaux and Wade (2011) state that surprisingly, investment costs were not significant in determining replacement intentions. To better understand the effects of prior sunk and investment costs on discontinuance, a total system cost measure is required that includes implementation costs, customisation costs and past operating costs.

High system maintenance costs have been highlighted as a reason for system replacement decisions (Ng, 2001; Granö, 2003; Koskinen et al., 2004; Saarelainen, 2006). Furneaux and Wade (2011) did not however find system support costs to be significant indicator of replacement intentions. This inconsistency requires clarification through additional study.

Endogenous latent variables and the relative strength of change vs. inertia forces

A further inconsistency in past studies on discontinuance research is the definition of the endogenous latent variable. The examples include remaining life-span (Richmond, 2006), life expectancy (Swanson and Dans, 2002), continued maintenance efforts (Foster, 1993; Swanson and Dans, 2002), future benefits realisation (Ng, 2001) and replacement intentions (Furneaux and Wade, 2011). There are no studies that focus on the broader forms of discontinuance, such as the outcomes of system upgrade, replacement and abandonment, proposed but not tested by Furneaux and Wade (2011).

As a final inconsistency noted with both the Swanson and Dans (2000) and Furneaux and Wade (2011), is that both models are deemed to be in a state of equilibrium, but this was not investigated. This would prove difficult with models where the response data is at a point in time and not all the variance of the dependent variable is explained, but as a point of interest the relative strength of the overall forces of continuance and inertia should be investigated i.e. is the equilibrium disturbed (resulting in discontinuance) largely as a result of the pull of change forces or the weakening of inertia forces?

Chapter conclusion

This chapter defined information systems discontinuance and drew attention to three types of discontinuance decisions, namely abandonment, upgrade and replacement. Past studies into discontinuance were reviewed with a focus firstly on the 'system's engineering' view of maintenance and upgrade decisions, secondly on individual level discontinuance and finally a past discontinuance empirical studies into discontinuance were summarized. The Furneaux and Wade (2011) framework was identified as the most comprehensive framework to date to underpin this research study but that certain extensions to the framework may be required. It is discussed in greater detail in the next chapter.

CHAPTER 3. THE IS DISCONTINUANCE FRAMEWORK (THEORETICAL BACKGROUND & HYPOTHESES)

This chapter discusses Furneaux and Wade's (2011) IS Discontinuance Framework with additional underpinnings from Institutional Theory (DiMaggio and Powell, 1983), Information Systems Success Model (Delone and Mclean, 2003) and Diffusion of Innovation Theory (Rogers, 1995).

Extensions to Furneaux and Wade's (2011) framework are then discussed prior to the presentation of the research model and underlying hypotheses.

3.1 IS Discontinuance Framework

Furneaux and Wade (2011) used a deductive process to derive constructs for their discontinuance framework. Their framework extends Swanson and Dans (2000) exploratory research which showed that managers must weigh up the decision to replace a system with ongoing system maintenance. Furneaux and Wade (2011) framework hypothesizes that organisational discontinuance intentions are an outcome of a change in the balance between 'change forces' and the 'inertia or continuance' forces preventing the organisation from changing. Their framework is presented in Figure 3 below.

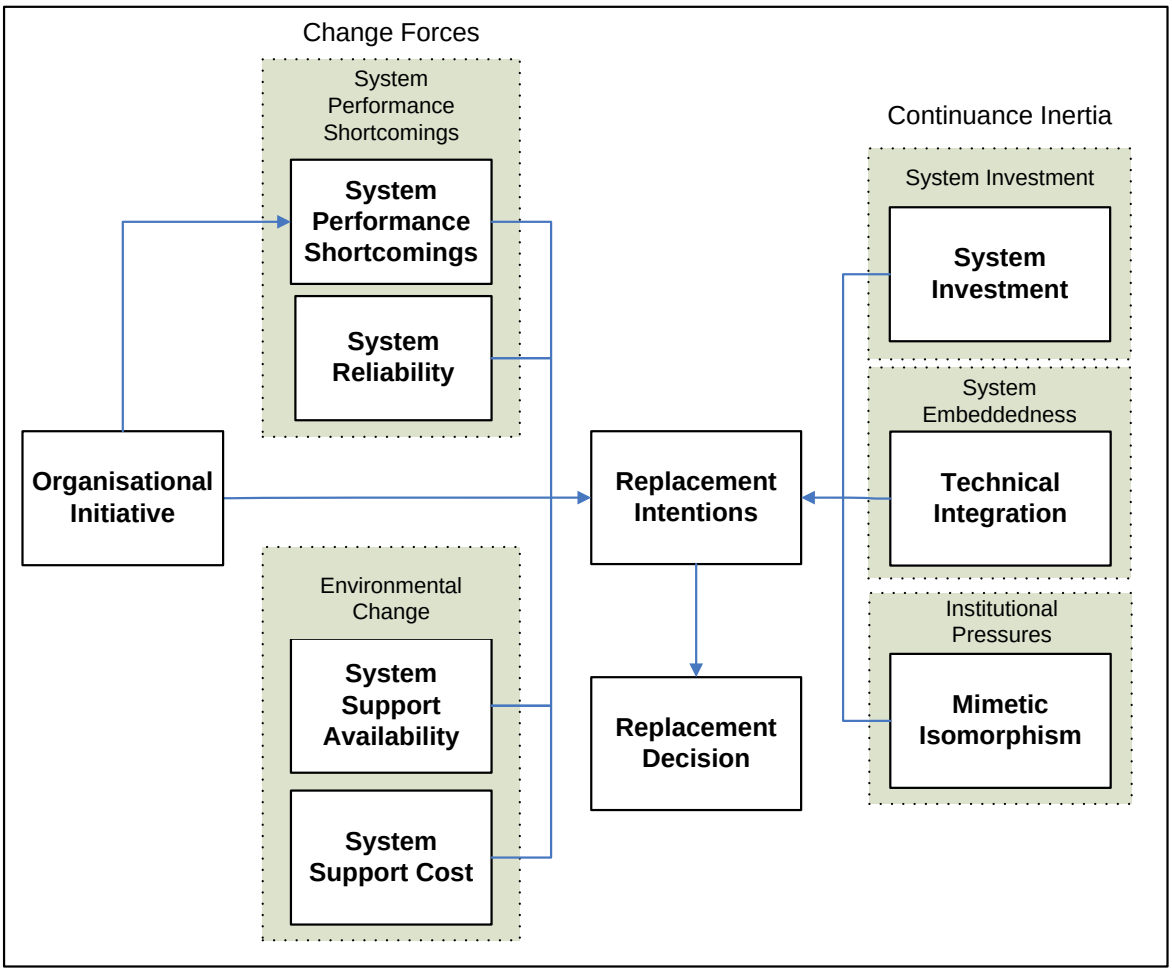

Figure 3: IS Discontinuance: A theoretical framework (Furneaux and Wade, 2011)

Furneaux and Wade (2011) focused on replacement intentions as a proxy for discontinuance intentions. Their research found that performance shortcomings (defined as limitations in the functionality of an information system that undermines its ability to meet organisational needs) and limitations in the availability of support (defined as the availability of the vendor and other support capabilities) for a system was found to significantly contribute to the formation of replacement intentions. On the inertia side, technical integration (most common dimension of system embeddedness) was found to undermine the formation of replacement intentions. In other words, a system that is embedded within a portfolio of applications is less easy to discontinue than one providing stand-alone functionality. Reliability of system, system support costs, level of system investment, organisational size and system age were considered within their model, but empirical testing did not find they contribute significantly to replacement intentions.

The main assumption in the framework proposed by Furneaux and Wade (2011) is that the internal organisational context mediates the effects of the environmental change forces on discontinuance intentions. The environment is recognized as being the driver of these change forces but the

environment is not operationalised in the framework, rather the internal IS and organisational factors are considered direct determinants of discontinuance and are therefore the focus of the discontinuance framework.

Drawing on the above and considering relevant extensions, this study's framework is presented in Figure 4 below.

The change forces and continuance forces reflect Furneaux and Wade's (2011) framework. However, the framework proposes seven extensions to Furneaux and Wade's (2011) framework. These extensions are considered necessary to reflect (a) the focus on packaged software rather than IS in general, (b) the political forces often considered present within organisational contexts that may influence IS decision making (Markus, 1983), (c) the multi-dimensional nature of IS performance that has been recognized elsewhere (e.g. Petter et al., 2008) and (d) that replacement (as considered by Furneaux and Wade) may not be the only basis on which a package might be discontinued. These extensions are highlighted with stars ☆ in Figure 4 and are outlined next and discussed in greater detail in subsequent sections of this chapter.

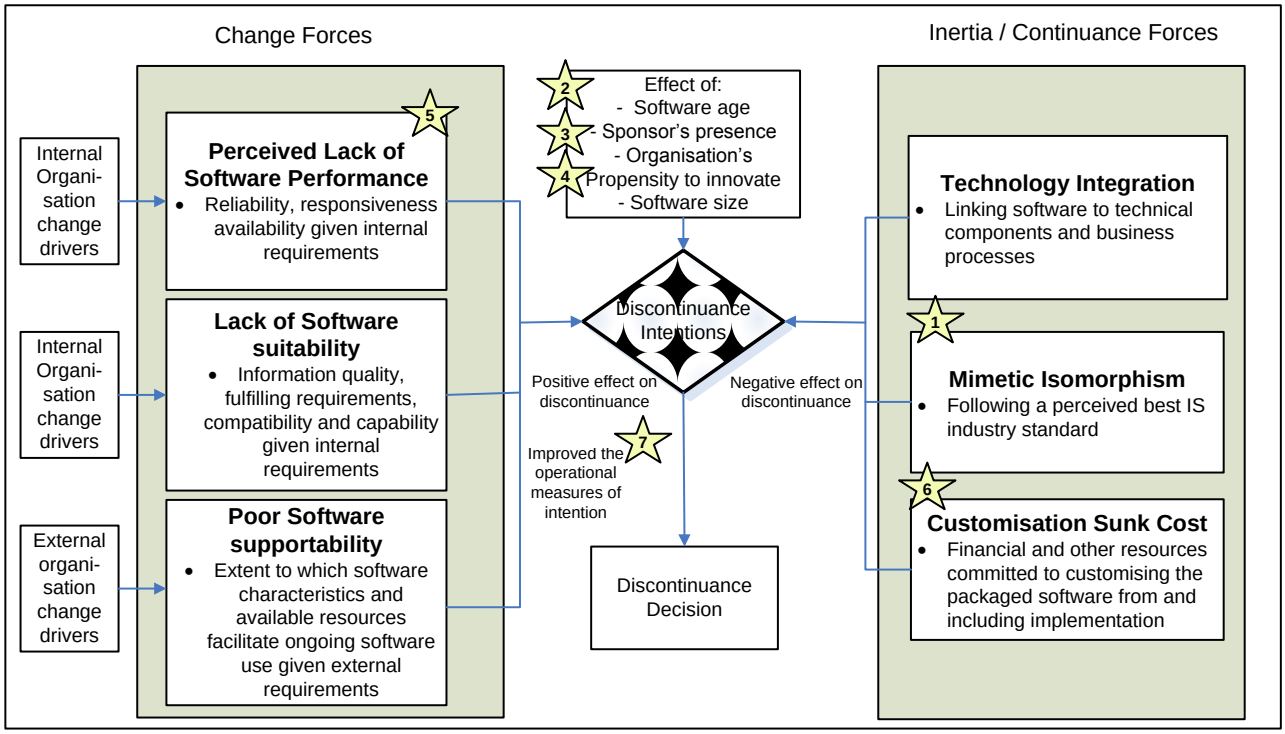

Figure 4: Extended IS discontinuance research framework

1. Mimetic Isomorphism or the institutional pressure to follow a perceived IS industry standard has been added as a continuance force. A packaged software based system is deemed less likely to be discontinued when it is perceived to be industry standard. The concept of mimetic isomorphism formed part of Furneaux and Wade's (2010) Model of IS Discontinuance, but was not researched

based on it not being referred to by a small sample of IT and business managers in their qualitative research. Mimetic pressure in this context is the organisation conforming to industry standards by maintaining those systems that are deemed to be the industry standard.

2. The proposed framework also includes system age. This is considered important to evaluate as it shows the effects of accumulation of changes and does determine the maintenance effort of a system (Swanson and Dans, 2000).

3. The presence of the original sponsor is an addition to determine the senior manager's effect on the discontinuance decision. Richmond et al. (2006) showed that presence of a non-executive sponsor lowers the likelihood of discontinuance intentions. This factor is deemed as proxy for the measurement of the political influence senior managers have on the discontinuance decision [from requirement (b) above].

4. The effect of an organisation's propensity to innovate will be incorporated into the model. Innovation can take many forms, such as improved maintenance highlighted by Heales (2002). An improved operational measure of system size has been included by stating the number of support people required by the system.

5. The perceived lack of system performance and lack of system suitability have been split from Furneaux and Wade's (2011) system capability shortcomings as a richer view of system's performance shortcomings. DeLone and McLean's IS success model will guide the conceptualisation of the system performance construct [from requirement (c) above].

6. The level of the sunk costs of customising a system's packaged software has replaced Furneaux and Wade's (2011) System Investment as an inertia force.

7. The operational measures of IS discontinuance intentions will be improved by extending the discontinuance concept to include abandon, replaced or upgrade [from requirement (d) above]. An upgrade for the purposes of this study is defined as the implementation of a newer version of an existing system package and not an entirely new software package. However an upgrade would require significant effort in data migration and loss of user preferences (settings, familiar screens etc.).

Taken together, the framework illustrates nine factors that are hypothesized to effect discontinuance intentions. The discontinuance decision is made by senior management and not by the users and the discontinuance intention is targeted at the packaged software application level.

The proposed change forces that drive discontinuance intentions are the senior manager's perceptions of the performance, suitability and supportability of the information system. Maintaining an industry standard, a highly integrated application and relatively high implementation sunk costs are defined as the continuance forces preventing discontinuance intentions. The organisation's ability to innovate, the size of the system replacement, the age of the system and the presence of the initial sponsor may also be important and these are included as controls. Based on the extended framework, a set of hypotheses can now be developed.

3.2 Research hypotheses

CHANGE FORCES

3.3 System performance

Delone and Mclean's (2003) recognized six dimensions to be responsible for information success, namely system quality, information quality, service quality, use, user satisfaction and net benefits (Figure 5). System quality is 'the desired characteristics of an information system'. It is measured in terms of ease-of-use, functionality, reliability, flexibility, data quality, portability, integration and importance.

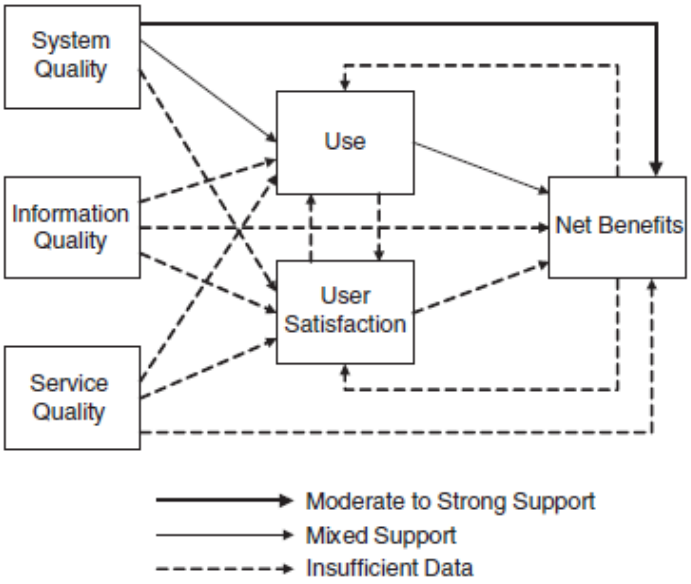

Figure 5: Delone and McLean's (2003) IS Success Model as depicted in Petteret al. (2008)

Petter et al. (2008) in their qualitative literature review of research which used Delone and McLean's (2003) Model from 1997 to 2007 found that at an organisational level, the relationship between system quality and net benefits was particularly noteworthy. Petter et al. (2008) conclude that in an organisational context high quality systems lead to greater net benefits.

Drawing on this finding, system quality is considered an important IS performance measure that will be considered in discontinuance. System reliability, system responsiveness and system availability are important quality characteristics. Reliability was defined by Delone and Mclean (2003) as a 'dependable Information System'. Furneaux and Wade (2011) defined system reliability as the 'extent to which a system can be counted on to perform its intended task'. Furneaux and Wade (2011) propose that if the system becomes more unreliable over the time period since its implementation, the system causes considerable business risk and it is likely to be discontinued and replaced.

Responsiveness deals with the user's perceptions that the system must react to user instruction in a time period acceptable to the user (adapted from Gefen, 2002). Slow response rates from a system for whatever system or infrastructure reason, negatively impacts the system's benefits. The reason is that the speed of information system determines the speed of the user interaction (Schleifera and Amick, 1989) and if the response rate is slow it can cause significant frustration for customers and users (Randall et al., 1999). Therefore, the implication for discontinuance is that poor response times will lead to increased user frustration and consequently increased discontinuance intentions.

Availability reflects whether the system is accessible by the users to perform real time tasks and it can be measured by the number of interruptions to system accessibility per month (Swanson and Zozaya-Gorostiza, 2000). This measure looks primarily at unplanned disruption but it does include whether the system is unavailable during planned 'back-up' or maintenance processes. If users cannot access the system when they need to, this will have a negative impact on all the business processes relating to that system. Therefore, for a system that is repeatedly unavailable it would be expected that there would be higher discontinuance intentions. Taken together, a system's under-performance in terms of its reliability, responsiveness and availability will act as a change force for discontinuance. It is therefore hypothesized that:

H1: A perceived lack of packaged software performance (low reliability, low responsiveness, low availability) is associated with increased discontinuance intentions.

3.4 System suitability

System suitability as highlighted by Furneaux and Wade (2010) is the measure of the difference between what a system is capable of performing versus what is expected of the system. Evaluations of the suitability of a system take place as the system is utilized (Goodhue and Thompson, 1995). The suitability of the information system is evaluated with respect to needs which may change over time as the external environment changes. An IS usually starts life as having capabilities suitable to its environment, but over time as the environment changes so the system's capabilities may become less suitable to the new environment. Kelly et al. (1999) point out that there may even be a point where system limitations are reached and it can no longer be changed. This usually leads to user frustration and importantly lost business opportunities.

System suitability is conceptually similar to concepts such as compatibility (Wang,. Wang and Yang, 2010) and task – technology fit (Goodhue and Thompson, 1995; Cooper and Zmud, 1990) which have been described as necessary for the realisation of IT benefits. Compatibility can be defined as the degree to which the functions of an IS are perceived as being consistent with the needs and existing practices of its users (Wang et al., 2010). Therefore the less suitable (or compatible) the more likely the system is to being discontinued. It can therefore be hypothesized that:

H2: A lack of packaged software suitability is associated with increased discontinuance intentions.

3.5 System supportability

System supportability is the extent to which available support resources facilitate a system's ongoing use (Murphy, 2012). The need for the system to be supported is recognized within the DeLone and McLean Model (Figure 5) as 'service quality' and is considered an important measure of IS success and necessary for the achievement of usage and subsequent net benefits. An important indicator of IS supportability is the extent to which technical support personnel are available from either within the firm or the external market. For example, although vendors may offer system support early in the lifecycle, 'sunset clauses' within contracts may allow the vendor to cease providing such support as the IS ages. The technology platform used (including hardware and software) and even the availability of documentation is impacted if the IS cannot be supported in the later stages of its life cycle. The availability of support skills in the technology may be limited in the market place or may only be available at a high premium (Furneaux and Wade, 2011). A firm is at risk of system and business process failure if it continues to operate a system where supportability has declined.

The cost of support is another dimension that needs to be considered. Furneaux and Wade (2011) define support costs as costs that an organisation incurs to support ongoing operation of an information system. Even if support is available, the cost may be prohibitive resulting in system discontinuance intentions. The level of support required may also influence the support cost, with the more support required the less cost effective the system is to operate.

Taken together, it can be hypothesized that an IS that lack system supportability is more likely to be discontinued. It is therefore hypothesized that:

H3: Poor packaged software supportability (availability and cost) is associated with increased discontinuance intentions

CONTINUANCE FORCES

3.6 Mimetic isomorphism

Mimetic Isomorphism is defined as the tendency of firms to mimic or copy the actions of those organisations that are perceived to have high levels of legitimacy (Furneaux and Wade, 2010). Based on this phenomenon, certain IS in operation may be perceived as being of a higher benefit because they are used by a number of other organisations and considered an industry standard.

Mimetic Isomorphism is well documented in the Institutional Theory (DiMaggio and Powell, 1983). Institutional theory surmises that organisational decisions are not driven only by rational goals of

efficiency, but also by social and cultural factors and concerns for legitimacy (Oliveira and Martins, 2011). It is described as a pressure for legitimacy exerted on organisations in the same field, driving organisations to become homologous over time.

