UNIVERSITY OF WITSWATERSRAND

Explaining the influence of Enterprise Architecture Planning on Information Technology Performance: A Resource Based View of the Firm

Submitted to the School of Economic and Business Sciences for the 50% Research Component of a Master Degree

Candidate Name	Thaku Huni
Supervisor	Samuel Chikasha
Head of Department	Dr Jason Cohen
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DEDICATION

I wish to thank:

- To my God almighty for blessing me through my studies.
- To my parents and family who supported me through the research and writing of this report

DECLARATION

I, ______________________________, declare that this research report is my own unaided work. It is submitted in partial fulfillment of the requirements for the degree of Master of Commerce (by coursework) at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.

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ABSTRACT

The concept of Architecture has received widespread acceptance within the construction industry. However, its importance within the Information Technology industry is a contested one. Critics of Architecture in the Information Technology (IT) industry posit that there is inadequate evidence to assume that it makes a difference to performance of IT. Enterprises increasingly need to ensure that they leverage their IT benefits not only within their silos but across business units. This need has driven ideas to introduce enterprise-wide blueprints or Enterprise Architecture (EA) Planning solutions to guide them in the design and implementation of IT. This study uses a quantitative survey to attempt to answer two questions: 1) *What factors influence EA Planning within organizations? 2) To what extent does EA Planning improve IT performance?* The Diffusion of Innovation theory (Compatibility, Ease of Use and Relative Advantage) was used to investigate the use of EA Planning whilst the Resource Based View of the Firm was used to investigate the performance impact of EA Planning.

IT Performance is measured by Heterogeneity of Physical IT Infrastructure, Replication of IT Infrastructure Services, Business Application Integration and Enterprise Data Integration. EA Planning is measured by EA Planning Human Capital, IT Infrastructure Flexibility and Partnership Quality.

Data was collected from 90 architects, some from South African consulting companies and the rest from architects around the world linked to popular Enterprise Architecture virtual communities. The key findings were significant relationships between the following for the factors that influence use of EA Planning: Compatibility and IT Infrastructure Flexibility; Ease of Use of EA Planning Policies and EA Planning Human Capital; Relative Advantage and EA Planning Partnership Quality.

Significant relationships were found between the following for factors that influence IT Performance: EA Planning Human Capital and IT Performance (a combination of Enterprise Data Integration, Business Application Integration, Replication of IT Infrastructure Service and Heterogeneity of Physical IT Infrastructure); EA Planning IT Infrastructure Flexibility and Heterogeneity of Physical IT Infrastructure; EA Planning IT Infrastructure Flexibility and Business Application Integration. EA Planning Partnership Quality was rejected as a determinant of IT Performance.

This study sheds light on how resistance to EA Planning can be reduced and also highlights the potential benefits of EA Planning in organizations. The implications will directly affect the relationship between EA practitioners and IT projects.

Keywords: Enterprise Architecture; IT Performance

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1. INTRODUCTION

1.1 Introduction

A study by Schekkerman (2003) revealed that failed IT projects in industry and government accounted for approximately $75 billion dollars in losses in the United States of America each year. Information System (IS) professionals are finding it increasingly difficult to integrate and manage complex systems within their departments (Peterson, 2004). This is partly due to different departments within organizations implementing different technological solutions. As a result, most of these departments do not benefit from economies of scale and lack coherence (Boh and Yellin, 2007). Business units tend to have similar customer information residing in different database systems across the business units. This results in information redundancy and increased IT infrastructure costs. Enterprise Architecture (EA) standards have been used by some large organizations in recent years to address these challenges (Cardwell, 2008).

2.1 Background

Cardwell (2008) defines Enterprise Architecture as systematically derived and captured structural descriptions of the mode of operation of a given enterprise. Boh et al. (2007:164) define EA Planning as a “set of policies, rules and guidelines that provide the organizing logic for application, data, and infrastructure technologies”.

According to Cardwell (2008), the benefits of using EA Planning should include increased integration among business units (in terms of data and business processes), reduced solution delivery time and system development costs, increased overall organization agility, and the ability to create a common future vision for both business and IT. Mathee, Tobin, and van der Merwe (2006) mention “containment of costs and business alignment” as potential advantages. All of these factors should amount to increased IT performance.

1.2. Problem Statement

Notwithstanding the above benefits associated with using EA Planning, research has also identified drawbacks associated with the use of EA Planning. EA Planning and Information Systems Strategic alignment are one of the top ten challenges faced by CIOs (Chan, Huff, Barclay, and Copeland, 1997). Schekkerman (2003:3) contends that although using EA Planning provides good descriptive architecture models, it does not create “real actionable, extended enterprise architectures that address today’s rapidly evolving complex collaboration environments”. Although using EA Planning may increase the overall agility of the organization to adapt to change, it tends to reduce or limit the flexibility of the departments or business units to adapt to change (Boh et al., 2007). The EA Planning approaches that are used by organizations are too high level and are not industry specific (Schekkerman, 2003). Bans van der Raadt and Hans van Vliet (2008) claim that EA Planning is too theoretical and focuses on long term goals that do not solve the immediate practical and technical problems faced by project managers within organizations today. There is limited research evidence on the factors that influence EA planning in organizations as well as its impact on IT performance. Thus this study focuses on the value that EA Planning has within organizations, especially with regards to IT performance.

1.3. Aims and Objectives of the Research

This research attempted to uncover whether the use of EA Planning by IS professionals will have a positive impact on IT performance. It will also assist IS professionals to understand what factors influence the use of EA Planning within organizations. The aim of this study is therefore to:

1. Determine the factors that influence use of EA Planning
2. Determine the impact of EA Planning on IT performance and a relationship between EA Planning and IT performance.
3. Help practitioners to better understand what strategies they can use to facilitate the use of EA Planning.

The two main research questions that will be investigated include the following:

- *What are the key factors that influence EA Planning within organizations?*
- *To what extent does EA Planning improve IT Performance?*

1.4. Importance of Research to Practitioners

The study provides further insight for practitioners to determine what factors influence the use of EA Planning within organizations. The study shows a transparent perspective of what practitioners can expect as potential benefits and failures of EA Planning. Practitioners will be enabled to determine which EA Planning approach will be ideal for their organization and be able to modify it to suit their organization. They will be able to understand how both the factors that influence use of EA Planning and the actual use of EA Planning affect IT performance. The study also provides a basis for practitioners to determine what the potential barriers to use of EA Planning are. This research provides practitioners with some insight as to what extent EA Planning has an impact on IT performance.

1.5. Importance of Research for Academia

Limited research has been done in EA Planning from an Resource Based View of the Firm (RBV) perspective (Boh et al., 2007; Thong and Yap, 1995; Hong et al., 2006; Bhattacherjee and Premkumar, 2004). This research enhances current literature in Enterprise Architecture with a specific focus on the use and impact. It also provides a foundation for further research in use and impact of EA Planning and the limitations of EA Planning.

1.6. Structure of the Research Report

The research report includes the following chapters:

Chapter 1 – Introduction

The purpose of this section is to present the reader with a broad introduction of the research topic. It also provides a background to the research and outlines the research problems and objectives.

Chapter 2 – Literature Review

This section highlights the research done by others in relation to use and impact of EA Planning on IT project performance. It discusses the theories that support the study and the findings that may or may not be consistent with the study.

Chapter 3 – Research Methodology

This chapter explains why the chosen research method was selected for this study. It discusses how the data was be collected and the sample that was be used. The format of the questionnaires as well as the pre-test and pilot test will also be discussed.

Chapter 4 – Analysis of Results

The section discusses how data was analyzed using statistical techniques. Important results will be highlighted.

Chapter 5 – Discussion of Results

Interpretation of the research results will be in this chapter. The significance of the model proposed will be evaluated and the key findings and contributions summarized.

Chapter 6 – Conclusion

Conclusions that can be drawn from the research are presented in chapter 6. A summary of the research report is given, as well as recommendations for future research. The limitations of the study are also discussed in this chapter.

2. LITERATURE REVIEW

2.1. Introduction

The purpose of this chapter is to review the literature pertaining to the use of EA Planning and the impact it has on IT performance. In this chapter the researcher discusses the concept of failures associated with EA Planning, approaches to EA Planning, and organizational environment in relation to EA Planning among other issues. The chapter concludes with theoretical underpinnings supporting the research model and a summary of the hypothesized relationships from the research model.

2.2. What is Enterprise Architecture

The concept of Enterprise Architecture was first brought to light in the late 1980s (Langenberg and Wegmann, 2004). One of the leading pioneers in Enterprise Architecture, John Zachman, published an article in the IBM Systems Journal (Langenberg et al., 2004). His article received enormous attention amongst practitioners and researchers (Langenberg et al., 2004). John Zachman worked on one of the earliest attempts to apply the concept into practice by the United States Department of Defense known as the Technology Architecture Framework for Information Management or TAFIM (Langenberg et al., 2004). This resulted in a Chief Information Office (CIO) council being created (Langenberg et al., 2004).