In the case of IT adoption, mimetic pressures may lead an organisation to follow other organisations that are structurally equivalent to themselves as this will save information systems search costs and avoid first-mover risks by following adoption that appears to have been successful (Teo et al., 2003). For example, in the adoption of a packaged software that is considered to be the industry standard (Kaganer, 2007). Once a system is highly diffused across organisations and has perceived to become standard, discontinuing the use of such a package may undermine the organisation's legitimacy. Organisations may therefore be more likely to retain and continue using software packages still regarded as industry standard. We can thus we can hypothesize that:

H4: The pressure to retain packaged software considered industry standard is associated with reduced discontinuance intentions

3.7 Degree of technical and business process integration

Furneaux and Wade (2011) have defined technical integration as the extent to which an information system relies on sophisticated linkages among component elements to deliver needed capabilities. The level of technical integration is thus defined by the number of technology components and the complexity of the linkages amongst these components within the information system. A high degree of technical integration increases the development effort required to replace the IS and thus this favours inertia.

Process integration on the other hand is defined as the number of business processes that are influenced by the information system (Kelly et al., 1999). Discontinuance of a system that underpins a large user base and supports multiple processes increases the organisational change efforts required to replace the IS. The degree of technical and process integration thus act as continuance forces to retain the IS.

Therefore we can hypothesize that:

H5a: Packaged software exhibiting higher levels of technical integration with other systems are associated with reduced discontinuance intentions.

H5b: Packaged software that is integrated into a larger number of business processes is associated with reduced discontinuance intentions.

3.8 Customisation sunk cost

Customisation sunk cost is defined as the financial and other resources committed to customising the packaged software from and including system implementation. These sunk costs are unrecoverable past expenditure on the system. This study will measure the continuance force of the sunk cost effect. Keil et al. (2000) show an example of the sunk cost effect as the situation when key decision makers display risk seeking behavior by escalating their commitment of resources to a failing system. These decision makers continue to commit resources after the initial expenditure as the alternative (discontinuing and potentially replacing the system) is perceived to be a loss of their previous investment.

The construct focuses on the cost of customising the software as this is a variable cost capable of escalation by management as opposed to the fixed capital cost of the actual software. Furneaux and Wade (2010) point out that the expenditure on resources to customise the software is only one part of a system investment being perceived as a sunk cost. The inertia force of sunk costs can include technical and user skills gained in the system.

The sunk cost of customisation construct differs from Furneaux and Wade's (2011) 'system investment' construct in that software customisation is ongoing cost of operating a system and does not include the initial capital expenditure. Furneaux and Wade (2011) found that system investment did not prove predictive in determining replacement intentions as they assumed that the key decision makers they interviewed inherited the systems and therefore did not feel personally responsible for the initial investment.

We can therefore hypothesize that:

H6: Higher costs of customising packaged software is associated with reduced discontinuance intentions.

3.9 Software age, size, sponsor's presence and propensity to innovate

The control variables are software age, the continued presence of an original sponsor, the organisation's propensity to innovate and system size.

Swanson and Dans (2002) show that age of a system influences the maintenance effort on a system such that the older the system the greater the maintenance efforts required. Given that technology personnel will over time become less familiar with aged system technologies and the costs of scarce skills increases, the likelihood of discontinuance intentions will be higher.

Richmond et al. (2006) showed that a system whose original sponsor is a senior executive had a shorter operational life span than systems where the managing sponsor is not an executive. Kling and Iacono (1984) expands upon such 'political forces' and highlights that an organisation is a number of coalitions, competing for control over resources to determine their own 'ideological preferences'. The coalitions therefore are politically invested in the existing organisational information system infrastructure and the system's longevity seems to be tied into both the continuous presence of the sponsor and the role of the sponsor. Pollard (2003) concluded that the most significant determinants of initial adoption was the support of a champion, while the presence of an intra-departmental champion strongly influenced continued use. This study includes 'presence of the sponsor' to account for this political force for maintaining the current IS (Markus, 1983).

Innovative organisations disrupt normal course of industry events and they change the industry to the disadvantage of competitors (Macmillian, 1982). Rogers (1998) defines innovation as the process of introducing new ideas to the firm which result in increased firm performance. Firm-level measures of innovation are based on the output from the innovations including the number of new processes implemented and increasing sales through new products and services.

Roger (1995) proposed in a Theory of Diffusion of Innovations that different individuals have different rates at which they adopt innovations. The innovativeness of a population follows a normal distribution and can be categorized into five categories of decreasing propensity to innovate, namely 'innovators', 'early adopters', 'early majority', 'late majority' and 'laggards' (represented in Figure 6 below). It is proposed in this study that innovative organisations or organisations that contain more innovative decision makers are more likely to discontinue systems that present a constraint to innovation efforts. Organisations that focus on stability and efficiency rather than innovation are less likely discontinue systems and more likely to maximize the use and return on investment on their current portfolio of information systems.

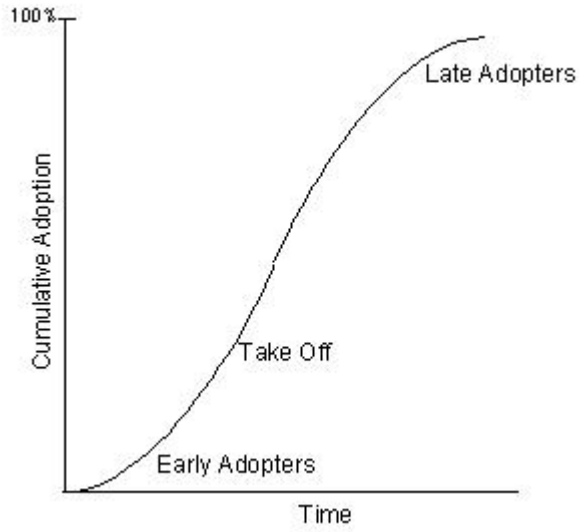

Figure 6: Roger (1995) cumulative percent curve of rate of adoption of innovations in a population

System size is usually measured as the number of executable lines of code (Koskinen et al., 2004). The respondents in this study's sample of senior managers may however not readily have the number of executable line of code available so the number of users will be requested as it is a highly correlated proxy for the number of lines of code (Heales, 2002). The number of support personnel for the system will be requested as an additional indicator of the size of the system. The bigger the system the larger the will be the effort to replace the system and it is more likely to retain such systems for longer.

Thus the following additional hypotheses are stated:

H7a: Packaged software age is associated with increased discontinuance intentions.

H7b: Continued tenure of a packaged software's executive sponsor is associated with reduced discontinuance intentions.

H7c: An organisation's propensity to innovate in the creation and use of information systems is associated with increased discontinuance intentions.

H7d: Packaged software size is associated with reduced discontinuance intentions.

Chapter conclusion

This chapter reviewed the IS Discontinuance Framework proposed by Furneaux and Wade (2011). It then introduced an extended IS Discontinunace Framework as the underpinning for this study

Hypotheses were developed with respect to the effects of the change forces and continuance forces on manager's discontinuance intentions regarding packaged software. In all eleven hypotheses were

stated and they are summarized below. The next chapter presents the research methodology through which the research hypotheses will be tested.

Table 3: Summary of research hypotheses

Hypothesis	Explanation	Supporting Theory
H1	A perceived lack of packaged software performance (low reliability, low responsiveness, low availability) is associated with increased discontinuance intentions.	IS Discontinuance Furneaux and Wade (2011) IS Success Model - Delone & McLean (2003)
H2	A lack of packaged software suitability is associated with increased discontinuance intentions.	IS Discontinuance - Furneaux and Wade (2010)
H3	Poor packaged software supportability is associated with increased discontinuance intentions	IS Discontinuance- Furneaux and Wade (2011)
H4	Packaged software in use that is the industry standard is associated with reduced discontinuance intentions	Institutional Theory - DiMaggio and Powell (1983)
H5a	Packaged software exhibiting higher levels of technical integration with other systems are associated with reduced discontinuance intentions.	IS Discontinuance- Furneaux and Wade (2011)
H5b	Packaged Software that is integrated into a larger number of business processes is associated with reduced discontinuance intentions.	IS Discontinuance- Furneaux and Wade (2011)
H6	Higher costs of customising packaged software is associated with reduced discontinuance intentions.	Prospect Theory -Kahneman and Tversky's (1979) as discussed in Keil et al. (2000)
H7a	Packaged software age is associated with increased discontinuance intentions.	
H7b	Continued tenure of a packaged software's executive sponsor is associated with reduced discontinuance intentions.	Power and Politics Perspective - Markus (1983)
H7c	An organisation's propensity to innovate in the creation and use of information systems is associated with increased discontinuance intentions.	Theory of Diffusion of Innovation – Roger (1995)
H7d	Packaged software size is associated with reduced discontinuance intentions.	

CHAPTER 4. RESEARCH METHODOLOGY

The purpose of the chapter is to describe the research design including a discussion on the key characteristics and strengths of the chosen research design. The chapter details the research from the population sampled, to the research instrument and the changes made to the instrument during the pre and pilot tests. Ethical considerations of administrating the research instrument are also presented. Next, the details of the analysis methods for ensuring validity and reliability are discussed together with methods for hypothesis testing that will be presented in chapter 5. Finally, the limitations of the methods are outlined.

4.1 Research design

The research follows a relational or explanatory research design, which is a continuation of the descriptive research approach but goes further than merely describing the characteristics to analyze hypothesized association between variables (Palgrave MacMillan - Academic, 2008). This type of research focuses on developing and testing theories using quantitative methods and inferential statistics. Relational study falls into the positivist category of research design as it applies to social science research. Lee (1991) describes the positivist approach as 'the manipulation of theoretical propositions using the scientific methods of formal logic' (including mathematical reasoning) and hypothetico-deductive logic. The hypothetico-deductive method uses propositions or hypotheses based on the premise that theorised constructs have effects that can be observed even if the construct itself cannot be observed.

The methods of research that generally are defined as quantitative are descriptive research, correlational, developmental design, observational studies and survey research (Williams, 2007). There is however not always a defined distinction between quantitative and qualitative research methods and an area of mixed methods exists that is neither purely quantitative or qualitative (Johnson and Onwuegbuzie, 2004).

An alternative or even a hybrid research approach could have been a qualitative research approach. Williams (2007) compares the research approaches by stating that qualitative research builds its premises on inductive, rather than deductive reasoning. The research observes elements that pose questions that the researcher attempts to explain. Williams (2007) explains that the observer makes their observations in the phenomena's natural setting and due to this there is a strong correlation between the observer and the data. This is marked difference from quantitative research, where the researcher is strictly outside of the phenomena being investigated.

There are five main areas of qualitative research namely case study, ethnography study, phenomenological study, grounded theory study and content analysis (Williams, 2007). Furneaux and Wade (2011) in their discontinuance study used a mixed qualitative and quantitative model. This approach was required as there was a lack of strong theory in discontinuance research so they allowed their theory flexibility to evolve through analyzing data from semi-structured interviews of a small yet well informed sample of senior decision makers.

This discontinuance study was able to benefit from their analysis and therefore it becomes more feasible to research discontinuance intentions using a quantitative methods based on the theoretical framework they developed. This study developed a set of hypotheses regarding the impact of various 'change' and 'intertia or continuance' forces on a dependent variable (discontinuance intention). A hypothetico-deductive approach is thus being followed and the relational design is relevant.

Within the relational design, the cross-sectional field survey methodology is often used. Because the collection of data only occurs at one point in time, a recognize limitation of the methodology is that it is unable to establish temporal precedence and causality (Bhattacherjee, 2012). However, the survey methodology and sampling process often allows for increased external validity. Because data is sourced from a wide variety of individuals, organisations or other units of analysis in the field, results are more generalisable (i.e. the study has stronger external validity than the interpretive research methods such as case studies).

Bhattacherjee (2012) goes further in stating that the strengths of survey allow a researcher the ability to capture and control for a number of variables and allows a researcher to study the problem using multiple theories.

4.2 Population and sampling

The population or unit of analysis of the research was the decision makers responsible for making discontinuance decisions about packaged information systems in use within South African firms. This population was too broad to study therefore the study required that a sample or sample frame was selected which is both accessible and should represent the population to be studied (Bhattacherjee, 2012). The sampling frame used was the directory of South African organisations listed in McGregor's Who Owns Whom, which contains the names of 3,682 'for profit' South African companies. This list is therefore not a complete list of organisations in South Africa. Organisations were required to be of sufficient size to have self-managed information systems. This

was difficult to determine and the cutoff of 50 or more employees was intended to be used as a proxy of self-managed information systems.

A random sample of 500 companies was drawn using the following procedure. First, each company entry in the alphabetical list of McGregor's Who Owns Whom was given a number from 1 to 3,682. Second, a random number generator (RANDBETWEEN) was used in Microsoft Excel to generate random numbers in no specific order. Third, the first 500 distinct (non-duplicated) numbers were used as the random list and the correspondingly numbered companies were selected as the sampling frame.

It did however soon become apparent that it was difficult to find senior IT executive's contact details for all the organisations on the random list. Consequently, an additional list of South African organisations with IT decision makers was obtained via an online search using tools such as the professional network web site LinkedIn (http://www.linkedin.com) and Web Brainstorm – CIO Directory 2013. This enabled the correct decision maker to be linked to the company. IT decision makers not in the organisation list were added to the emailed sample.

The breakdown of the total number of organisations emailed and the number of successful emails sent is shown below.

Table 4: Summary of survey emails

	McGregor's List	**Sample Size**	**Additional Organisations added to sample**
	3 382	500	
Number with one or more identifiable IT decision makers for inclusion		312	215
Number of successful emails sent		210	118

Thus a total of 527 organisations were identified for inclusion. In certain cases, multiple IT decision makers within the organisations could be targeted, each representing a different software package.

The senior IS decision makers comprised senior executives, chief information officers, chief technology officers, IT executives, IT managers, architects, business, operations and finance managers. Given that the unit of analysis is the system and that some organisations within the sampling frame are very large with multiple IS decision makers, the sampling strategy therefore allowed for multiple respondents from the same organisation.

A total of 1,226 IT decision makers from these 527 organisations were identified and invited to participate from August to November 2013. However, only 715 invitations to IT decision makers within 328 organisations were successfully delivered via email.

A total of 144 responses were received. Thus represents a 20% response rate (144/715). This is very similar to the response rate that Furneaux and Wade (2011) found in their research of 21.4% after they removed the undelivered surveys from the sample. A response of 100 was deemed by the researcher as sufficient to conduct analysis and therefore no further follow-ups or extensions to the sampling frame were required.

As a result of the procedures adopted, the sample frame cannot be considered completely random and is better understood as a non-probability constructed sampling frame. The sample does not represent the general population of 'for-profit' organisations in South Africa, but researcher is however of the opinion that the sample is representative of companies in South Africa where contact details are available for senior decision makers.

4.3 The research instrument

The research instrument was a questionnaire containing closed-ended structured questions (scale items). The items of the questionnaire were as far as possible taken from pre-validated scales from the academic literature. Where applicable the intention was to use multiple items to measure each variable. This ensures that the questions have been tested for a range of issues including ambiguity, complexity, imaginary or hypothetical questions and that the questions are understandable (Bhattacherjee, 2012).

The sequencing of the questions in the questionnaire is in two sections. The first section relates to what Bhattacherjee (2012) terms the 'firmographics' or demographics of the organsation. This will include the number of employees and industry. Specific information was required regarding the respondent, including his/her job title, how many years in the current organisations and how many years has the respondent been responsible for the system. Then the questionnaire will contain items that operationalise the variables of the research model.

The table below (Table 5) specifies the variables and the measurement items. A reference to the literature is included where applicable. The table includes the construct name, dimensions that may or may not be present and the variable short code used in the statistical analysis. The table is structured in the order of items that appeared in the questionnaire.

Organisation size, decision maker details, organisation's primary industry, system size, software vendor and type of software accounts are the 'firmographic' items in the questionnaire. Together with sponsors presence, discontinuance (DISCONT, DISCONT_SOON) and software age these are the only items that were not a answered using a seven point Likert Scale ('strongly disagree', 'disagree', 'slightly disagree', 'don't agree or disagree', 'slightly agree', 'agree' and 'strongly agree').

There are two multi-dimensional constructs namely performance and technical integration. Performance construct comprises the dimensions of reliability, responsiveness which are from the service quality construct (Delone and Mclean, 2003; Gefen, 2002) and the 'availability' dimension from Gefen (2002). Technical integration includes two dimensions, the technical integration and business process integration (Wang et al., 2010).

The discontinuance intention being the endogenous latent construct is composed of three seven point Likert questions (DISCON_PLANS, DISCONT_FUTURE and DISCONT_SOON) and two descriptive fields (DISCONT and DISCONT_TIME). The two description fields of the next discontinuance move and the timelines of the next move were purely for information purposes and not used in the calculation of the discontinuance construct.

The questionnaire cover letter explained to respondents that discontinuance includes a decision to abandon, replace or upgrade the software package.

The organisation's propensity for technical innovation construct is the only construct that is not based from previous studies in the literature. This is loosely based on Rogers (1998) definition of innovation which includes one of the types of innovation being 'the introduction of a new product or qualitative change in an existing product' (item INNOV_PROD). The researcher provided the two other measures of innovation namely INNOV_IT and INNOV_ITFORE.

Table 5: Constructs, variables and sources

Construct	Dimension (if applicable)	Variable Name	Question Items	Primary Source
Organisation Size		EMPLOY_NO	How many employees are working at your organisation?	Furneaux and Wade, 2011
Decision Maker Details		JOB_TITLE	What your job title?	
		NO_YRS_ORG	How many years have you been in this organisation? (scored from 1 to 15+)	
		NO_YRS_RESP	How many years have you been responsible for the software package? (scored from 1 to 15+)	
Industry		PRIM_BUS	In which industry is the organisation's primary business?	
System Size		SUPPORT_STAFF	How many support staff are directly supporting the software?	Swanson and Dans, 2000
		NO_SOFT_USERS	The number of users of the system?	Swanson and Dans, 2000
Vendor		VENDOR	Who is the vendor of the packaged software?	
Type of Software		TYPE_SOFT	What type of packaged software?	
Performance *	Reliability	PERF_RELIAB_TASK	The packaged software can be counted on to perform it's intended task.	Furneaux and Wade, 2011. Delone and Mclean, 2003
		PERF_RELIAB_RELIAB	Users of the packaged software consider it to be reliable.	Furneaux and Wade, 2011
		PERF_RELIAB_NEED	This packaged software can be counted on to perform as needed.	Furneaux and Wade, 2011
	Responsiveness	PERF_RESP_REQ	The packaged software responds quickly to users' requests.	Delone and Mclean, 2003
		PERF_RESP_QUICK	If a problem with the packaged software occurs, it is resolved quickly.	Gefen, 2002
		PERF_RESP_PROCESS	The packaged software informs users of how long processing tasks or actions will take.	Gefen, 2002
	Availability	PERF_AVAIL_UNAVAIL	The packaged software is often unavailable for short periods when required.	Gefen, 2002
		PERF_AVAIL_DELAYS	The packaged software provides output without long delays.	

* Performance items were coded such that high scores reflected poor performance

Suitability		SUIT_QUAL_OUT	The packaged software presents outputs in a useful format. (reverse scored)	Wang et al., 2010
		SUIT_NEEDS	There are notable limitations in the ability of this packaged software to meet our needs.	Furneaux and Wade, 2011.
		SUIT_INFRAST	The packaged software is highly compatible with our existing information infrastructure. (reverse scored)	Wang et al., 2010
		SUIT_SUPP	There are many capabilities that we would like that are not supported by this packaged software.	Furneaux and Wade, 2011 Wang et al., 2010
Supportability		SUPP_OBTAIN	We encounter difficulties in obtaining needed packaged software support services.	Furneaux and Wade, 2011
		SUPP_COST	Supporting the ongoing use of this packaged software is costly.	Furneaux and Wade, 2011
Technical Integration	Technical Integration	INTEG_TECH_SOPH	This packaged software depends on a sophisticated integration of technology components.	Furneaux and Wade, 2011
		INTEG_TECH_COMP	There is considerable technical complexity underlying this packaged software.	Wang et al., 2010
	Business Process integration	INTEG_BUS_PROCES	The packaged software supports a number of different business processes.	Wang et al., 2010
		INTEG_BUS_SUCCES	The packaged software supports business processes that are key to the success of the organisation.	
Mimetic Isomorphism		MIMETIC_COMPET	This packaged software from the same vendor but not necessarily the same version, is used by many of the organisation's competitors.	Teo et al., 2003
Customisation Sunk Cost		SUNK_CUSTOM	Significant organisational resources have been invested to customise the system.	Furneaux and Wade, 2011
		SUNK_IMPL	We have committed considerable resources to the implementation of this packaged software.	Furneaux and Wade, 2011
		SUNK_OPERAT	We have committed considerable resources to the operation of this packaged software.	Furneaux and Wade, 2011

Discontinuance	DISCONT_PLANS [1]	We have firm plans to discontinue the packaged software.	
	DISCONT_FUTURE [1]	We intend to continue operating the packaged software for the foreseeable future. (reverse scored)	
	DISCONT_SOON [1]	We are not likely to discontinue this packaged software anytime soon. (reverse scored)	
	DISCONT [2]	Your next move with regards to this software package will be to (please select one): 'Carry out a minor upgade / patch' 'Carry out a major upgrade (inclu. data migration)' 'Replace the software package' 'Abandon the software package and not replace' 'Other – Please specify'	
	DISCONT_TIME [2]	When do you propose to undertake this: (A six point scale: '0 – 6 months'; '7 – 12 months'; '1 – 2 years'; '2 -3 years'; '3- 5 years'; 'greater than 5 years').	
Sponsor Presence	SPONSOR_PRES	Is the original management sponsor of the system still the sponsor? ('YES' or 'NO')	Richmond et al., 2006
Software Age	SOFT_AGE	Relative to other applications in the organisation, the age of this software package (period of operation) can be described as: (A five point Likert Scale: 'One of the newest', 'Relatively new', 'About average', 'Relatively old', 'One of the oldest')	
Organisation's Propensity for Technological Innovation	INNOV_PROD	Compared to our competitors, new product / process introduction in this organisation always has significant IT implications.	Rogers, 1998
	INNOV_IT	Compared to our competitors, IT is always at the forefront of innovation efforts in this organisation.	
	INNOV_ITFORE	Compared to our competitors, this organisation would be slow to implement new innovations without IT.	

[1] These items are used to measure the discontinuance intentions for hypothesis testing

[2] Please note that these items were used for descriptive reporting purposes only

The final version of the questionnaire sample can be found in Appendix C.

4.4 Pre and pilot test

The research process started with a pre-test using a convenience sample of three senior IT executives and three academics. The three IT executives included two chief operating officers and an IT Architect. The three academics are familiar with information systems research and the constructs used in this study. The objective of the pre-test was to ensure the instrument's content validity. The pre-test is according to Bhattacherjee (2012) designed to remove ambiguity, lack of clarity, or biases in question wording and ensure there is South African contextual fit, prior to administering the final instrument to the intended sample. Changes in the pre-test phase are listed below in Table 6.

Table 6: Changes in the pre-test phase

Specific constructs and dimensions	Changes made
Survey changes	All references to 'systems' or 'information systems' from the literature was changed to packaged software.
Performance construct, responsiveness dimension	Gefen's (2002) original question: "Amazon.com is never too busy to respond to user requests" was changed to: "The system provides guidance if problems occur" could be viewed as a yes / no answer so this was further changed to: "If a problem with the packaged software occurs, it is resolved quickly".
Performance construct, availability dimension	"The system is often unavailable for short periods" was changed to: "The packaged software is often unavailable for short periods when required."
Suitability	An item adapted from Wang et al. (2010), namely "The system's processes are consistent with existing business practices." was considered confusing and removed from the questionnaire
Supportability	Furneaux and Wade's (2010) original question: "We can easily obtain the support resources necessary to continue operating this system" was changed to the negative to illicit responses "We encounter difficulties in obtaining needed packaged software support services."
Innovation	Rogers (1998) question "Introduction of new or improved product(s) or process(es)" as a yes / no response in a certain time frame would have little meaning in a cross sector analysis. This was changed to: "Compared to our competitors, new product / process introduction in this organisation always has significant IT implications."

After the pre-test, a pilot study using the refined questionnaire was conducted on a representative subset of the sample (Bhattacherjee, 2012). The function of the pilot study was to ensure face validity of the instrument. The survey was sent to five decision makers involved in the pilot test.

Following this, there were a few final changes made to the drop-down lists in the questionnaire (i.e. increased the number of job titles available) and the questionnaire was administered to the sampling frame.

4.5 Validity and reliability

Reliability and validity are key requirements for scientific research in the social sciences. Scale reliability (or instrument reliability) is as Bhattacherjee (2012) states 'the degree to which the measure of a construct is consistent or dependable.' Convergent and discriminant validity are part of criterion – related validity (or construct validity) which measures whether the construct measures what it is supposed to measure. Convergent validity tests that the constructs that are related are actually related. Discriminant validity is the opposite in that it tests that a measure is not reflective of constructs they are not intended to measure.

Exploratory factor analysis (EFA) and specifically principal components factor (PCA) analysis was used to provide initial tests of construct reliability and validity (DeVellis, 2003). EFA uses statistical results and not theoretical underpinning to derive how many factors exist or which variables belong to which constructs (Chin, 2000b).

With PCA all measurable factors are related to every factor by a factor loading estimate. Through an iterative process the variables were retained that loaded highly onto one factor and smaller loadings (less that 0.4) on other factors. This data reduction process is used to ensure that items load onto the component they are supposed to measure and not onto other components (Gefen and Straub, 2005).

A CFA is subsequently necessary as according to Alloway, Gathercole, Willis and Adams (2004) the CFA method provides a means of testing the adequacy of competing theoretical accounts of the relationships between measures, with each model specified in terms of paths between observed variables and latent constructs and between constructs. The CFA results provides evidence of convergent validity if measures (items) load highly onto the expected theoretical construct and provides evidence of discriminant validity if the items have low cross-loadings on other constructs. The loading pattern is rotated using Varimax rotation to maximise the independence of the factors for easier interpretation.

The scales for the variables have been kept, were possible, to the original scales found reliable and valid in past research studies in academic literature. Reliability will be estimated in terms of average item-to-total correlation and Cronbach's Alpha. Cronbach's Alphas must exceed the widely recommended minimum value of 0.7 (DeVellis, 2003).

Items were scored (or reverse scored) where necessary in such a way that high (or low) scores represented the correct expected positive or negative correlation with discontinuance intentions (e.g. poor performing software package would be a driver for changed and increase discontinuance intentions).

4.6 Administration of the instrument and ethical considerations

The initial contact was a one page introductory letter emailed from a WITS email address inviting IS decision makers from the sampled organisations to participate in the study. The letter addressed three important ethical considerations, namely voluntary participation, informed consent and anonymity and confidentiality. First, the cover letter explained to potential respondents that participation is voluntary, that they are free to withdraw participation at any time. Second, the cover letter indicated that there are no risks or loss of benefits should they choose not to participate. Third, the letter informed the potential respondents that responses were provided anonymously and that results will only be reported in aggregated. Ethics clearance was obtained from the university's Human Subjects Research Ethics Committee, protocol number: H13/03/06. A copy of the clearance certificate can be found in Appendix A.

Consenting participants were then able to follow a link to the online survey which was administered via an online survey-tool. The online questions are shown in Appendix C and a detailed description of the data gathering techniques used is in Appendix E.

The online survey has the benefits of a controlled mechanism for the delivery of the survey and allowed respondent anonymity to be assured. Data coding was also simplified as responses were stored electronically by the online survey tool and easily available for download. The main disadvantages of the online survey are that the researcher has to place a link email which increase security concerns, decreasing response rates.

Both respondents and non-respondents in the sample were sent a second letter inviting them to participate after approximately two weeks from the first.

The IT decision makers were located using the following two methods:

An email formatting website (http://www.email-format.com) was used to get an email address. Multiple people were contacted in the same organisation if they had a designation of an IT decision maker. Initially the emails were personalized and sent form a University of Witwatersrand email address. This was later changed to bulk emails from a gmail account, as this proved faster to automate and was less susceptible to email being rejected due to 'poor reputation of the sender'.

The email requests were sent over a four month period from 21/07/2013 and the final email wave was sent on 23/11/2013. A small database of survey contacts was maintained in order to avoid contacting the same person twice and to keep track of people who had responded by email.

A list of emails that were returned, including the return reason was maintained. It is suspected however that email servers may not always respond to emails that are deemed as 'spam' (or 'poor sender reputation') and if the person could not be found at the email domain. A total of 1,226 potential respondents were emailed and a total of 715 emails (or 58%) did not get an error response from the email server for either the initial or follow-up email and thus the email delivery was deemed as successful.

Attached in Appendix B is a diary of successful emails sent and responses per month.

4.7 Hypothesis testing

After presenting the response profile and testing the measures for validity and reliability, the hypotheses will be tested in the next chapter. First correlation analysis will be used in order to first establish that the hypothesized factors correlate with discontinuance. Next, regression analysis will be used to examine the combined and relative effects of the hypothesized factors on discontinuance. Finally, the partial least squares (PLS) approach to structural equation modeling will be used in order model the overall effects of the change versus inertia forces. PLS was used by Furneaux and Wade (2011) to test their discontinuance model as it is a well-established technique for estimating path coefficients in structural models and has been widely used in various research studies (e.g Chin, Marcolin and Newsted, 1996).

Chin et al. (1996) point out that PLS is a general model with encompasses amongst other techniques, canonical correlation, redundancy analysis, multiple regression, multivariate analysis of variance and principal component analysis (PCA). Chin et al. (1996) went further to state that PLS is intended for causal-predictive analysis in situations of highly complex models with large numbers but low theoretical information. The discontinuance research is suited to PLS as the research area is new or changing; the theoretical measures are not well formed; and data conditions relating to normal distributions, independence and/or sample size are not size are not met (Chin et al., 1996).

PLS estimates path coefficients in the model and the statistical significance of the paths (at an alpha level of 0.05) will be used as a basis for accepting or rejecting the study's hypotheses.

4.8 Limitations of the study

A potential issue with a cross-sectional, field survey research design is low internal validity. It is impossible to control out all extraneous factors and it is difficult to establish causality because the temporal precedence criterion has not been met (Bhattacherjee, 2012). Thus causality cannot be inferred from the correlation evidence provided by this study design.

Moreover, non-response bias, which is caused by low response rates, may also affect the generalisability of the results (Bhattacherjee, 2012). External validity has been considered in this study and a randomly sampled group will be targeted to maximize the external validity. Follow-ups will be used to maximize response and reduce non-response bias. However, since data is being collected from respondents in their natural setting, external validity is enhanced (Copper and Zmud, 1990).

Surveys can also be affected by respondent bias (i.e. where the respondent gives the 'socially acceptable' response instead of the real response) and common-methods bias where data about all variables in the model are collected from a single key informant. There are potential limitations of this approach, in that we relying on stakeholders to quantify perceptions and intentions at an organisational level that were generally made by senior managers using a combination of business cost analysis and intuition. This proposed survey could show individual respondent bias for discontinuance intentions that would generally have to be shared by senior management to result in discontinuance decisions.

The sampling frame was constructed using organisations with publically available details through the McGregor's listing and through the various web-based searches conducted. Therefore not all South African organisations had an equal probability of being included in the study. The sample is thus more biased towards larger firms that have senior IT executives listed in public domains. This could reduce the external validity of the research.

The research survey allowed respondents to identify the software package they wished to report on. Respondents may be biased towards responding on larger packaged software requiring greater attention from executive decision makers. Larger enterprise software packages may have different determinants than smaller, localised software packages.

The research method was a quantitative cross-sectional survey of South African information systems decision makers. The discontinuance research is relatively new with only one framework by Furneaux and Wade offering a theoretical underpinning. Therefore qualitative analysis of longitudinal case studies of organisational packaged software discontinuance would supplement quantitative research and provide rich data to help understand IS discontinuance. Case studies could help with understanding how

discontinuance intentions become decisions and the organisational changes that occurs due to the IS discontinuance.

Chapter conclusion

Chapter 4 has presented the explanatory research design including the key strengths of the cross-sectional survey instrument chosen for the study. The research used a constructed sample and the final instrument was discussed including changes made in the pre and pilot tests. The requirements of validity and reliability were reviewed as was ethical considerations in administrating the research instrument. The Chapter concluded with a brief description of how the hypotheses are to be tested and the internal and external validity limitations of the research design.

CHAPTER 5. DATA ANALYSIS AND FINDINGS

This chapter presents the results of the data analysis. First, it reports on data cleaning. This is followed by presentation of the response profile together with some descriptive statistics. This is followed by the analysis of construct reliability and validity. It then analyses the strength of the construct relationships firstly through correlation analysis and then using regression analysis, before final tests with PLS. The chapter ends with a summary of the key findings.

The data collected from the online survey was analysed using IBM SPSS Statistics 21.0.0.0 32-Bit Edition and SmartPLS software (Version 2.0.M3).

5.1 Data cleaning

Data collection resulted in 144 responses being received. However, if respondents had not completed the survey in full (completed less than 90% of the questions) they were removed. Moreover, one response was detected as a duplicate and was also removed. This left 103 responses with useable data available for analysis.

Missing values in these remaining 103 cases was examined and 30 cases were found to contain some missing responses as detailed below in Table 7.

Table 7: Missing data items

Item details	Number of cases missing a response
Item 4 (No_Yrs_Org)	1
Item 5 (No_Years_Resp)	1
Item 9 (Vendor)	2
Item 10 (Type_Soft)	1
Item 15 (Perf_Resp_Quick)	1
Item 16 (Perf_Resp_Process)	2
Item 18 (Suit_Qual_Out)	3
Item 22 (Suit_Supp)	1
Item 23 (Supp_Obtain)	3
Item 25 (Integ_Tech_Soph)	4
Item 26 (Integ_Tech_Comp)	2
Item 30 (Sunk_Custom)	2
Item 32 (Sunk_Operat)	2
Item 33 (Discont_Plans)	1
Item 34 (Discont_Future)	1
Item 35 (Discont_Soon)	2
Item 41 (Innov_IT)	1
Total	**30**

Finding no obvious pattern to the missing responses, the mean replacement strategy was used to impute values for missing responses. Five items were reversed scored (namely PERF_RELIAB_TASK, PERF_RELIAB_RELIAB, PERF_RELIAB_NEED, PERF_RESP_PROCESS, SUIT_QUAL_OUT) to ensure these items were scaled in the appropriate direction for their constructs. These items were scored in such a way that high or strong scores on the performance items represented poor performance (i.e. a high force for change, which would then be expected to correlate positively with discontinuance intentions). DISC_FUTURE, DISC_SOON were also reversed scores so as to reflect the discontinuance decision.

5.2 Response profile

This section examines the general profile of respondents along job title, respondent's years at the organisation, primary industry of the organisation and the organisation's size (measured by number of employees). Next the chapter reports on the packaged software types and their vendors that were selected by the respondents. The number of years for which the respondents were responsible for the selected software package, years the organisation has been using the packaged software, the number of users and the number of software support personal are also reported.

5.3 Job title

Nearly a quarter of the respondents are Chief Information Officers (24.3%). The next largest grouping (at 15%) of respondents classified themselves as IT Executives / Directors. Following this, nearly 11% of respondents classified themselves as Head of IT / IS. Other executive roles including Chief Financial Officers (CFO) and Chief Operating Officers (COO) made up 6% of the survey respondents. Therefore at least around 57% of the survey respondents are senior executives, but it is organisation specific whether a respondent's role is at an executive level. Based on the reported job titles, it can be concluded that all respondents were appropriate informants and positioned well enough as decision makers to report on the variables of interest in this study. Results also showed that the average length of time respondents have been in their organisation was 7.32 years.

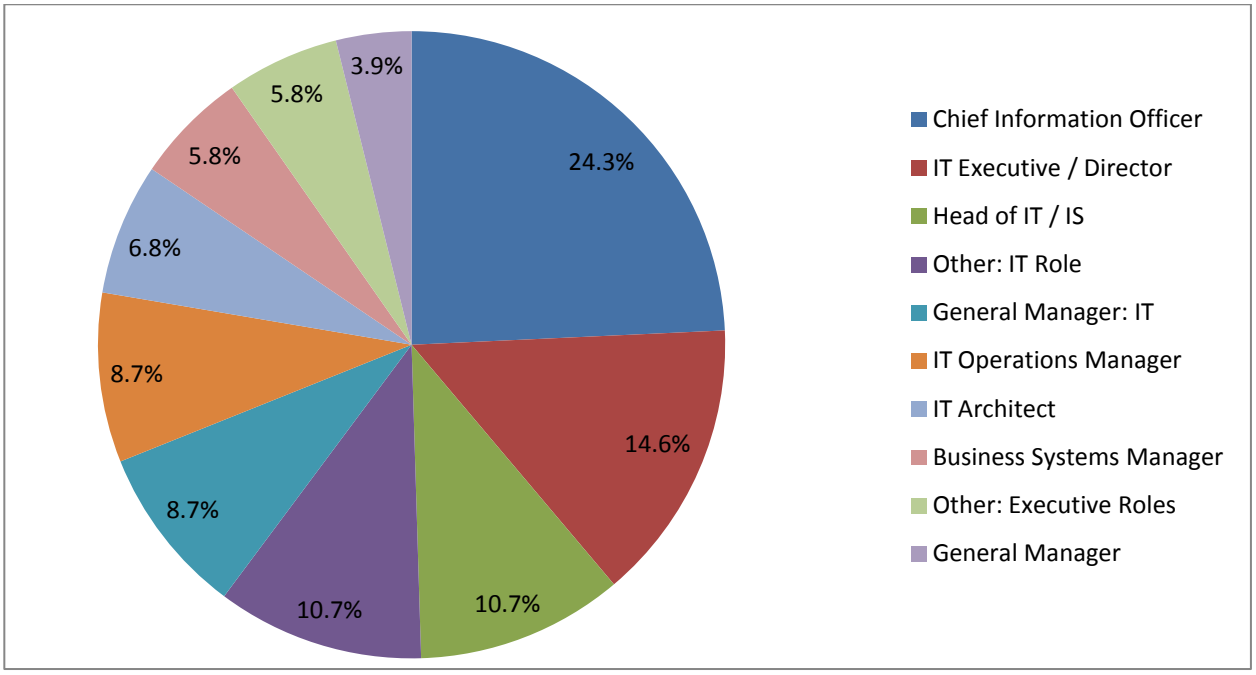

Figure 7: Respondents by frequency of job title

5.4 Primary industry

The largest number of responses (17.5%) was from the financial services/banking industry. This was followed by insurance and pensions at 11.7% and computer related industries including software development. Manufacturing and retail trade were next at 9.7% each, followed by business (accounting, legal and consulting) at 7.8%, personal services (including education and health) at 6.8% and mining and

quarrying at 5.8%. The remaining industries accounted for 20.4% of the responses with less than 4% representations each.

Results suggest that the sample reflects a range of industries with good reputation from financial services, IT, manufacturing and retail as sectors that have traditionally invested significantly in IT. In comparison to the percentage contributions of sectors contribution to the Gross Domestic Product in South Africa (with Government Services removed) the pattern looks similar to the overall industry sector allocation (Figure 9: Industry Sector). We can therefore conclude that the sample was reasonably reflective of the industries in the overall composition of the South African economy.

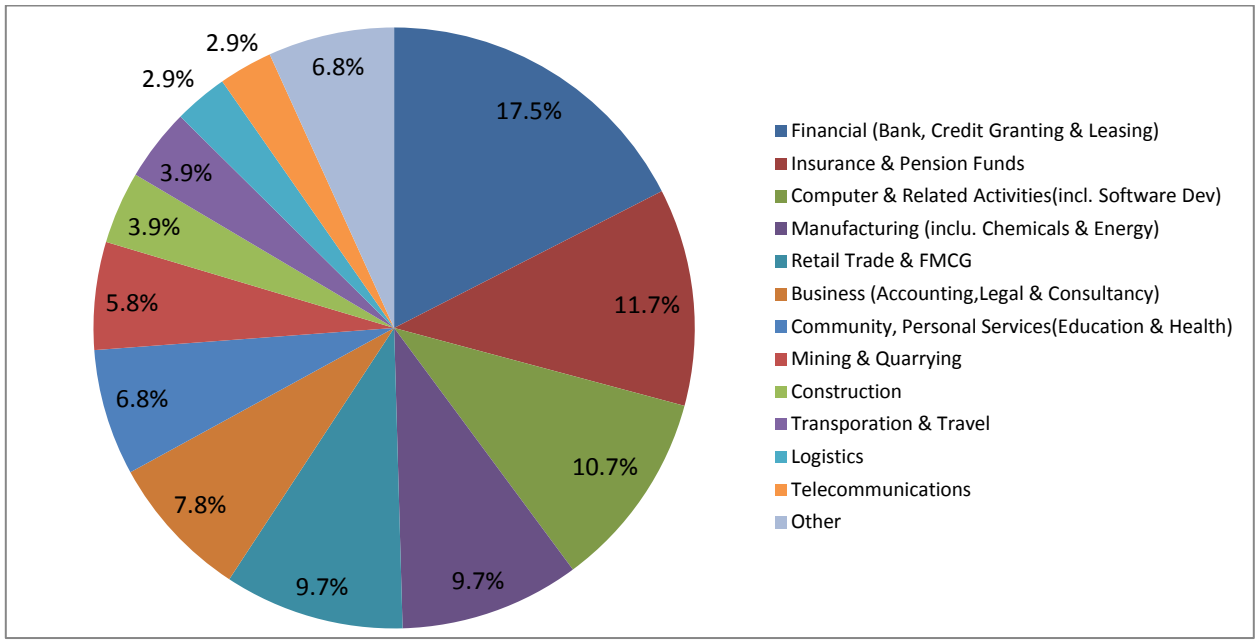

Figure 8: Respondents by industry type

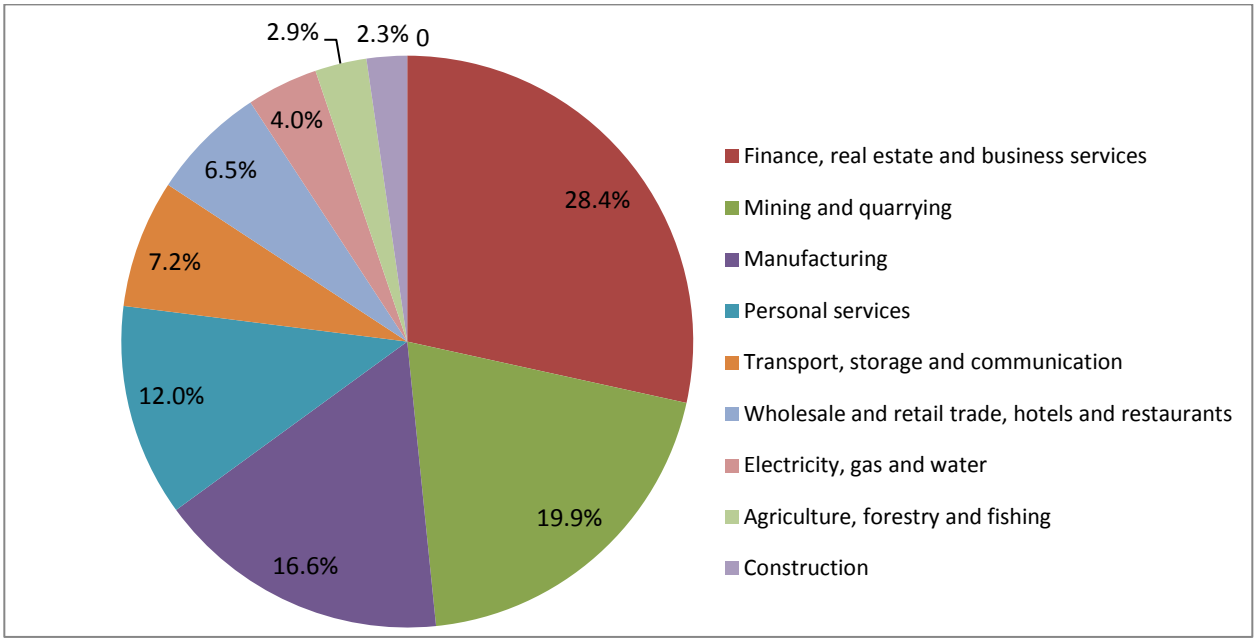

Figure 9: Industry Sector as a % total South African GDP (Q3 2013)

Source: "Gross Domestic Product, Third Quarter 2013". StatsSA. 28 May 2013. Available at (http://beta2.statssa.gov.za/?page_id=1849)

5.5 Number of employees

Nearly 77% of all the respondents are from large and very large organisations with more than 500 employees. Medium size companies (50 to 500 employees) are represented by around 19% of the respondents and 5% are from small companies (0 to 49 employees).