In 1998, the CIO council created one of the first ever Enterprise Architecture Frameworks known as the Federal Enterprise Architecture Framework (FEAF later known as FEA) (Langenberg et al., 2004). In the same year, TAFIM was officially retired by the United States Department of Defense, four years after it was introduced (Langenberg et al., 2004). The work was taken over by the Open Group and developed into a new standard that is now known today as TOGAF (The Open Group Architecture Framework) (Langenberg et al., 2004). According to Langenberg et al. (2004), the phenomenon was still referred to as Information Systems Architecture in the 1980s. It was only until late in 1996 that the field was formally known as Enterprise Architecture (Langenberg et al., 2004).

An Enterprise is defined as one or more organizations sharing a definite mission, goals and objectives to offer an output such as a product or a service (Chen, Doumeingts and Vernadat, 2008). The idea is to put together capabilities and competencies coming from different areas within the organization that it requires at the right time. Architecture is defined as a description of the basic arrangement and connectivity of parts of a system, either a physical or a conceptual object or entity (Chen et al., 2008). Enterprise

Architecture is defined as ‘A strategic information asset base, which defines the mission; the information necessary to perform the mission; the technologies necessary to perform the mission; and the transitional processes for implementing new technologies in response to changing needs; and includes: a baseline architecture; a target architecture; and a sequencing plan’ (M. Mathee, P. Tobin and P. van der Merwe, 2006). Cardwell (2008:49) defines Enterprise Architecture as the systematically derived and captured structural descriptions in useful diagrams, narratives and models of the mode of operation of a given enterprise. As such the architecture describes the enterprise’s operations in both logical terms (such as interrelated business processes and business rules, information needs and flows, and work locations and users) and technical terms (such as hardware, software, data, communications, and security attributes and performance standards).

Moreover, it provides these perspectives both for the enterprise’s current or ‘as is’ environment and for its targeted future (or ‘to be’) environment, as well as the transition plan for moving from the ‘as is’ to the ‘to be’ environment. It allows managing complexity and risks due to various factors such as technology, size, interface, context and stakeholders. B. van der Raadt and H. van Vliet (2008) mention that Enterprise Architecture can be compared to architecture in the physical world, where EA is analogous to city planning.

2.3. Why Enterprise Architecture

As business becomes global and faster it is becoming very complex. Business processes are changing on a constant basis (Cardwell, 2008). Maintaining systems in sync with dynamic business processes is becoming more challenging (M. Mathee et al, 2006). As projects get more complex, there are so many variables and project managers cannot keep track of all the issues and decisions (Cardwell, 2008). The key is to try and keep each project as simple and as short as possible (Cardwell, 2008). Cardwell (2008) argues that the overriding principle to ensure successful IT projects is to simplify the business before investing in systems, hence the need for Enterprise Architecture. Although the potential savings from consolidating information and information systems can be huge, these efficiencies are impossible to achieve without a shared understanding of the processes that use those systems – their steps, resources, and management metrics expressed in a common vocabulary and reference model (Cardwell, 2008). M. Mathee et al. (2006) argues that Enterprise Architecture should be a practice that must be recognized by organizations of all sizes, especially where IT plays a significant role in the smooth running of an organization.

To remain competitive, organizations must address the growing dislocation between business requirements and IT capabilities (Cardwell, 2008). Adoption of an end to end Enterprise Architecture approach will help to re-align IT developments with business objectives (Cardwell, 2008). To be effective, Enterprise Architecture must be more than models for business, information and organization (Cardwell, 2008). Only by embracing an end to end methodology and framework will organizations avoid separate islands of knowledge, maximizing the benefits and cost savings available from the use Enterprise Architecture (Cardwell, 2008).

According to Cardwell (2008), the benefits of Enterprise Architecture should include increased integration among business units (in terms of data and business processes), reduced solution delivery time and system development costs, increased overall organization agility, and the ability to create a common future vision for both business and IT. M. Mathee et al (2006) mention “containment of costs and business alignment” as potential advantages of Enterprise Architecture. All of these factors amount to increased performance of the organization. B. van der Raadt and H. van Vliet (2008) further purport that Enterprise Architecture improves risk management due to reduced complexity and management satisfaction. Apart from the potential benefits associated with the practice of EA Planning, research also identifies legislative compliance as one of the major reasons why organizations use the Enterprise Architecture (M. Mathee et al, 2006). This is especially true for developed countries that have gone as far as implementing the practice within their own government departments and with e-government solutions (K. Hjort-Madsen, 2006).