This indicates that the majority of respondents are from organisations that have sufficient size to control their own information systems and make their own discontinuance decisions. This was due to the constructed sample and partly due to the fact that larger organisations were more likely to have the details of their senior IS decision makers listed in the public domain.

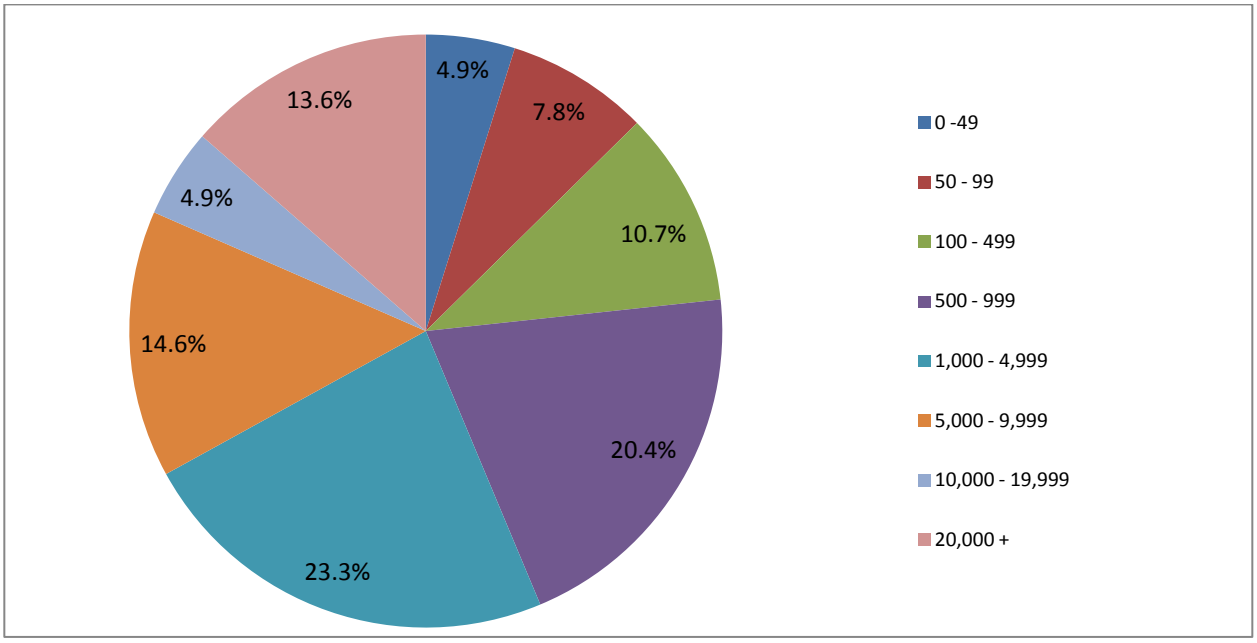

Figure 10: Respondents by number of employees

5.6 Packaged software type

Respondents were asked to select a particular package for which they were responsible and to answer all questions in relation to that software package. The largest number of responses (17.5%) was for packages classified as Enterprise Resource Planning Software. Customer Relationship Management and Sales Reporting accounted for 13.6% of the responses and then software that controls financial transactions and accounting software were both at 6.8%. Thereafter inventory and warehouse management software had 5.8% and content workflow management software and software development software had less than 5% representation each. There were a total of 41 responses that comprised 4% (or less) share of the responses per software type.

The responses represented a wide range of software packaged types, representing the wide range of software packages and the wide range of industries sampled in the constructed sample. Software packages that are common to multiple industry types and organisations (including Enterprise Resource Planning and Customer Relationship Management) were well represented in the responses (i.e. total of 31.1%).

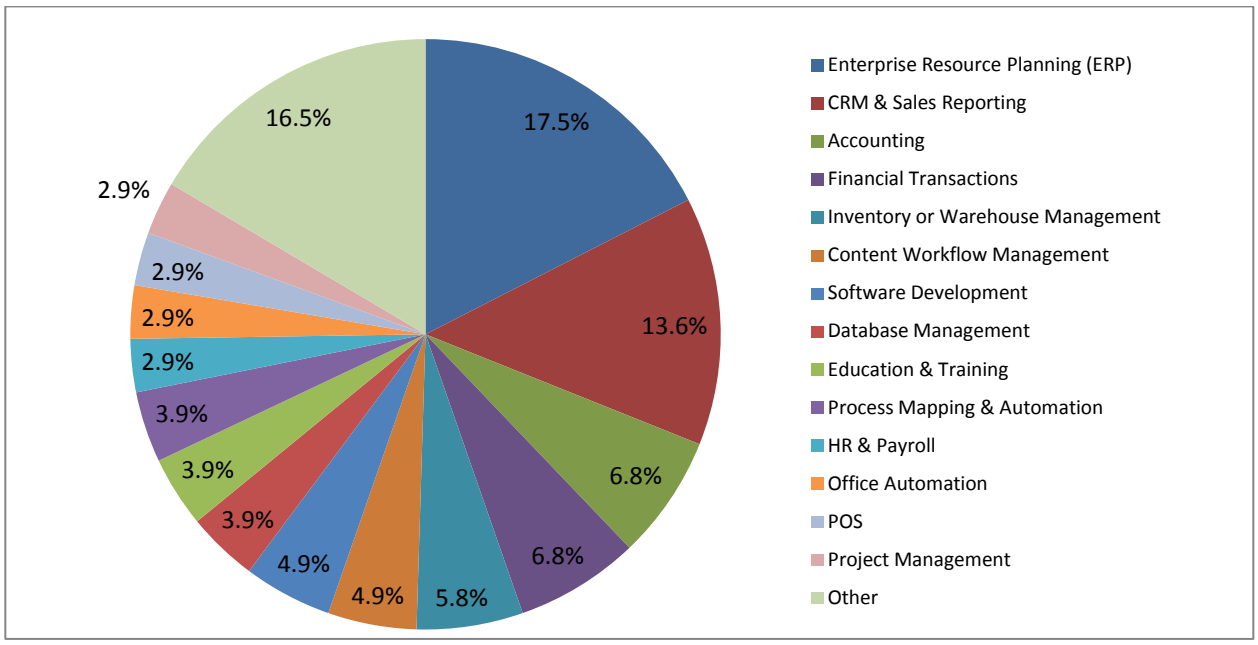

Figure 11: Percentage survey responses by software type

5.7 Response by vendor

The single biggest vendor by response frequency is Oracle at 11.7%. This is followed by SAP at 7.8%, Microsoft at 6.8% and Sage at 4.9%. The rest of the responses have less than 2% share of the total frequency of vendors selected and this diversified range of vendor's selected makes up 65% of the total response numbers. 3.9% of the survey respondents did not specify a vendor.

The response data is representative of the multitude of software packages available. Oracle had the most responses and this is most likely as it spans multiple industries with a range of software types including Enterprise Resource Planning (ERP), Customer Relationship Management (CRM), data analytics and financial control. The response data is weighted towards the larger enterprise application systems and all of the vendor with the largest market shares in South Africa, namely SAP, Oracle, Sage and Microsoft, were well represented (refer IT News Africa, 2013 for estimated market shares of these vendors).

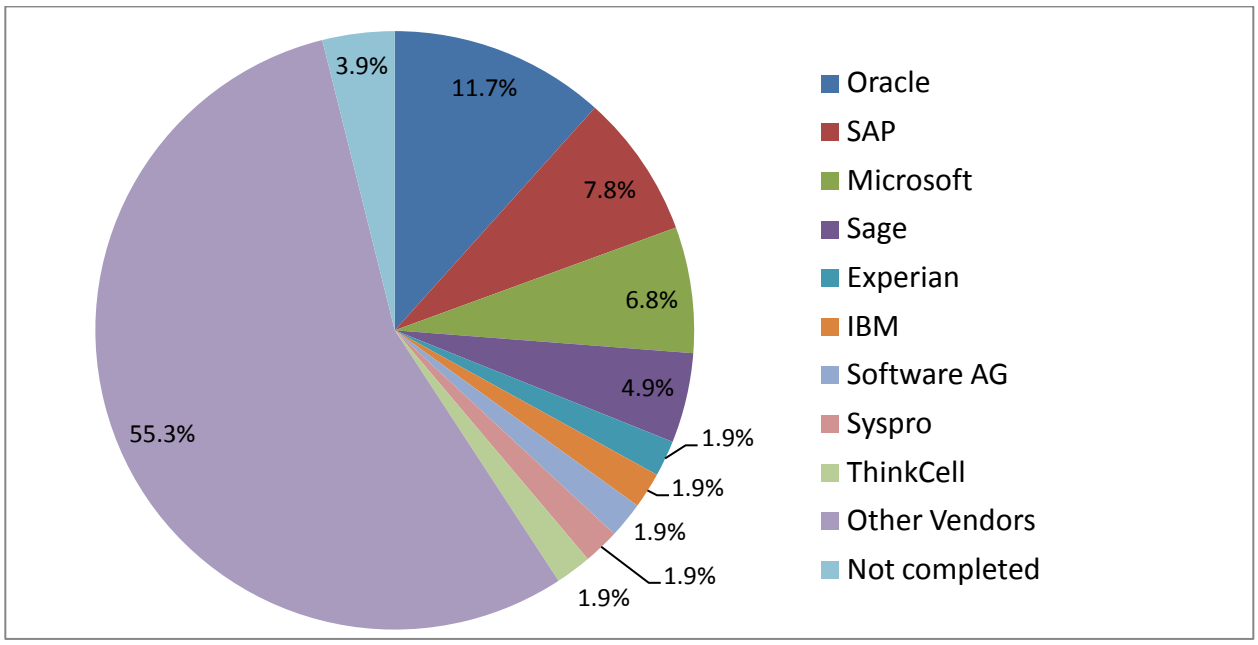

Figure 12: Survey responses by packaged software vendor as a percentage

Respondents reported on average that they were responsible for their software package for 5.41 years. This confirms that respondents were, on average, well positioned as respondents.

The packages had been in use for an average of 8.45 years. Swanson and Beath (1989) indicated that the life expectancy of software can be more than 10 years and thus the average of 8.45 years is not unexpected. However, this does suggest that many of the packages would be close to end of life and that many of the responding organisations are likely to be actively engaging in discontinuance decisions.

5.8 Number of software users

Roughly a third (35.9%) of respondents had less than 100 software users. A further 38.9% had between 100 and 500 users, while25.2% of respondent organisations had greater than a 1,000 software users. This shows that generally software packages were larger enterprise wide packages, with large number of users that would necessitate decisions made by senior executive decision makers.

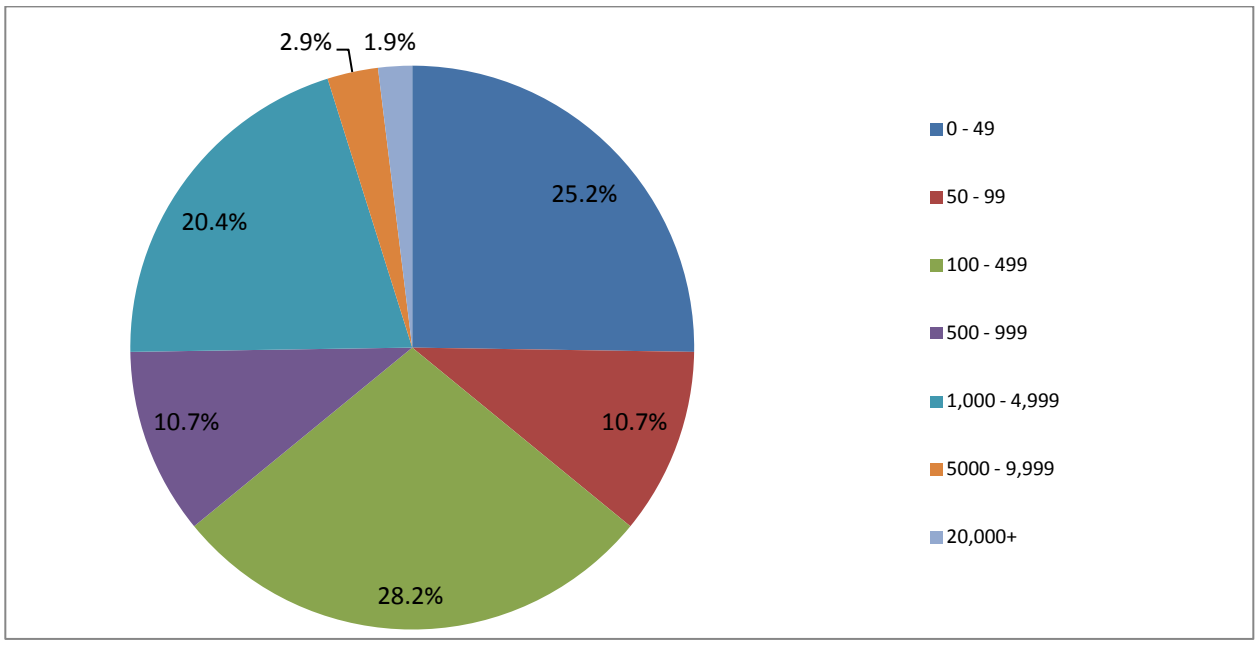

Figure 13: Respondents by number of employees %

5.9 Number of packaged software support staff

Around half of the respondents (49.5%) packaged software is supported by teams of less than 10 people. Support teams of 37%, of respondents were between 10 and 49 people while teams of over 50 people accounted for 13%. The largest packaged software support team consists of 1,000 members.

This indicates that half the systems have a relatively small number of people supporting the system. This information is slightly lower than what would have been expected with the fact that larger software packages were generally selected by respondents. This could point to how the item was operationalised and it is likely the definition of "support staff" that "are directly supporting the packaged software" being from both first line query response and technical support, was not fully understood.

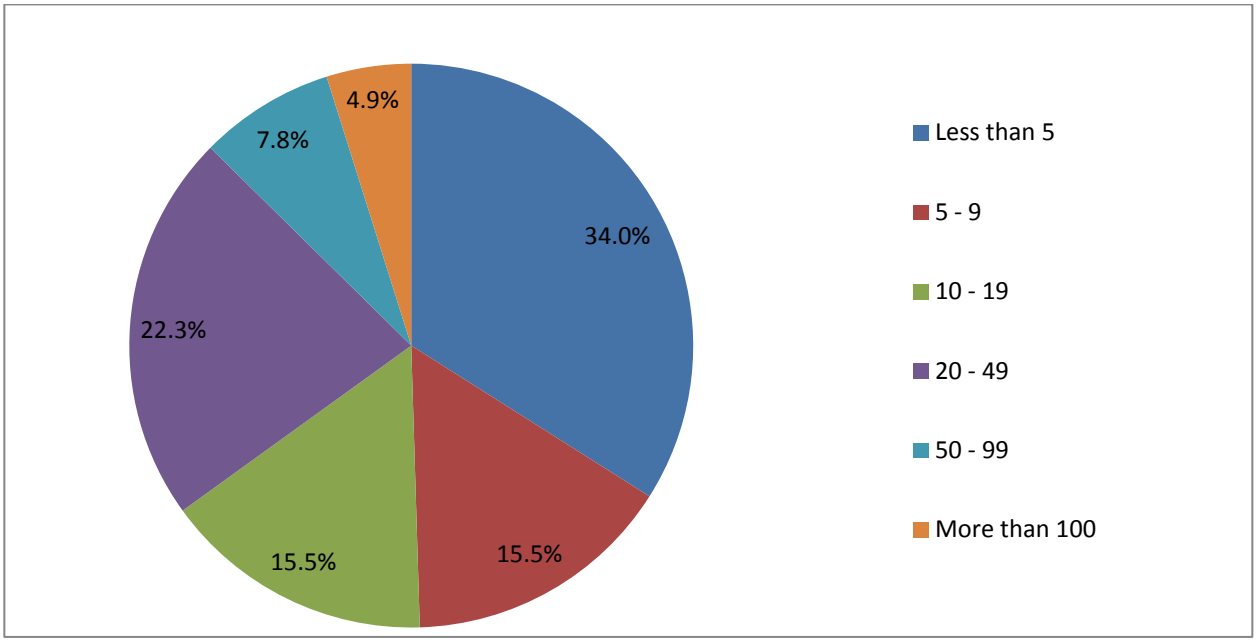

Figure 14: Respondents by number of packaged software support staff

The cross-tabulation table below illustrates the relation between the number of software users and the number of packaged software support staff. The table does indicate that there appears to be an increase in number of support staff as the number of software users increases.

Table 8: Cross tabulation table: number of software users vs. number of package software support staff.

	Support Staff						
Software Users	**Less than 5**	**5 - 9**	**10 - 19**	**20 - 49**	**50 - 99**	**More than 100**	**Totals**
0 -49	19	3	3	1	0	0	26
50 - 99	5	3	0	2	1	0	11
100 - 499	10	4	5	10	0	0	29
500 - 999	0	3	3	4	1	0	11
1,000 – 4,999	1	3	5	6	5	1	21
5,000 – 9,999	0	0	0	0	1	2	3
10,000 - 19,999	0	0	0	0	0	0	2
20,000 +	0	0	0	0	0	2	2
Totals	35	16	16	23	8	5	103

5.10 Category of discontinuance intention and intended time period

The survey requested information on the respondent organisation's next move regarding the software package and the timelines for this next move. The majority of responses 39.8% selected that they intended to 'replace the software package'. 35.9% of responses selected to 'carry out a minor upgrade /

patch' and 24.3% selected 'carry out a major upgrade (including data migration)'. The option for 'abandon the software package and do not replace' was not selected by any respondent.

The response data is representative of a range of discontinuance decisions with the exception of abandon the software package. It would appear that in the surveyed organisations the current software package functionality is required and respondents could not abandon the software without replacing the functionality in either a minor or major upgrade or software replacement.

In terms of this study's definition of discontinuance, only major upgrade, replacement and abandonment fell within the definition of discontinuance presented to respondents.

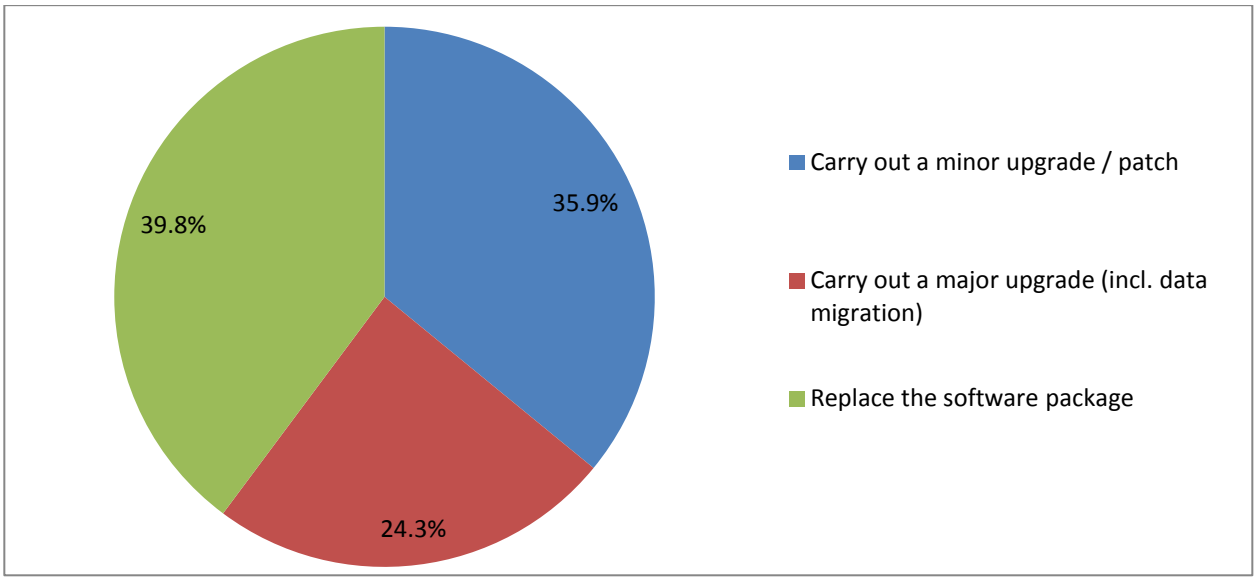

Figure 15: Survey responses per minor / major upgrade and replacement as a percentage

The time period for this next move was in the majority of responses due to occur within a year as 32% of the responses had the next action as being due in 0 – 6 months and 24.2% of responses were due in 7-12 months. In the case of 34% of responses the action was intended to occur in 1-2 years, for 4.9% the action is due in 2-3 years, 3.9% action is due in 3-5 years and 1% of responses the action is due in over 5 years in the future.

With the majority of responses (90.2%), the proposed discontinuance action period was within two years. This weighting represents the short term nature of managerial decisions.

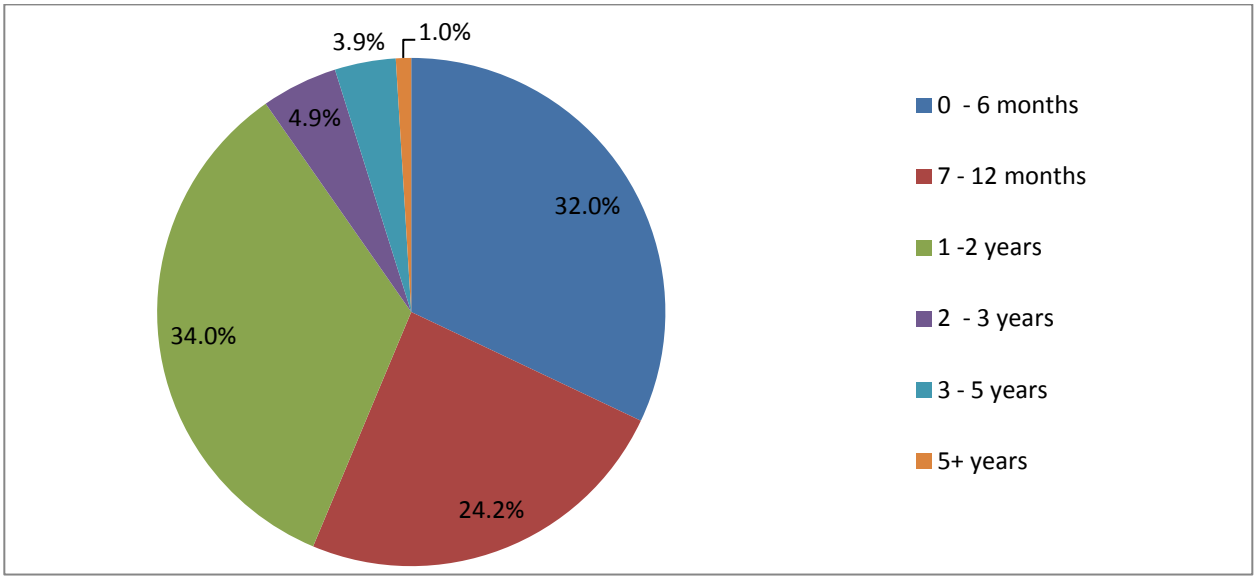

Figure 16: Time frame selected for minor / major upgrade or replacement as a percentage

The cross tabulation below shows that the software decision is generally minor upgrade in the short term 0-6 months at 18.4% of responses, but this changes to a 16.5% of responses being to replace the software in 1 – 2 years. 95% of the software decisions were to be implemented within 3 years.

The response data indicates that decision makers in the survey sample have a very short-term action plan for minor upgrades, while a slightly longer term plan for major upgrades and software replacement. This is most likely as a result of increasing relative complexity of a minor upgrade, major upgrade and replacement. These actions are however all within a short term time frame of three years.

Table 9: Cross tabulation table: Software decision category vs. time frame selected for action

		Software Decision Category			
		Carry out a minor upgrade / patch	Carry out a major upgrade (incl. data migration)	Replace the software package	Totals
Action Time Frame	0 - 6 months	18.4%	3.9%	9.7%	32.0%
	7 - 12 months	9.7%	5.8%	8.7%	24.3%
	1 -2 years	6.8%	10.7%	16.5%	34.0%
	2 - 3 years	1.0%	2.9%	1.0%	4.9%
	3 - 5 years		1.0%	2.9%	3.9%
	5+ years			1.0%	1.0%
Totals		35.9%	24.3%	39.8%	100.0%

5.11 Descriptive statistics

An exploratory data analysis was conducted on survey items using the 103 valid survey returns. This included table summaries and graphs shown in the appendices. The means, standard deviations, skewness and kurtosis for each of the scale items are presented in Appendix F. The results show sufficient variance in the responses and that the responses appear, for the most part, to be acceptability distributed around the mean. With the exception of the variable (PERF_RELIAB_RELIAB) the responses had reasonable skewness and kurtosis which is defined by Jiang, Klein and Carr (2002) as being less than 2 for skewness and less than 5 for kurtosis.

All the survey items that formed part of the statistical analysis are deemed at least interval level in measurement as it formed part of seven point Likert scale around the mid-point.

5.12 PCA of reflective, multi-item constructs

As discussed in Chapter 4, a principal components analysis (PCA) was carried out in order to investigate the factor structure of the data and to demonstrate convergent and divergent validity. Items representing the multi-item constructs of performance, suitability, integration, sunk costs and discontinuance were included. The two supportability items were not included in the PCA. This is because supportability will be modeled as a formative construct (i.e. the two components of cost and availability of support) are not necessarily expected to covary with each other and form a single construct. Furneaux and Wade (2011) also modeled these separately (refer Figure 1). The supportability construct variables (SUPP_OBTAIN and SUPP_COST) will therefore be removed from the PCA but examined separately for their effects in subsequent tests of hypotheses.

Five factors emerged with eigen values in excess of 1.00 which accounted for 68.9% of the variance explained. The Kaiser-Meyer-Olkin (KMO) Measure was above .5 at .747.

PCA was used to extract the average shared variance (AVE) for each factor. The benchmark of an AVE for each construct was to account for at least 50% of the variance in each construct to ensure there are no issues with convergent validity of the variables. Items were required to have low loadings on constructs they were not intended to measure for discriminant validity to be established (Paswan, 2009).

Multiple iterations of PCA were run. In early runs, some items had poor factor loadings and / or did not load onto the constructs they were theoretically supposed to measure. This included four performance items (PERF_RESP_REQ, PERF_AVAIL_UNAVAIL, PERF_AVAIL_DELAYS and PERF_RESP_QUICK); one each from suitability and integration (SUIT_INFRAST and

INTEG_BUS_SUCCES) and all the innovation construct items (INNOV_PROD, INNOV_IT AND INNOV_ITFORE). These were therefore dropped from subsequent analysis.

These items were then subject to a final CFA to confirm discriminant and convergent validity. The CFA cross-loading matrix is presented below.

Table 10: CFA loadings for discontinuance research framework

VARIABLE	Software Age	Integration	Discont	Mimetic	Sunk_Cost	Perform	Suitability	Supportability
Soft_Age	1.000	0.165	0.285	-0.095	0.173	0.227	0.172	0.210
Discont_Plans	0.346	-0.266	**0.927**	-0.247	-0.043	0.597	0.338	0.158
Disc_Future	0.258	-0.343	**0.917**	-0.308	-0.162	0.560	0.344	0.172
Disc_Soon	0.183	-0.329	**0.913**	-0.326	-0.136	0.599	0.467	0.054
Integ_Bus_Proces	0.266	**0.726**	-0.266	0.235	0.363	-0.252	-0.191	0.139
Integ_Tech_Soph	0.083	**0.872**	-0.315	0.245	0.194	-0.299	-0.102	0.044
Integ_Tech_Comp	0.072	**0.892**	-0.263	0.246	0.268	-0.338	-0.073	0.090
Mimetic	-0.095	0.291	-0.320	1.000	0.034	-0.370	-0.242	-0.193
Perf_Reliab_Task	0.139	-0.271	0.500	-0.256	-0.177	**0.788**	0.333	0.008
Perf_Reliab_Reliab	0.113	-0.228	0.394	-0.302	0.036	**0.687**	0.270	0.129
Perf_Reliab_Need	0.216	-0.302	0.574	-0.423	-0.109	**0.854**	0.347	0.097
Perf_Resp_Process	0.207	-0.265	0.421	-0.096	-0.038	**0.657**	0.257	0.058
Sunk_Custom	0.198	0.329	-0.117	0.013	**0.992**	-0.098	-0.052	0.332
Sunk_Impl	0.256	0.409	-0.007	0.025	**0.672**	-0.137	-0.191	0.374
Sunk_Operat	0.289	0.236	0.018	-0.119	**0.376**	-0.013	0.040	0.430
Suit_Needs	0.221	-0.122	0.432	-0.204	-0.081	0.443	**0.935**	0.166
Suit_Supp	0.060	-0.146	0.298	-0.239	-0.041	0.255	**0.859**	0.172
Supp_Cost	0.102	0.253	0.064	0.034	0.327	-0.020	0.032	0.544
Supp_Obtain	0.198	0.003	0.132	-0.244	0.188	0.120	0.204	0.914

All variables loaded on their constructs without loading highly on other constructs. It can therefore be determined that the retained items display a substantial degree of convergent and discriminant validity. The results (summarized in Table 11) show the Composite Reliability (CR) scores are not less than 0.8 with the exception of customisation sunk cost. The Average Variance Extracted (AVE) is greater than 50% of the variance in each construct is much larger than the construct's correlation with other constructs (Gefen and Straub 2005).

5.13 Construct reliability

Cronbach's alpha was selected as a measure of reliability. It usefully highlights individual-item issues like poor variability, negative correlations among items, low item-scale correlations and weak inter-item correlations (DeVellis, 2003). The results of the Cronbach's alpha test are shown in Appendix G.

Analysis showed that certain items reduced the Cronbach's alpha below the required estimated 0.7 but this was evaluated against the loss of conceptual validity of the measure. The 'item to the total correlations' were required to be above 0.4.

DeVellis (2003) categorized levels of alpha's as follows; below .60 'unacceptable'; between .60 and .65 'undesirable'; between .65 and .70 'minimally acceptable'; between .70 and .80 'respectable'; between .80 and .90 as 'very good' and much above .90 the researcher could shorten the scales of the instrument and decrease the burden on respondents. For the purposes of this study the alpha's between .70 and .80 will be categorized as 'good.'

For the performance construct, the Cronbach's alpha was obtained after removing those items dropped during the factor analysis from the scale (PERF_RESP_REQ, PERF_AVAIL_UNAVAIL, PERF_AVAIL_DELAYS and PERF_RESP_QUICK). The remaining four items had an alpha of 0.717. For the construct suitability, the two retained items, SUIT_NEEDS and SUIT_SUPP, demonstrated reliability with a Cronbach's alpha of .765 and thus above the lower acceptable bound of alpha 0.7 (DeVellis, 2003).

In the case of the customisation sunk cost construct, all the variables (namely SUNK_CUSTOM, SUNK_IMPL and SUNK_OPERAT) were retained in the model with a Cronbach's alpha for these three items at .818.

The construct innovation did not have an alpha of greater than .6 and it could not converge in the PCA. The entire construct was removed as a control variable from the research.

The discontinuance construct has a high alpha (.908) and strong inter-item correlations and as a result all items were retained.

A summary of the Cronbach's alpha's for the composite constructs is obtained is listed below:

Table 11: Summary of Cronbach's alpha reliability results

Construct	# of items	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	Average inter-item correlation	AVE	Composite Reliability	Implied Reliability
Performance	4	.717	.739	.523	.563	.836	Good
Suitability	2	.765	.765	.620	.806	.892	Good
Integration	3	.777	.775	.621	.694	.871	Good
Customisation Sunk Cost	3	.818	.824	.680	.526	.745	Very good
Discontinuance	3	.908	.909	.818	.845	.942	Very good

This confirms the suitability of the underlying measurement model and allowed for the hypothesis testing to proceed.

Composite scores for the above multi-item constructs were then calculated by taking the average over the surviving set of measurement items weighted equally. These composite scores were then used in subsequent correlation and regression analyses.

5.14 Correlation analysis

Pearson correlation analysis was used to examine the relationships between the study's variables. This included all "firmographic" information (number of users, number of years in the organisation etc.), the individual items for supportability, mimetic isomorphism, system age, and the composite scores calculated for the multi-item scales. Pearson correlation was used. The correlations are available in the correlation matrix in Appendix G, Table 21. The correlation coefficients do not however, imply causality.

The discontinuance construct (COMPDISCONT) correlates to the performance construct (COMPPERFROM) at 0.533 (significant at $p<0.001$). This is the strongest correlation between the independent and dependent variable. The correlation between 'years using organisation has been using the software' (Yrs_Using_Soft) and the 'software age' (Soft_Age) 0.539 (significant at $p<0.001$) are related as the two would be related but the software age variable includes a measure relative to the portfolio of systems in the organisation (i.e. "one of the newest, 'relatively new', 'about average', 'relatively old' and 'one of the oldest').

Simple regression analysis

To analyse the relationship between the independent and the dependent variables a simple regression was done for the independent variables each separately. The control variables were excluded from this analysis. The summary of the findings is shown below.

Table 12: Linear regression analysis of constructs

Construct / Variable	Correlation Co-efficient	R^2(explained Variance)	Beta Co-efficient	F Value	p-Value
Performance	.533**	.284**	-.533**	39.997	.000
Suitability	.363**	.132**	.363**	15.297	.000
Supportability (Cost)	.316	.100	.100	1.015	.316
Supportability (Obtain)	-.008	.000	-.008	.006	.340
Integration	-.210*	.044*	-.210*	4.655	.033
Mimetic Isomorphism	-.215*	.046*	-.215*	4.919	.029
Customisation Sunk Cost	-.021	.000	-.021	.045	.832

* Significant at the $p<0.05$ for a 2 tail test

** Significant at the $p<0.001$ for a 2 tail test

The simple regression analysis shows that performance explains the largest roughly 28% of the variance in the discontinuance construct. This is significant at the $p<0.001$ level for a two tailed test. Suitability explains around 13% ($p<0.001$ level) and Integration and mimetic isomorphism explain around 4% (at the $p<0.05$ level). The other predictor constructs have non-significant effects.

To examine the combined effects of the independent and control variables on the dependent discontinuance construct, multiple regression analyses were run. These are reported in the next section together with tests for collinearity.

5.15 Regression results including collinearity assessment

Multiple regression analysis

A multiple regression analysis was run in SPSS to test the simultaneous effects of the independent constructs (and two variables) on the discontinuance dependent construct. A hierarchical regression test was performed using the control variables and then the main effects variables. The results are depicted in Table 13 below.

Table 13: Multiple regression analysis summary

Model		R = .603 R^2= .363 Adjusted R^2 = .286 p < .0000 Std Error of Estimate: 0.787 β	Std. Error of β	b (Beta)	t	Sig.	Tolerance	VIF
Control Variables	**No_Soft_Users ***	-.137	.145	-.132	-.943	.348	.482	2.075
	Support_Staff *	.007	.212	.005	.035	.972	.487	2.051
	Soft_Age	.194	.084	.236	2.309	.023	.912	1.096
	Sponsor_Presence	.142	.192	.077	.741	.461	.887	1.127
Main effect constructs and variables	**Performance**	.416	.105	.411	3.977	.000	.654	1.529
	Suitability	.119	.055	.202	2.142	.035	.786	1.273
	Supportability (Cost)	.074	.056	.130	1.318	.191	.716	1.397
	Supportability (Obtain)	-.079	.048	-.157	-1.641	.104	.766	1.305
	Integration	-.060	.071	-.090	-.845	.400	.622	1.609
	Mimetic Isomorph	-.007	.047	-.015	-.157	.875	.741	1.349
	Custom Sunk Costs	.024	.076	.039	.314	.754	.460	2.175

Dependent Variable: Discontinuance Construct

* Log_{10}

The model explains roughly 36.3% of the variance in discontinuance intentions. The R^2 is significant at the p<.001 level. The performance construct at a significance level of p<0.001 is significant and suitability is significant at the p<0.05 level.

Assess collinearity

The regression results also provide an assessment of collinearity among the independent variables. Results are shown in the last two columns of Table 11 above. Tolerance scores and the inverse of the tolerance scores variance inflation factors (VIF) were analysed. Tolerance scores were close to 1 and VIF's were below 5 indicating that the collinearity is not too high and no constructs are required to be eliminated.

The next step in the analysis, as a final test of the study's hypotheses was to test the model within PLS. This is especially useful for modeling the change and inertia forces as higher-order factors. This is reported next and followed by the presentation of two PLS model results.

5.16 Test of the PLS structural model

Bootstrapping with 1000 samples was used to obtain t-values for determining the significance of the path coefficients.

Figure 17 presents results. The constructs included in the research model account for approximately 48.5% of the variance in discontinuance intentions. The t-statistic was significant ($t > 1.982$ with a two tail test) for software performance, software age and business and technical integration. The results can be interpreted as the better the performance of the software, the lower the discontinuance intention; the older the software, the higher the discontinuance intention and the more integrated the software, the lower the discontinuance intention. This provides support for hypotheses H1 (supported at $p<0.001$), H5 and H7a (supported at $p<0.05$) and H2 received some support but at $p<0.1$ level. The effects of the other factors were not significant, leading to the rejection of hypotheses H3, H4, H6, H7b-d.

In Figure 17 the following applies:

The thick solid blue line  highlights support at the $p<0.001$

The medium thick solid line  highlights significant support at $p<0.05$

The thin blue line  highlights some support at $p<0.1$

The dotted blue line  highlights were there is no significant support.

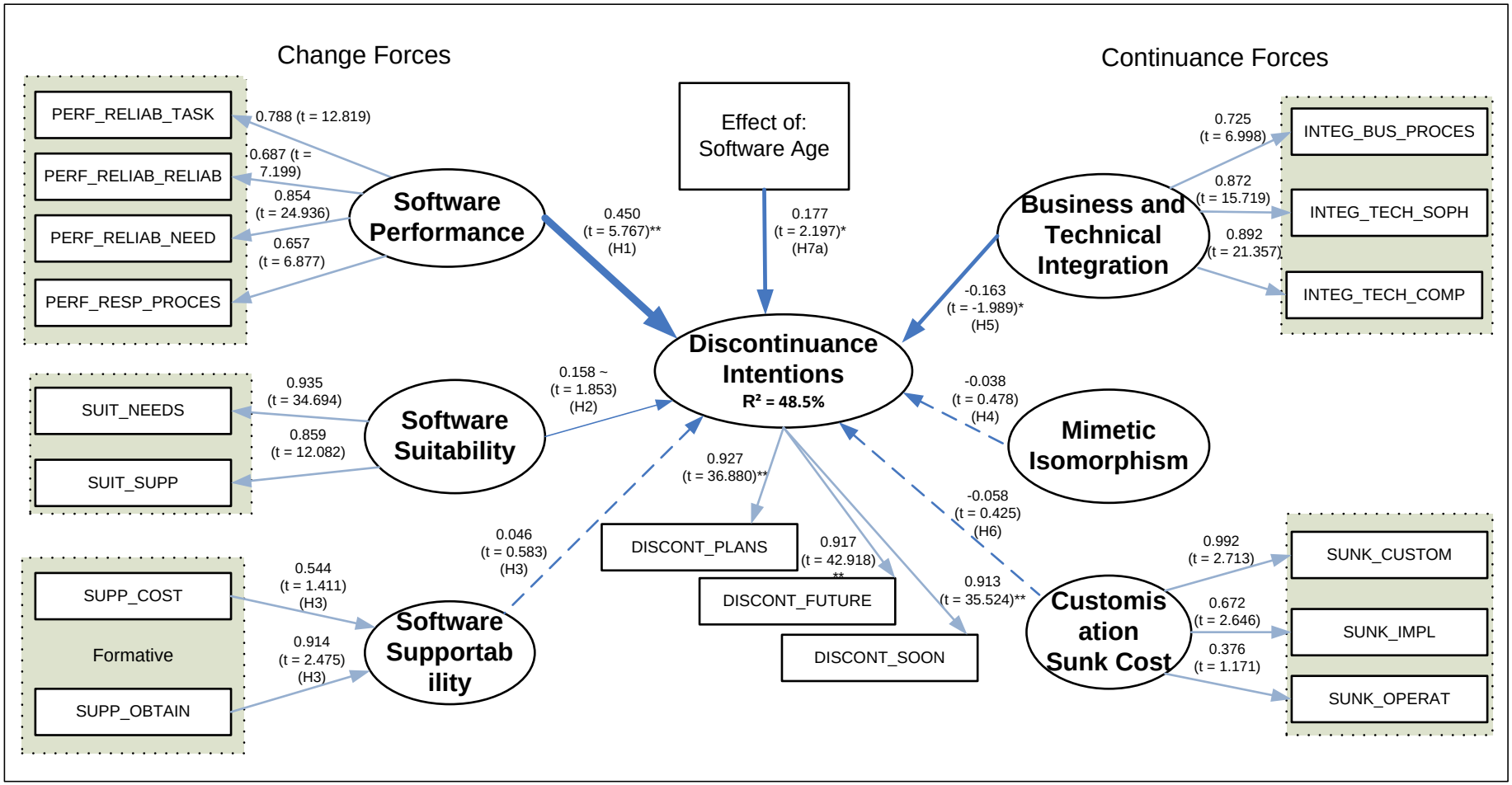

Figure 17: IS Discontinuance Framework (total effects and t values)

** Significant at a two tail test (t > 3.38 and p < 0.001 where df = 102)

* Significant at a two tail test (t > 1.982 and p < 0.05 where df = 102)

~ Significant at the two tail test (t > 1.66 and p < 0.1 where df = 102)

Further analysis was undertaken to determine the relative strength of change forces and continuance forces in determining change in discontinuance intentions.

The change and continuance forces were modeled as formative second-order constructs. This was considered appropriate as the first-order constructs for change (software performance, suitability and supportability) and continuance (integration, customisation sunk costs and mimetic isomorphism) are not necessarily interdependent and would contribute individually to discontinuance. The first-order factors are not expected to covary (Chin, 2000a). Factor scores from the variables were used as the manifest indicators of the second-order construct for the purposes of this analysis. The supportability fields of support obtain and support cost were modeled separately as change forces.

The results are shown in Figure 6 below. Change forces (performance, suitability and supportability) are collectively far more important to discontinuance than inertia forces (integration, mimetic pressure to retain the software and sunk cost).

The results show that the combined effects of the change forces are most significant with performance concerns being the primary driver, but software suitability is also a significant component of the combined change force. Inertia (continuance) forces still exert an effect to lower discontinuance but this is not considered statistically significant at the $p<0.1$ level. Business and technical integration and mimetic isomorphism are the prominent forces maintaining the status quo.

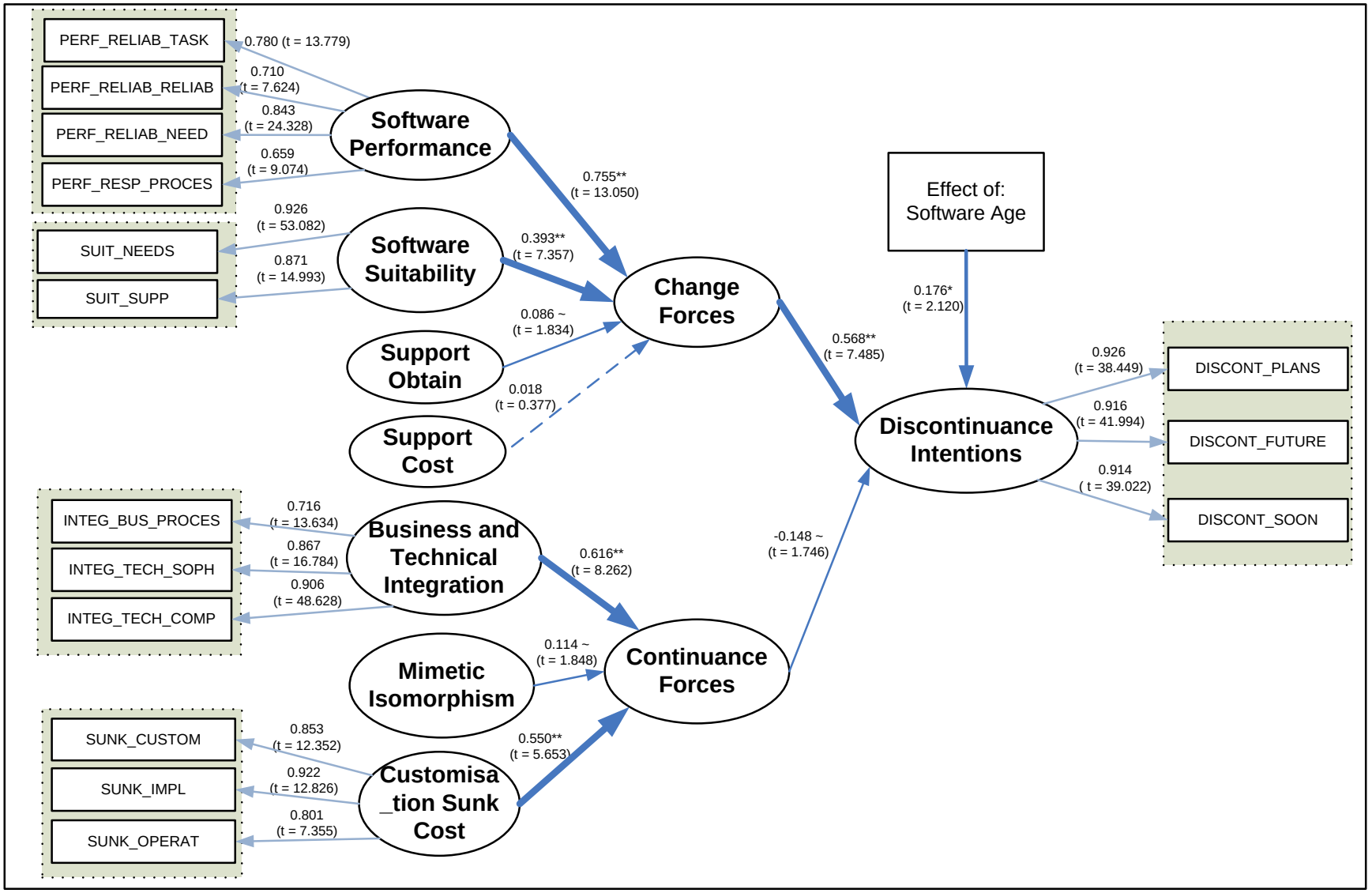

Figure 18: Relative strength of change and continuance forces.

** Significant at a two tail test (t > 3.38 and p < 0.001 where df = 102)

* Significant at a two tail test (t > 1.982 and p < 0.05 where df = 102)

~ Significant at a two tail test (t > 1.66 and p < 0.1 where df = 102)

5.17 Moderation of software age and sponsor presence

There was no significant moderating effect found that the sponsor presence has on the relationship between customisation sunk costs and the endogenous latent variable. Therefore the premise that the original sponsor would be more affected than other managers by what Keil et al. (2000) termed the sunk cost effect, was not evident in this research.

There was no significant moderating effect found that software age has on the relationship between the cost of supportability and discontinuance intentions. The concept highlighted by Swanson and Beath (1989), that support costs should increase as the software ages was not corroborated in this study.

The effect of software age has on the relationship between the availability of support and the discontinuance construct was show to have a very slight moderating effect. At 'low' software ages (i.e. relatively new software in the portfolio) the discontinuance intentions increase if the difficulties in obtaining support increase. At 'high' software ages or (relatively old software in the portfolio) the effect is noticeable in that discontinuance intentions decrease if the difficulties in obtaining support resources increase. This is counter intuitive and shows the moderating effect of software age albeit a relatively weak influence.

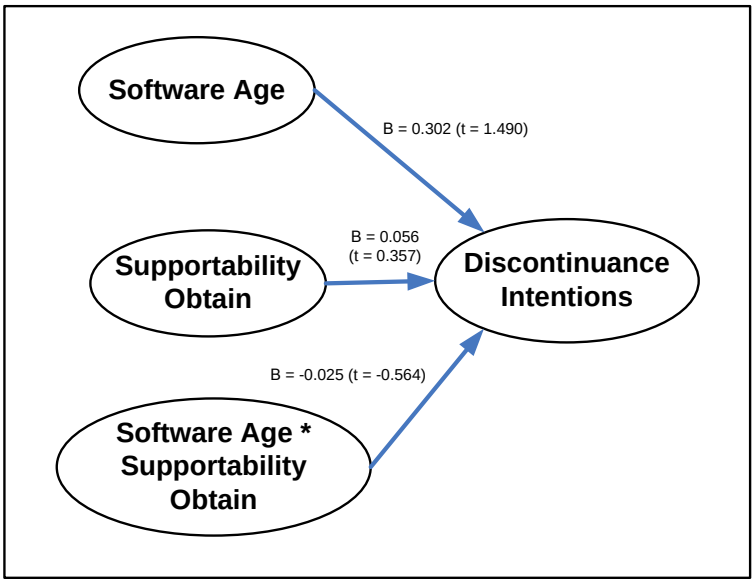

Figure 19: Software Age as a moderating effect on supportability obtain variable

The following coefficients were analysed from Figure 19 and the two-way interaction effects are mapped in the figure below.

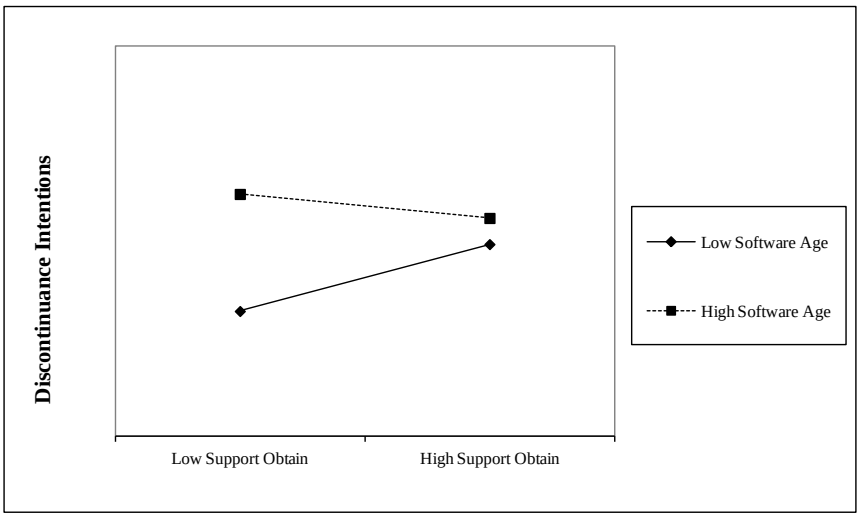

Figure 20: Two way interaction effects of support obtain and software age

Figure 21 below presents an integrated framework of packaged software discontinuance. It is derived from the significant findings of this study and highlights the effects of system performance and integration which are consistent with Furneaux and Wade. The effect of support availability was not however, confirmed in this study.

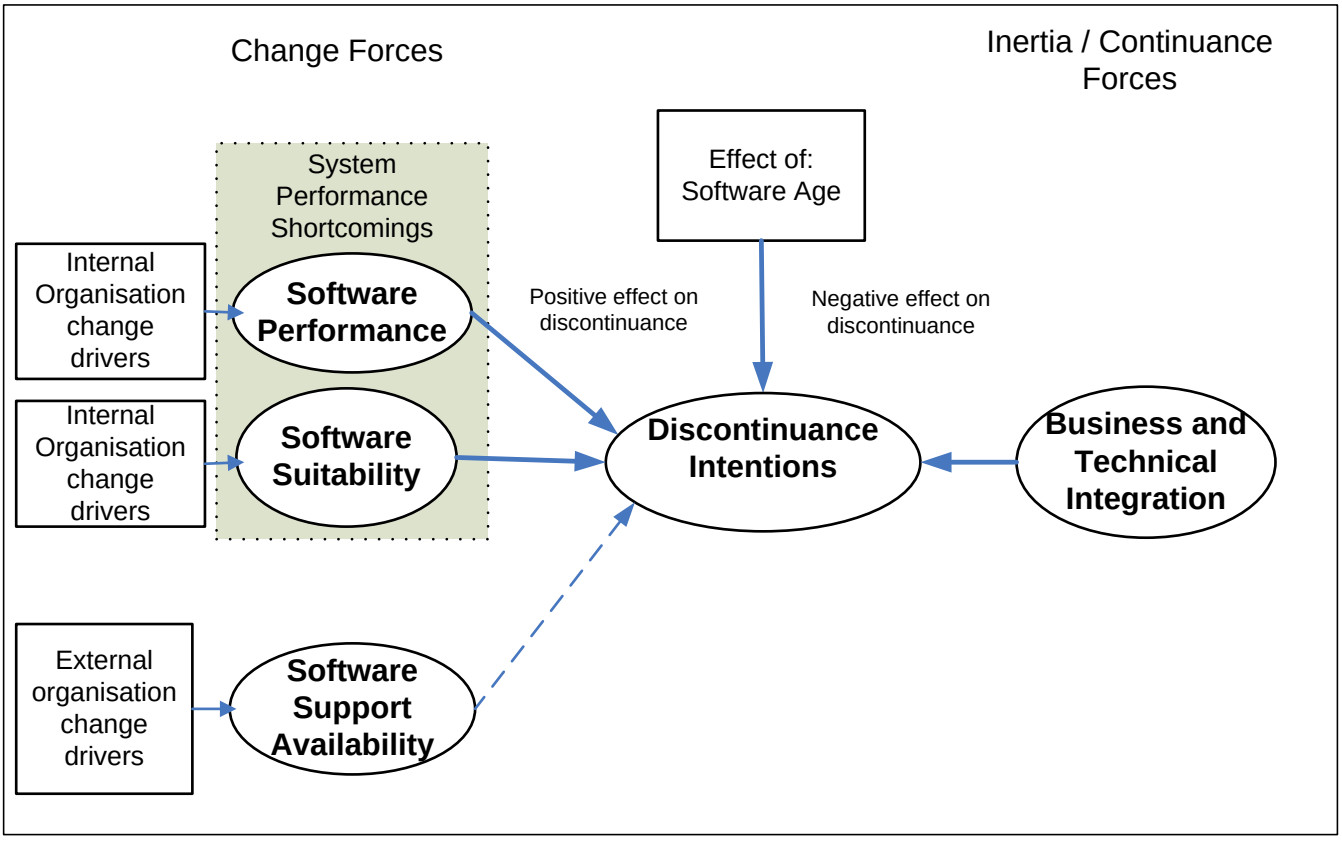

Figure 21: An integrated framework summarizing the significant findings of Furneaux and Wade (2011) and this study.

Chapter conclusion

Chapter 5 has given an overview of the survey results, analysis of the descriptive statistics, analysed construct reliability and validity and analysed the strength of the construct relationships. The final chapter will give a summary of the findings based on the underlying hypotheses, propose future studies and draw conclusions on the discontinuance research.

CHAPTER 6. DISCUSSION AND INTERPRETATION OF RESULTS

This chapter will discuss the outcomes of testing the hypotheses proposed in Chapter 3. The discussion will refer back to the theoretical underpinnings and relevant literature.

The results of the hypotheses testing reveal that two of the 'change forces' and one 'inertia force' were significant predictors of discontinuance, whilst the effect of software age was also supported.

Table 14: Summary of hypothesis testing

Hypothesis	Explanation	Finding
H1	A perceived lack of packaged software performance (low reliability, low responsiveness, low availability) is associated with increased discontinuance intentions.	Supported
H2	A lack of packaged software suitability is associated with increased discontinuance intentions.	Some support
H3	Poor packaged software supportability is associated with increased discontinuance intentions	Not supported
H4	Packaged software in use that is the industry standard is associated with reduced discontinuance intentions	Not supported
H5	Packaged software exhibiting higher levels of (technical and business) integration are associated with reduced discontinuance intentions. *	Supported
H6	Higher costs of customising packaged software is associated with reduced discontinuance intentions.	Not supported
H7a	Packaged software age is associated with increased discontinuance intentions.	Supported
H7b	Continued tenure of a packaged software's executive sponsor is associated with reduced discontinuance intentions.	Not supported
H7c	An organisation's propensity to innovate in the creation and use of information systems is associated with increased discontinuance intentions.	Not supported
H7d	Packaged software size is associated with reduced discontinuance intentions.	Not supported

* Factor analysis resulted in technical and business integration loading together on one factor. H5a and H5b were thus combined.

H1 - A perceived lack of packaged software system performance (low reliability, low responsiveness, low availability) is associated with increased discontinuance intentions.

Drawing on arguments by Furneaux and Wade (2011), this study included performance as change force for discontinuance. More specifically, it was hypothesized that perceptions of poor system performance would drive discontinuance intentions. This is because the net benefits of system use would reduce as system performance declines (DeLone and McLean; Petter et al.). Drawing inter-alia on DeLone and McLean's (2003) work into system quality, performance was initially conceptualized as consisting of reliability, responsiveness and availability components. Factor analysis suggests that a single

performance construct be modeled. Results showed that the performance construct proved to be statistically significant and the strongest determinant of discontinuance intentions in this research model. Thus H1 is supported. Poor performance was positively correlated with discontinuance. Decision maker's discontinuance intentions regarding a software package is strongly linked to the software reliability dimension defined as the software performing its' intended task. If the system becomes more unreliable over the time period since its implementation, it can cause considerable business risk (Furneaux and Wade, 2011). One item was retained in the responsiveness dimension from 'if the software informs users how long software takes for processing'. If the response rate of the system is slow, frustration for customers and users may result and this should increase intentions to discontinue the system's use (Randall et al., 1999). The software availability dimension ('software unavailable for short periods' and 'provides output without long delays') did however, not form part of the performance construct as it was dropped during PCA analysis. Reasons for this could include that the software packages that were analysed by respondents, were the larger software packages and system availability may not be a perceptible concern of respondent's responsible for these systems.

This research concludes that delays in software processing were not considered a reason for discontinuance intentions, but if delays occur it is important that the software notifies users of this delay. Results reported here suggest that a broader conceptualisation of system performance was necessary. Furneaux and Wade (2011) only considered system reliability and they did not find it linked to discontinuance. In the qualitative section of their research however use could be extended if the system was reliable. This study therefore has contributed further to our understanding by confirming the importance of performance.

H2 - A lack of packaged software suitability is associated with increased discontinuance intentions.

Suitability was shown to be a somewhat significant determinant of discontinuance intentions in the PLS investigation. Suitability as a change force was found to have a somewhat significant and a weak influence.

The suitability construct shared two items with Furneaux and Wade's (2011) system capability construct, which was found to be the most significant factor impacting replacement intentions. As the software ages and system and business processes change, the software may become less suitable to the meet the needs of the organisation. At some point as suggested by Kelly et al. (1999), system limitations are reached and it can no longer be maintained and will no longer meet user needs as it becomes less suitable to the new environment. Suitability is thus important to discontinuance intentions, where a specific emphasis should be placed on limitations of the software to meet user needs and required capabilities that are not supported in the package.

H3 - Poor packaged software supportability is associated with increased discontinuance intentions

The influence of the availability and cost of support as change forces were not shown to be significant. It was initially hypothesized that if vendors were ceasing to provide support or would only make such support available at a high cost then it would be more likely that the software package would be discontinued. Furneaux and Wade (2011) did not find support cost to be important in their study, however they did find that support availability explained a large amount of variance in the decision maker's replacement intentions. The findings of this study are thus not consistent with expectation or with the results of Furneaux and Wade with regards to availability of support. An explanation for this finding regarding cost is that organisations have different relative assessments of support costs and support costs are often not directly recognized as they could be built into an initial license fee. Consequently, support availability should take on more salience. However, lack of support for availability in this study sample may be explained by the fact that due to the large, enterprise packages selected, these are likely to be running on supported platforms. A study relying on a different sample of software packages may reach different conclusions regarding this hypothesis.

Taken together with the above results, discontinuance appears to be motivated largely by internal organisational considerations regarding the performance and suitability of the package rather than external IT industry considerations such as the availability of support.

H4 - Packaged software in use that is the industry standard is associated with reduced discontinuance intentions

Mimetic isomorphism as a continuance force was operationalized by asking respondents whether they perceived that the software package under consideration was an industry standard. Drawing on institutional theory, it was hypothesized that because organisations are driven to seek legitimacy, they would be less likely to abandon the use of a package that was dominant. For example, in the 1980s there was an industry anecdote that CIOs did not get fired for buying IBM.

Furneaux and Wade (2011) discussed the importance of mimetic institutional pressures but did not test it within their quantitative model. It was therefore considered important to consider here. Empirical results did not however show this mimetic pressure to be a significant determination of discontinuance intentions. This suggests that the senior managers surveyed in this study place more weight on the rational considerations of software performance and their discontinuance decisions are not based on the perceived legitimacy of the software package. A further explanation could be that mimetic pressures are only salient with the decision maker's perception that the technology is highly complex and thus would rely on mimetic behaviours as a means to reduce the complexity of the decision process (Teo et al., 2003). Future research may wish to examine this further.

H5 - Packaged software exhibiting higher levels of integration (technical and business) are associated with reduced discontinuance intentions.

Although technical integration and business process integration were initially conceived of as two separate factors, the empirical analysis could not discriminate between the two constructs and they were consequently merged into a single business and technical integration construct. This finding likely reflects the strong degree of infusion of packaged software applications into the underlying business processes they are designed to support with packages supporting a large number of processes requiring greater degrees of technical complexity. The combined integration construct was found to be a significant continuance force.

These findings corroborate those of Furneaux and Wade (2011) where technical integration was found to be a significant determinant of replacement intentions in their model. Replacement of software packages with high degrees of technical complexity and those that underpin multiple processes with a large user base, would require large amounts of development and organisational change efforts. Findings suggest that organisations will shy away from the discontinuance of such system.

H6 - Higher costs of customising packaged software is associated with reduced discontinuance intentions.

It was hypothesized that decision makers would continue to commit resources to a software package after their initial expenditure as discontinuing the system would be perceived as a loss of their previous investment. Keil et al. (2000) referred to this as the sunk cost effect.

Empirical results did not however find the sunk cost effect to be a significant continuance force. This suggests that decision makers do not consider the implementation costs, software customisation costs or ongoing operating costs as primary reasons for forming discontinuance intentions.

However, as pointed out by Furneaux and Wade (2010), the expenditure of financial resources on the software is only one part of a system investment. The inertia force of sunk costs can also include technical and user skills gained in the system. Those were not considered here and future research may wish to examine the inertia effects of these non-financial investments.

H7a - Packaged software age is associated with increased discontinuance intentions.

Software age was hypothesized to influence discontinuance intentions such that older software packages were more likely targets for discontinuance. This is because the age of a system influences the maintenance efforts required (Swanson and Dans, 2002). Moreover, older systems may fail to meet requirements of a changing business environment. Software age was measured in this study as the package's period of operation relative to the portfolio of applications within the organisation. This

hypothesis was supported by the empirical evidence in that relatively older packages were more likely to be discontinued. This makes intuitive sense in that as a system ages, the probability of changes in competing software packages and changes in business strategy increases, which increases the likelihood of discontinuance intentions.

H7b - Continued tenure of a packaged software's executive sponsor is associated with reduced discontinuance intentions.

Drawing on the political perspective (Markus, 1982; Kling and Iacono, 1984), it was hypothesized that the presence of the original management sponsor for the package software would result in inertia and act as a force to retain the software package. This is because the sponsor would be politically invested in earlier decisions and ideological preferences regarding the software package and would seek to ensure the software's return on investment was maximized even if such return was failing to materialize.

Empirical results did not however find presence of the sponsor to have a significant influence on discontinuance intentions. One explanation might be that because large organisations and large software packages constituted the sample studied, the responsibility of being a system sponsor is not necessarily invested in one executive and it may include a group of executives. Another possible explanation is that the sponsor's role in the selection and implementation of the system may be more important than his/her continual presence. Future research may wish to explore these ideas further.

H7c - An organisation's propensity to innovate in the creation and use of information systems is associated with increased discontinuance intentions

It was hypothesized that innovative organisations or organisations that contain more innovative decision makers would be more likely to discontinue systems that present constraints to innovation efforts. Unfortunately, innovativeness was found difficult to measure reliably and the construct was dropped from model testing. It was thus not possible to conclude whether the propensity for an organisation to innovate would be associated with increased likelihood of discontinuous intentions. Future studies may wish to consider alternate operational measures for innovativeness.

H7d - Packaged software size is associated with reduced discontinuance intentions.

Finally, the number of users and the number of support personnel were considered measures of packaged software size. It was thought that the larger the system (number of users), the larger the will be the effort to replace the system and the more likely an organisation would want to retain such systems for longer. Moreover, the larger the number of support personnel, the more manageable would be the operations and maintenance activities and the less pressure would be exerted to replace a package. Results showed however that size did not have a significant effect on discontinuance. The number of support personnel, or total number of employee also did not have an effect on the forces impacting discontinuance intentions.

Chapter Conclusion

This chapter discussed the outcomes of empirically testing the hypotheses proposed in Chapter 3. The discussion referred back to theoretical underpinnings and relevant literature, while proposing plausible explanations for the results shown in this research.

CHAPTER 7. CONCLUSION

This final chapter will summarise the study, it will discuss the implications of the study for research and practice and highlight areas of future research. The chapter will conclude with the limitations of this research study.

7.1 Summary of the study

The managerial decision to discontinue an existing software package by replacement, upgrade or abandonment requires extensive justification and evaluation. The timing of a system's discontinuance is of strategic concern as the cost and impact of a packaged software application can be extensive. If the decision is made too early in the system's life cycle, it can negatively affect the return on investment, but if the decision occurs too late, the system may become a liability to an organisation as it continues to consume resources in maintenance and support.

Information system discontinuance is however an underrepresented research topic. This study had made an incremental step to address the limited academic research into discontinuance by extending and empirically validating a framework of continuance and inertia forces as originally proposed by Furneaux and Wade (2011).

Continuance forces included software performance, suitability and supportability (both availability and cost). Inertia or continuance forces included the software's business and technical integration, mimetic isomorphism and the customisation sunk cost of the packaged software. The factors were analysed together with the effects of system age, sponsor presence and system size.

The empirical context for the study was South African organisations. IT executives and managers were the targeted respondents and were asked to report on the study's variables and their software package discontinuance intentions. The response data from 103 IT decision makers was received and analysed to test the hypotheses.

The research findings show that two change force constructs, software performance and suitability and one continuance force, business and technical integration, were significant in their effects on discontinuance intentions. The system performance was overwhelmingly the strongest determinant of discontinuance intentions. The software's age relatively to the organisation's portfolio of applications was also proven to be significant in this research.

Results showed the overall larger effects of the change forces over the continuance or inertia forces. The implications of these findings for research and practice are discussed next.

7.2 Implications for research

This study has made an important contribution through its extensions and reexamination of the Furneaux and Wade's (2011) framework.

First, Furneaux and Wade's system capability shortcomings construct was split into system performance and suitability constructs. This gave a richer view of these separate constructs which both proved to be significant in this research. System performance includes both reliability and responsiveness dimensions but did not find variables in system availability significant. Suitability included meeting the needs and capabilities requirements but did not include the quality of outputs or the compatibility with infrastructure. These inclusions and exclusions indicate a pattern at this stage in the evolution of modern packaged software; senior managers do not view outputs, infrastructure incompatibility or software unavailability as decisive issues with software.

Second, Furneaux and Wade did not test the effects of mimetic pressure. Drawing on Institutional Theory this research tested whether managers are only driven by rational goals of efficiency or are they also driven by mimetic pressures of social and cultural factors and concerns for legitimacy. The findings show that rational goals are the primary driver.

Third, Furneaux and Wade did not include a political perspective. This was reflected in this research through the inclusion of the presence of the original sponsor, to determine the senior manager's effect on the discontinuance decision. Examining power and politics perspectives only through the presence of the original sponsor may not however fully capture the complexity of those phenomena and future studies may wish to further conceptualize the construct.

Fourth, this study departed from Furneaux and Wade's measure of software age and measured it as the package's relative age within the overall applications portfolio. This measure of age was shown to have a significant effect on discontinuance intentions.

Fifth, this research improved on Furneaux and Wade's use of replacement intentions as the endogenous latent construct, to include abandonment, replacement or upgrade as possible forms of discontinuance.

Sixth, Furneaux and Wade's system investment construct was broadened to look at a total value of sunk customisation costs including the stages of implementation, customisation and ongoing resource cost of operation. This addressed the issue of managers quantifying the total value invested into the information system.

Seventh, the tested framework and extensions included a propensity to innovate as a control variable. The propensity to innovate however proved difficult to operationalise reliably and it was dropped from the model. It is however deserving of attention by future as a way of examining how organisational strategies and culture influence discontinuance.

The findings of this study have supported the efforts of Furneaux and Wade in the study of discontinuance and have shown the significance of the performance, suitability and integration constructs. Although the findings that support availability, support costs and sunk cost (system investment) proved to have non-significant influence on discontinuance there is none-the-less much room to consider these variables in future studies. For example, investments can be considered not only in terms of costs (as was the case here) but also technical facilities and user skills as being part of the customisation sunk cost.

The framework tested explained a fairly large amount of variance in the endogenous latent variable (48.5%). Further research is required to identify and test other change forces and inertia related factors that might come to influence discontinuance decisions.

7.3 Future research

Furneaux and Wade (2011) point out that in an under researched topic such as information system discontinuance, there are numerous fields of research possible. These research topics can go from the research testing Furneaux and Wade's (2011) framework in various geographical and industry sectors, to testing replacement intentions for specific types of software systems (ERP, CRM or Database).

Future discontinuance research could include how the roles people occupy within the organisation can influence their discontinuance intentions. As an example, research how user's perceptions of a software package ultimately influence a decision maker's discontinuance intentions.

This study used packaged software as the category of information system. There is a range of information system categories that may well be subject to discontinuance intentions. This includes proprietary developed software, rented software, software components of enterprise systems and software as a service (SaaS). Richmond et al. (2006) highlighted that the formulation of discontinuance intentions for other IS types may behave very differently to packaged software. Interestingly to note is that in this study a software development house declined to participate, but the gains of understanding their customer's discontinuance intentions at the organisational unit level would be invaluable.

This study focuses on a traditional packaged software discontinuance model. In this case the software lifespan starts with purchase of the software, which is then followed by design, implementation, customisation and inevitability discontinuance of the system and cancellation of any support or

maintenance contracts. Software discontinuance intentions may however be different with proprietary developed software, software as a service or rented software agreements. In these situations the software is under constant development which may result in a different set of factors determining discontinuance.

This research focused on discontinuance intentions and did not examine the discontinuance process itself. Case studies of discontinuance may prove useful. Discontinuance is a complex decision where under estimating the costs of discontinuance (e.g. re-training users, change management, infrastructure changes), or the time required to decommission the old system and change over to a new system can have negative implications for successful discontinuance . Future work may wish to focus on case studies of organisations undertaking a discontinuance effort.

Longitudinal studies should also be carried out to determine the relationship between discontinuance intentions and the actual discontinuance of a system.

7.4 Limitations of the study

The study was conducted in a South African context, using a non-probability sample with a weighting to larger organisations and enterprise application systems. The findings may therefore not be generalisable to organisations operating in different geographies or cultural environments. Notwithstanding this, this research has covered a broad spectrum of South African organisations and it's the researcher's opinion that this research is largely representative of manager's perceptions of the determinants of packaged software discontinuance in South African organisations.

The data was cross-sectional in nature and based on the perspective of managers. Causal associations between the change or inertia forces and discontinuance cannot be determined. Moreover, there could be common methods bias in that the results reflect the perceptions of only a single IT decision maker within each organisation whilst discontinuance decisions may be a group decision making phenomenon.

Organisational study of intentions is complex as it assumes that the organisation's intentions are represented by the intentions of the key decision makers. The survey results could therefore be subject to respondent bias and this appeared to be most evident in the responses on items relating to the IT department's propensity to innovate. The research survey allowed respondents to identify the software package they wished to report on. Respondents may be biased towards responding on larger packaged software requiring greater attention from executive decision makers. Larger enterprise software packages may have different determinants than smaller, localised software packages.

The discontinuance research is relatively new with only one framework by Furneaux and Wade (2011) offering a theoretical underpinning. Therefore the comprehensiveness and integrative nature of the change and inertia factors requires continued exploration.

Chapter conclusion

This study has extended the discontinuance framework proposed by Furneaux and Wade (2011) to examine the effects of selected factors on organisational intentions to discontinue a packaged software application. Results showed that poor software performance, lack of suitability and low levels of business and technical integration were the strongest determinants of discontinuance intentions, along with the software's age relatively to other applications in the organisation's portfolio. This study has contributed by consolidating the effects of a number of factors drawn from the literature and developing an integrated framework of discontinuance. By providing an understanding of the relative importance of each factor, results will help IT decision makers when considering a discontinuance decision.

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Appendix A: Ethics Approval

Research Office

HUMAN RESEARCH ETHICS COMMITTEE (NON MEDICAL)
R14/49 Formby

CLEARANCE CERTIFICATE	**PROTOCOL NUMBER H13/03/06**
PROJECT TITLE	Determinants of packaged software discontinuance intentions: an empirical study of South African managers' perceptions
INVESTIGATOR(S)	Mr D Formby
SCHOOL/DEPARTMENT	Economic and Business Sciences/
DATE CONSIDERED	15/03/2013
DECISION OF THE COMMITTEE	Approved unconditionally
EXPIRY DATE	16/04/2015
DATE 17/04/2013	**CHAIRPERSON** (Professor T Milani)

cc: Supervisor : Professor J Cohen

DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10005, 10th Floor, Senate House, University.

I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. **I agree to completion of a yearly progress report.**

Signature

18 / 04 / 2013
Date

Appendix B: Data gathering techniques

Below is a diary of both number of successful emails sent and response rates over time per month.

Table 15: Number of successful emails and valid reponses

Month	Number Successful Initial Emails Sent	Number of Valid Responses
Jul-13	10	2
Aug-13	76	16
Sep-13	335	16
Oct-13	172	32
Nov-13	130	29
Dec-13		8
Total	723	103

Appendix C: Research survey instrument

The full research instrument appeared as follows to the respondents using KwikSurveys.com

DETERMINANTS OF PACKAGED SOFTWARE DISCONTINUANCE INTENTIONS: AN EMPIRICAL STUDY OF SOUTH AFRICAN MANAGERS' PERCEPTIONS

Dear Respondent

My name is Dave Formby. I am completing my Master of Commerce degree in Information Systems at the University of the Witwatersrand, Johannesburg.

For the purposes of my degree, I am conducting an empirical research study on the factors that influence the decisions made by organisations to discontinue packaged software applications.

As an IT decision-maker within your organisation I am inviting you to complete an online questionnaire relating to a packaged software system that is currently in use in your organisation and for which you are responsible or have decision authority.

If you consent to participate, the online survey will take approximately 15 minutes to complete. The questionnaire consists of 43 questions related to your perceptions of the packaged software system and your organisation's discontinuance intentions.

Please understand that your **participation is voluntary**. The choice of whether to participate or not, is yours alone. No risks, penalties or losses will be incurred if you opt not to participate in the study. If you agree to participate, you may stop participating in the research at any time by simply exiting from the online survey. If you do this, there will be no penalties or losses and you will not be prejudiced in any way.

This questionnaire is for research purposes only. There are no right or wrong answers. All responses are anonymous and you are not asked to provide your name nor that of your organisation anywhere. All responses will be kept strictly confidential and the results will only be reported in the aggregate. A copy of the report will be made available to respondents on request. All data will be destroyed once the University requirements have been met.

Results of this study will promote our understanding of the factors that influence the decision by organisations to discontinue their packaged software systems by means of replacement, upgrade or abandonment.

This study was approved by the Wits Human Research Ethics Committee (Non-Medical), protocol number: H13/03/06.

Thank you for considering your participation. If you would like to receive feedback on my study, would like a copy of the research report, or have any concerns or questions about the research, please contact me on david.formby@students.wits.ac.za or 087 736 1842 or you may contact my supervisor Professor Jason Cohen in the School of Economic and Business Sciences, jason.cohen@wits.ac.za

By submitting the completed questionnaire your consent to participate voluntarily in the research is assumed.

Dave Formby
Master of Commerce student
School of Economic and Business Sciences
University of the Witwatersrand, Johannesburg

1* Do you agree to participate?

- ○ Yes
- ○ No

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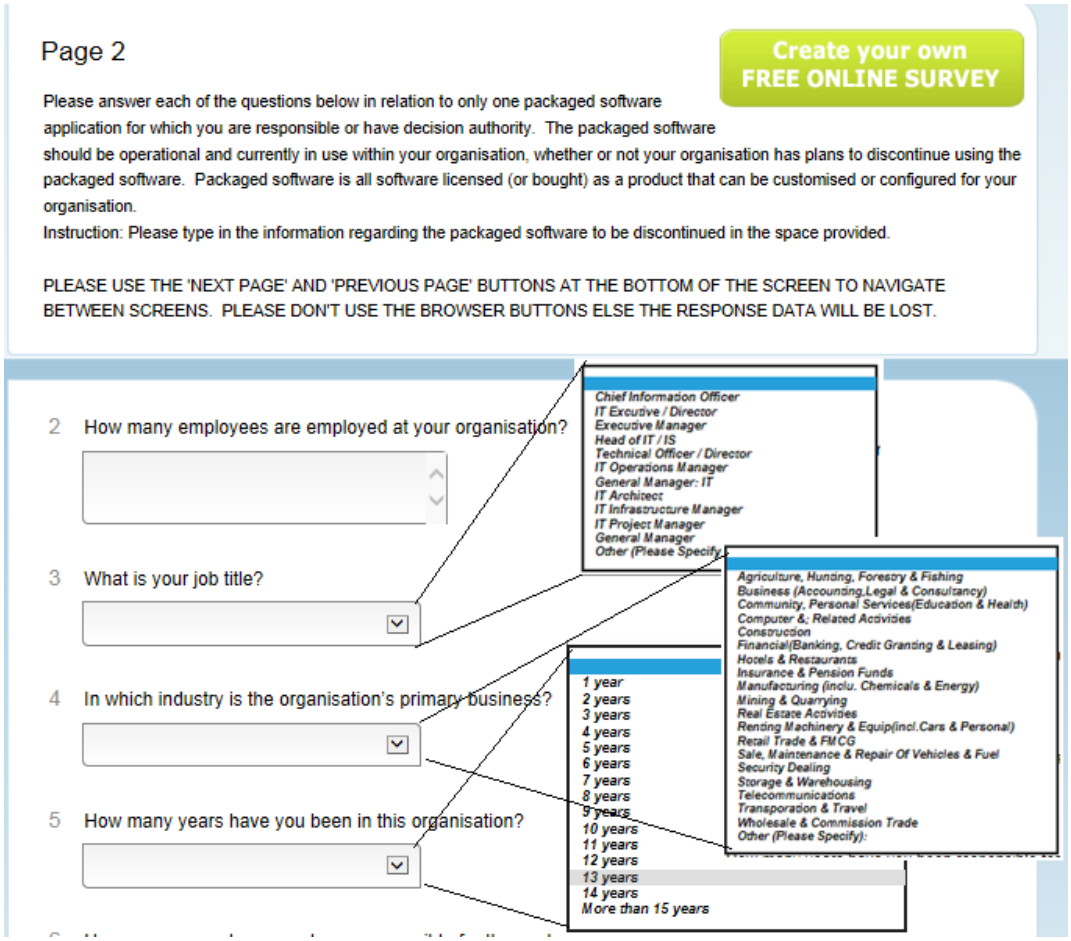

Page 2
Create your own FREE ONLINE SURVEY
Please answer each of the questions below in relation to only one packaged software application for which you are responsible or have decision authority. The packaged software should be operational and currently in use within your organisation, whether or not your organisation has plans to discontinue using the packaged software. Packaged software is all software licensed (or bought) as a product that can be customised or configured for your organisation.
Instruction: Please type in the information regarding the packaged software to be discontinued in the space provided.
PLEASE USE THE 'NEXT PAGE' AND 'PREVIOUS PAGE' BUTTONS AT THE BOTTOM OF THE SCREEN TO NAVIGATE BETWEEN SCREENS. PLEASE DON'T USE THE BROWSER BUTTONS ELSE THE RESPONSE DATA WILL BE LOST.
2 How many employees are employed at your organisation?
3 What is your job title?
4 In which industry is the organisation's primary business?
5 How many years have you been in this organisation?
Chief Information Officer
IT Excutive / Director
Executive Manager
Head of IT / IS
Technical Officer / Director
IT Operations Manager
General Manager: IT
IT Architect
IT Infrastructure Manager
IT Project Manager
General Manager
Other (Please Specify)
Agriculture, Hunting, Forestry & Fishing
Business (Accounting,Legal & Consultancy)
Community, Personal Services(Education & Health)
Computer &; Related Activities
Construction
Financial(Banking, Credit Granting & Leasing)
Hotels & Restaurants
Insurance & Pension Funds
Manufacturing (inclu. Chemicals & Energy)
Mining & Quarrying
Real Estate Activities
Renting Machinery & Equip(incl.Cars & Personal)
Retail Trade & FMCG
Sale, Maintenance & Repair Of Vehicles & Fuel
Security Dealing
Storage & Warehousing
Telecommunications
Transporation & Travel
Wholesale & Commission Trade
Other (Please Specify):
1 year
2 years
3 years
4 years
5 years
6 years
7 years
8 years
9 years
10 years
11 years
12 years
13 years
14 years
More than 15 years

6 How many years have you been responsible for the packaged software?

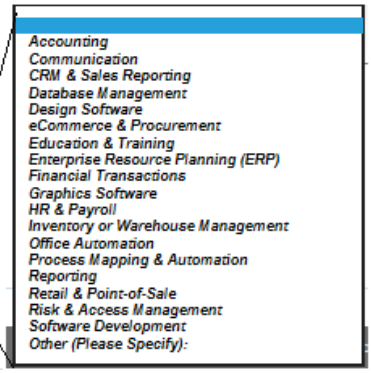
7 How many users work with the packaged software?

8 How many support staff are directly supporting the packaged software?

9 Approximately how many years has your organisation been using this packaged software?

10 Who is the vendor of the packaged software?

11 What type of packaged software?



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Page 3

Instruction: Please indicate the extent to which you agree with each of the following statements relating to the software package by ticking the appropriate box. There are no right or wrong answers.

PLEASE USE THE 'NEXT PAGE' AND 'PREVIOUS PAGE' BUTTONS AT THE BOTTOM OF THE SCREEN TO NAVIGATE BETWEEN SCREENS. PLEASE DON'T USE THE BROWSER BUTTONS ELSE THE RESPONSE DATA WILL BE LOST.

12 The packaged software can be counted on to perform it's intended task.

Strongly disagree	Disagree	Slightly disagree	Don't agree or disagree	Slightly agree	Agree	Strongly Agree
○	○	○	○	○	○	○

13 Users of the packaged software consider it to be reliable.

Strongly disagree	Disagree	Slightly disagree	Don't agree or disagree	Slightly agree	Agree	Strongly Agree
○	○	○	○	○	○	○

14 This packaged software can be counted on to perform as needed.

Strongly disagree	Disagree	Slightly disagree	Don't agree or disagree	Slightly agree	Agree	Strongly Agree
○	○	○	○	○	○	○

15 The packaged software responds quickly to users' requests.

Strongly disagree	Disagree	Slightly disagree	Don't agree or disagree	Slightly agree	Agree	Strongly Agree
○	○	○	○	○	○	○

16 If a problem with the packaged software occurs, it is resolved quickly.

Strongly disagree	Disagree	Slightly disagree	Don't agree or disagree	Slightly agree	Agree	Strongly Agree
○	○	○	○	○	○	○

17 The packaged software informs users of how long processing tasks or actions will take.

Strongly disagree	Disagree	Slightly disagree	Don't agree or disagree	Slightly agree	Agree	Strongly Agree
○	○	○	○	○	○	○

18 The packaged software is often unavailable for short periods when required.

Strongly disagree	Disagree	Slightly disagree	Don't agree or disagree	Slightly agree	Agree	Strongly Agree
○	○	○	○	○	○	○

19 The packaged software presents outputs in a useful format.

Strongly disagree	Disagree	Slightly disagree	Don't agree or disagree	Slightly agree	Agree	Strongly Agree
○	○	○	○	○	○	○

20 The packaged software provides output without long delays.

Strongly disagree	Disagree	Slightly disagree	Don't agree or disagree	Slightly agree	Agree	Strongly Agree
○	○	○	○	○	○	○

21 There are notable limitations in the ability of this packaged software to meet our needs.

Strongly disagree	Disagree	Slightly disagree	Don't agree or disagree	Slightly agree	Agree	Strongly Agree
○	○	○	○	○	○	○

22 The packaged software is highly compatible with our existing information infrastructure.

Strongly disagree	Disagree	Slightly disagree	Don't agree or disagree	Slightly agree	Agree	Strongly Agree
○	○	○	○	○	○	○

23 There are many capabilities that we would like that are not supported by this packaged software.

Strongly disagree	Disagree	Slightly disagree	Don't agree or disagree	Slightly agree	Agree	Strongly Agree
○	○	○	○	○	○	○

24 We encounter difficulties in obtaining needed packaged software support services.

Strongly disagree	Disagree	Slightly disagree	Don't agree or disagree	Slightly agree	Agree	Strongly Agree
○	○	○	○	○	○	○

25 Supporting the ongoing use of this packaged software is costly.

Strongly disagree	Disagree	Slightly disagree	Don't agree or disagree	Slightly agree	Agree	Strongly Agree
○	○	○	○	○	○	○

26 This packaged software depends on a sophisticated integration of technology components.

Strongly disagree	Disagree	Slightly disagree	Don't agree or disagree	Slightly agree	Agree	Strongly Agree
○	○	○	○	○	○	○

27 There is considerable technical complexity underlying this packaged software.

Strongly disagree	Disagree	Slightly disagree	Don't agree or disagree	Slightly agree	Agree	Strongly Agree
○	○	○	○	○	○	○

28 The packaged software supports a number of different business processes.

Strongly disagree	Disagree	Slightly disagree	Don't agree or disagree	Slightly agree	Agree	Strongly Agree
○	○	○	○	○	○	○

29 The packaged software supports business processes that are key to the success of the organisation.

Strongly disagree	Disagree	Slightly disagree	Don't agree or disagree	Slightly agree	Agree	Strongly Agree
○	○	○	○	○	○	○

30 This packaged software from the same vendor but not necessaily the same version, is used by many of the organisation's competitors.

Strongly disagree	Disagree	Slightly disagree	Don't agree or disagree	Slightly agree	Agree	Strongly Agree
○	○	○	○	○	○	○

31 Significant organisational resources have been invested to customise the packaged software.

Strongly disagree	Disagree	Slightly disagree	Don't agree or disagree	Slightly agree	Agree	Strongly Agree
○	○	○	○	○	○	○

32 We have committed considerable resources to the implementation of this packaged software.

Strongly disagree	Disagree	Slightly disagree	Don't agree or disagree	Slightly agree	Agree	Strongly Agree
○	○	○	○	○	○	○

33 We have committed considerable resources to the operation of this packaged software.

Strongly disagree	Disagree	Slightly disagree	Don't agree or disagree	Slightly agree	Agree	Strongly Agree
○	○	○	○	○	○	○

34 We have firm plans to discontinue the packaged software.

Strongly disagree	Disagree	Slightly disagree	Don't agree or disagree	Slightly agree	Agree	Strongly Agree
○	○	○	○	○	○	○

35 We intend to continue operating the packaged software for the foreseeable future.

Strongly disagree	Disagree	Slightly disagree	Don't agree or disagree	Slightly agree	Agree	Strongly Agree
○	○	○	○	○	○	○

36 We are not likely to discontinue this packaged software anytime soon.

Strongly disagree	Disagree	Slightly disagree	Don't agree or disagree	Slightly agree	Agree	Strongly Agree
○	○	○	○	○	○	○

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Page 4

Please answer questions 37 and 38 to best reflect your plans with regards to the packaged software. Please select 'Not Applicable' for if there is no intention for the action to occur.

PLEASE USE THE 'PREVIOUS PAGE' BUTTON AT THE BOTTOM OF THE SCREEN IF YOU REQUIRE TO NAVIGATE BACK TO SCREENS. PLEASE DON'T USE THE BROWSER BUTTONS ELSE THE RESPONSE DATA WILL BE LOST.

37 Your next move with regards to this software package will be to (please select one):

Carry out a minor upgrade / patch
Carry out a major upgrade (incl. data migration)
Replace the software package
Abandon the software package and not replace

38 When do you propose to undertake this:

0 - 6 months	7 - 12 months	1 -2 years	2 - 3 years	3 - 5 years	5+ years	N/A
○	○	○	○	○	○	○

39 Is the original management sponsor of the packaged software still the sponsor?

○ Yes
○ No

40 Relative to other applications in the organisation, the age of this software package (period of operation) can be described as:

One of the newest	Relatively new	About average	Relatively old	One of the oldest
○	○	○	○	○

41 Compared to our competitors, new product / process introduction in this organisation always has significant IT implications.

	Strongly disagree	Disagree	Slightly disagree	Don't agree or disagree	Slightly agree	Agree	Strongly agree
	○	○	○	○	○	○	○

42 Compared to our competitors, this organisation would be slow to implement new innovations without IT.

	Strongly disagree	Disagree	Slightly disagree	Don't agree or disagree	Slightly agree	Agree	Strongly agree
	○	○	○	○	○	○	○

43 Compared to our competitors, IT is always at the forefront of innovation efforts in this organisation.

	Strongly disagree	Disagree	Slightly disagree	Don't agree or disagree	Slightly agree	Agree	Strongly Agree
	○	○	○	○	○	○	○

Once the questionnaire is completed please press the 'Finish Survey' button and this will record the results. Thank you for your participation.

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Appendix F: Descriptive Statistics

Table 16: Descriptive statistics

	N	Range	Min	Max	Mean		Median	Std. Deviation	Variance	Skewness		Kurtosis	
						Std.					Std.		Std.
Perf_Reliab_Task	103	5	2	7	5.71	0.105	6.00	1.063	1.130	-1.887	0.238	3.493	0.472
Perf_Reliab_Reliab	103	5	2	7	5.56	0.107	6.00	1.082	1.170	-2.370	0.238	5.131	0.472
Perf_Reliab_Need	103	5	2	7	5.56	0.115	6.00	1.169	1.366	-1.865	0.238	3.079	0.472
Perf_Resp_Process	103	5	1	6	3.66	0.159	4.00	1.617	2.613	-0.031	0.238	-1.327	0.472
Perf_Resp_Req	103	6	1	7	4.88	0.164	6.00	1.665	2.771	-0.930	0.238	-0.504	0.472
Perf_Avail_Unavail	103	6	1	7	3.03	0.162	2.00	1.642	2.695	0.739	0.238	-0.898	0.472
Perf_Avail_Delays	103	5	2	7	5.34	0.117	6.00	1.184	1.403	-1.413	0.238	1.293	0.472
Perf_Resp_Quick	103	6	1	7	4.73	0.161	5.00	1.634	2.670	-0.714	0.238	-0.823	0.472
Suit_Needs	103	5	2	7	4.50	0.173	5.00	1.754	3.076	-0.286	0.238	-1.392	0.472
Suit_Infrast	103	6	1	7	4.89	0.172	6.00	1.748	3.057	-0.933	0.238	-0.466	0.472
Suit_Qual_Out	103	6	1	7	2.50	0.140	2.00	1.418	2.010	1.558	0.238	2.038	0.472
Suit_Supp	103	6	1	7	4.58	0.174	5.00	1.768	3.126	-0.322	0.238	-1.182	0.472
Supp_Cost	103	5	2	7	5.05	0.162	6.00	1.647	2.713	-0.737	0.238	-0.801	0.472
Supp_Obtain	103	6	1	7	4.18	0.181	4.18	1.838	3.380	-0.059	0.238	-1.413	0.472
Integ_Bus_Proces	103	6	1	7	5.41	0.158	6.00	1.599	2.558	-1.340	0.238	1.025	0.472
Integ_Bus_Succes	103	5	2	7	6.17	0.097	6.00	0.981	0.963	-1.737	0.238	4.193	0.472
Integ_Tech_Soph	103	6	1	7	4.93	0.167	6.00	1.699	2.887	-0.902	0.238	-0.390	0.472
Integ_Tech_Comp	103	6	1	7	4.93	0.169	6.00	1.711	2.927	-0.753	0.238	-0.767	0.472
Mimetic_Compet	103	6	1	7	4.59	0.191	5.00	1.937	3.754	-0.460	0.238	-1.303	0.472
Sunk_Custom	103	6	1	7	4.83	0.196	6.00	1.991	3.962	-0.645	0.238	-1.106	0.472
Sunk_Impl	103	5	2	7	5.27	0.166	6.00	1.681	2.827	-0.907	0.238	-0.436	0.472
Sunk_Operat	103	6	1	7	5.26	0.161	6.00	1.631	2.660	-1.105	0.238	0.124	0.472
Soft_Age	103	4	1	5	3.33	0.112	3.00	1.132	1.282	-0.105	0.238	-0.792	0.472
Yrs_Using_Soft	103	14	1	15	8.45	0.449	8.00	4.561	20.799	0.125	0.238	-1.239	0.472
Sponsor_Pres	103	1	1	2	1.51	0.049	2.00	0.502	0.252	-0.059	0.238	-2.036	0.472
No_Employ(Log_{10})	103	52,980	20	53,000	3.152	0.086	3.176	0.876	0.768	-0.171	0.238	-0.774	0.472
No_Soft_Users(Log_{10})	103	19,997	3	20,000	2.320	0.089	2.352	0.900	0.811	-0.019	0.238	-0.754	0.472
Support_Staff(Log_{10})	103	999	1	1,000	1.001	0.060	1	0.613	0.376	0.626	0.238	0.238	0.472
Innov_Prod	103	5	2	7	5.13	0.139	6.00	1.412	1.994	-0.739	0.238	-0.258	0.472
Innov_IT	103	6	1	7	4.84	0.154	5.00	1.564	2.446	-0.628	0.238	-0.455	0.472
Innov_ITFore	103	5	2	7	4.84	0.147	5.00	1.493	2.231	-0.341	0.238	-0.770	0.472
Discont_Plans	103	6	1	7	3.74	0.237	2.00	2.401	5.763	0.250	0.238	-1.680	0.472
Disc_Future	103	6	1	7	3.47	0.222	2.00	2.257	5.092	0.407	0.238	-1.513	0.472
Disc_Soon	103	6	1	7	3.39	0.216	2.00	2.187	4.784	0.547	0.238	-1.380	0.472

Appendix G: Cronbach's Alpha reliability Analysis

Table 17: Cronbach alpha reliability analysis on performance construct

Summary Statistics	Mean	Variance	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	Number of Items
	5.125	0.954	0.717	0.739	4

Item-Total Statistics					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Perf_Reliab_Task	14.79	9.033	.536	.430	.645
Perf_Reliab_Reliab	14.94	9.122	.504	.284	.660
Perf_Reliab_Need	14.94	8.161	.608	.496	.597
Perf_Resp_Process	16.83	7.139	.444	.214	.730

Table 18: Cronbach's alpha reliability analysis on suitability

Summary Statistics	Mean	Variance	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	Number of Items
	4.542	.003	.765	.765	2

Variable	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Suit_Needs	4.58	3.126	.620	.384	
Suit_Supp	4.50	3.076	.620	.384	

Table 19: Cronbach's alpha reliability analysis on integration

Summary Statistics	Mean	Variance	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	Number of Items
	5.089	.076	.777	.775	4

Variable	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Integ_Bus_Proces	9.86	10.184	.454	.227	.858
Integ_Tech_Soph	10.34	8.088	.663	.565	.644
Integ_Tech_Comp	10.34	7.479	.745	.609	.544

Table 20: Cronbach's alpha reliability analysis on customisation sunk cost

Summary Statistics	Mean	Variance	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	Number of Items
	5.120	.063	.818	.824	3

Variable	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Sunk_Custom	10.53	9.027	.653	.486	.784
Sunk_Impl	10.09	9.772	.780	.608	.645
Sunk_Operat	10.10	11.447	.606	.419	.814

Table 21: Cronbach's alpha reliability analysis on innovation

Summary Statistics	Mean	Variance	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	Number of Items
	4.938	.027	.506	.509	3

Variable	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Innov_Prod	9.69	5.543	.380	.144	.313
Innov_IT	9.97	5.421	.301	.101	.441
Innov_ITFore	9.97	5.768	.288	.091	.460

Table 22: Cronbach's alpha reliability analysis on discontinuance

Summary Statistics	Mean	Variance	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	Number of Items
	3.531	.033	.908	.909	3

Variable	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Discont_Plans	6.86	17.277	.832	.693	.857
Disc_Future	7.12	18.637	.817	.670	.868
Disc_Soon	7.21	19.379	.804	.648	.880

Appendix H: Statistical Analysis
Table 23: Correlation Matrix

		Soft_ Age	No_Yrs_ Org[1]	No_Yrs_ Resp[1]	Yrs_Use_ Soft[1]	Sponsor_ Pres	No_ Employ[1]	No_Soft_ Users[1]	Support_ Staff[1]	Comp Perf [2]	Comp Suit [2]	Supp_ Cost	Supp_ Obtain	Mimetic Compet	Comp Int [2]	Comp Sunk [2]	Comp Innov [2]	Comp Discont [2]
Soft_Age	Corr.	1	.177	.349**	.604**	.250*	.152	.201*	.206*	.232*	.156	.102	.196*	-.094	.166	.284**	.088	.229*
	Sig.		.076	.000	.000	.011	.125	.042	.037	.018	.115	.307	.048	.343	.094	.004	.375	.020
No_Yrs _Org[1]	Corr.	.177	1	.491**	.129	-.041	.098	-.049	-.047	.158	-.010	.025	.064	-.065	-.239*	-.046	.010	.094
	Sig.	.076		.000	.195	.680	.329	.627	.640	.114	.923	.802	.523	.517	.015	.645	.923	.346
No_Yrs_ Resp[1]	Corr.	.349**	.491**	1	.365**	-.015	.034	.145	.196*	-.034	-.056	-.049	-.079	.048	-.075	.004	-.109	.103
	Sig.	.000	.000		.000	.883	.731	.145	.049	.736	.573	.627	.431	.635	.454	.970	.276	.303
Yrs_Use_ Soft[1]	Corr.	.604**	.129	.365**	1	.183	.289**	.509**	.440**	.057	.087	.166	.023	-.061	.284**	.339**	.002	.112
	Sig.	.000	.195	.000		.065	.003	.000	.000	.566	.383	.093	.816	.542	.004	.000	.986	.259
Sponsor_ Pres	Corr.	.250*	-.041	-.015	.183	1	.300**	.265**	.236*	.186	-.017	.017	.185	-.155	.022	.213*	.170	.102
	Sig.	.011	.680	.883	.065		.002	.007	.016	.060	.861	.865	.061	.118	.829	.031	.085	.307
No_ Employ[1]	Corr.	.152	.098	.034	.289**	.300**	1	.616**	.537**	.064	.038	.254**	-.020	.037	.195*	.349**	.176	.118
	Sig.	.125	.329	.731	.003	.002		.000	.000	.519	.703	.010	.838	.712	.048	.000	.076	.235
No_Soft_ Users[1]	Corr.	.201*	-.049	.145	.509**	.265**	.616**	1	.712**	-.074	-.159	.235*	-.067	.216*	.371**	.519**	.170	-.061
	Sig.	.042	.627	.145	.000	.007	.000		.000	.458	.108	.017	.502	.029	.000	.000	.085	.538
Support_ Staff[1]	Corr.	.206*	-.047	.196*	.440**	.236*	.537**	.712**	1	-.099	-.171	.147	-.134	.160	.419**	.356**	.261**	-.023
	Sig.	.037	.640	.049	.000	.016	.000	.000		.322	.084	.138	.178	.106	.000	.000	.008	.819
Comp Perf [2]	Corr.	.232*	.158	-.034	.057	.186	.064	-.074	-.099	1	.375**	-.014	.118	-.339**	-.358**	-.106	-.115	.533**
	Sig.	.018	.114	.736	.566	.060	.519	.458	.322		.000	.886	.234	.000	.000	.286	.248	.000
Comp Suit [2]	Corr.	.156	-.010	-.056	.087	-.017	.038	-.159	-.171	.375**	1	.027	.211*	-.247*	-.148	-.078	-.076	.363**
	Sig.	.115	.923	.573	.383	.861	.703	.108	.084	.000		.790	.033	.012	.135	.434	.445	.000
Supp_ Cost	Corr.	.102	.025	-.049	.166	.017	.254**	.235*	.147	-.014	.027	1	.156	.034	.252*	.505**	.225*	.100
	Sig.	.307	.802	.627	.093	.865	.010	.017	.138	.886	.790		.116	.734	.010	.000	.022	.316
Supp_ Obtain	Corr.	.196*	.064	-.079	.023	.185	-.020	-.067	-.134	.118	.211*	.156	1	-.244*	.006	.271**	.077	-.008
	Sig.	.048	.523	.431	.816	.061	.838	.502	.178	.234	.033	.116		.013	.950	.006	.439	.940
Mimetic_C ompet	Corr.	-.094	-.065	.048	-.061	-.155	.037	.216*	.160	-.339**	-.247*	.034	-.244*	1	.290**	-.026	.139	-.215*
	Sig.	.343	.517	.635	.542	.118	.712	.029	.106	.000	.012	.734	.013		.003	.793	.163	.029
Comp Int [2]	Corr.	.166	-.239*	-.075	.284**	.022	.195*	.371**	.419**	-.358**	-.148	.252*	.006	.290**	1	.384**	.367**	-.210*
	Sig.	.094	.015	.454	.004	.829	.048	.000	.000	.000	.135	.010	.950	.003		.000	.000	.033
Comp Sunk [2]	Corr.	.284**	-.046	.004	.339**	.213*	.349**	.519**	.356**	-.106	-.078	.505**	.271**	-.026	.384**	1	.211*	-.021
	Sig.	.004	.645	.970	.000	.031	.000	.000	.000	.286	.434	.000	.006	.793	.000		.032	.832
Comp Innov [2]	Corr.	.088	.010	-.109	.002	.170	.176	.170	.261**	-.115	-.076	.225*	.077	.139	.367**	.211*	1	.027
	Sig.	.375	.923	.276	.986	.085	.076	.085	.008	.248	.445	.022	.439	.163	.000	.032		.784
Comp Discont [2]	Corr.	.229*	.094	.103	.112	.102	.118	-.061	-.023	.533**	.363**	.100	-.008	-.215*	-.210*	-.021	.027	1
	Sig.	.020	.346	.303	.259	.307	.235	.538	.819	.000	.000	.316	.940	.029	.033	.832	.784	

**. Correlation is significant at the 0.01 level (2-tailed). N = 103 (with the exception of No_Years_Resp and Yrs_Use_Soft which have N =102)

*. Correlation is significant at the 0.05 level (2-tailed). [1] Indicates the Log_{10} was taken for these items [2] Indicates that these are mean composites of the scores

Table 24: PLS correlation matrix

	Software Age	Integration	Customi--sation Sunk Cost	Discontinuance	Mimetic Isomorphism	Performance	Suitability	Support-ability
Software Age	1							
Integration	.165	1						
Customisation Sunk Cost	.173	.325	1					
Discontinuance	.285	-.340	-.123	1				
Mimetic Isomorphism	-.095	.291	.034	-.320	1			
Performance	-.228	.356	.107	.638	.369	1		
Suitability	.172	-.145	-.071	.417	-.242	-.406	1	
Supportability	.211	.083	.274	.140	-.209	-.102	.193	1

Table 25: Collinearity tests

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	5.404	.712		7.586	.000		
Software Age	.105	.076	.128	1.383	.170	.803	1.246
Integration	-.053	.067	-.079	-0.792	.430	.679	1.472
Customisation Sunk Cost	.005	.066	.008	.070	.945	.583	1.717
Mimetic Isomorphism	-.016	.045	-.034	-.368	.714	.787	1.271
Performance	-.413	.101	-.409	-4.075	.000	.679	1.474
Suitablility	.116	.054	.198	2.147	.034	.804	1.244
Supp_Cost	.073	.055	.128	1.322	.189	.724	1.381
Supp_Obtain	-.077	.046	-.153	-1.682	.096	.831	1.203