2.4. Enterprise Architecture Frameworks

The main purpose of frameworks is to provide an organizing mechanism so that concepts, problems, and knowledge of enterprise interoperability can be represented in a structured way (Chen et al., 2008). A variety of Enterprise Architecture Frameworks have emerged in previous years (Chen et al., 2008). These frameworks have been the tools used to deliver Enterprise Architecture within organizations. Some Enterprise Architecture frameworks include Service Oriented Architecture (SOA), The Open Group Architecture Framework (TOGAF) and the Zachman Framework. Chen et al. (2008) suggest two types of architectures, namely technical architecture and conceptual architecture. Conceptual architecture is derived from business requirements and are understood and supported by senior management (Chen et al., 2008). The technical architecture provides the technical components that enable the business strategies and functions (Chen et al., 2008).

SOA has been a more recent development and extension to Enterprise Architecture (Chen et al., 2008). This describes the add-on architecture which can interface with a number of legacy IT systems to provide one coordinated Enterprise Architecture where the SOA is used to integrate existing software (Chen et al., 2008). The Zachman Framework was developed by John Zachman of IBM (Cardwell, 2008). It is used to define and control the interfaces and integration of components of a system (Cardwell, 2008). The model provides a formal structure to capture system specific information from the various perspectives of the overall system architecture (Cardwell, 2008).

The Zachman Framework has two very distinctive features that make it ideal for information modeling (Cardwell, 2008). The framework can be applied at any level of abstraction in the system development process, from a global enterprise, to a system, subsystem, or major module level (Cardwell, 2008). The framework also gives the modeler more freedom in that any data representation technique can be used to model the inner workings of each cell (Cardwell, 2008).

2.5. Failures associated with EA Planning

Gouhue, Kirsch, Quillard, and Wybo (1992) posit that EA Planning may not be necessary in all situations and is most appropriate when the goal is integrated systems. Effectively applying EA Planning is no easy task because it’s often caused by architects not being very well integrated into the organization (Van der Raadt, Bonnet, Schouten and van Vliet, 2010). They try to solve problems in a manner that is not very effective. Van der Raadt et al. (2010) proposes two main typical patterns associated with architects: architects are too theoretical or too pragmatic.

Enterprise Architects are too theoretical because they suffer from delivering long term EA Planning, but forget the link with practice (van der Raadt et al.; 2010). An example is that EA Planning does not solve the urgent problems of a project manager, and thus ends up as a tool that is never used. Technical Architects on the other hand often solve short term practical problems with their technical expertise (van der Raadt et al.; 2010). They are, however, unable to provide senior management with the overview of the organization and advise them on which long term decisions to make (van der Raadt et al.; 2010). The specific product of EA Planning is not always articulated, making it difficult to get top management commitment and manage expectations of participants and managers (van der Raadt et al.; 2010). Since EA Planning is a long term objective, the business may change during the long planning process, making the EA Planning objective unachievable (Boh et al., 2007).

These pitfalls might be viewed as critical success factors for EA Planning, with the implication that they are not often achieved (Gouhue, Kirsch, Quillard, and Wybo; 1992). Literature reveals that in spite of the conceptual appeal for methods for achieving IS cohesion within organizations, many that have attempted them have failed or experienced difficulties (Gouhue, Kirsch, Quillard, and Wybo; 1992). An important revelation that van der Raadt et al. (2010) makes is that the answer as to why architects do not solve organizational complexity is to be found in other areas than the efficiency of the process and the means they use. Thus it is not necessary the frameworks like TOGAF, SOA and Zachman that cause failures in implementing EA Planning. Van der Raadt et al. (2010) points out the interaction between architects and stakeholders – such as senior management, program and project managers, designers and programmers – to be often problematic.

Architects are often insufficiently results or goal oriented (van der Raadt et al., 2010). The relationship between architects and EA Planning stakeholders is often problematic because EA Planning stakeholders are reluctant to take part in creating and implementing the EA (van der Raadt et al., 2010). This reluctance depends on the contentment of the EA Planning stakeholders (van der Raadt et al., 2010). This contentment is determined by the degree to which stakeholders perceive EA to help them achieve their individual goals (van der Raadt et al., 2010).

2.6. Comparison with the Construction Industry

There are several analogies that are drawn between Enterprise Architecture in organizations and Architecture in the construction industry. Chen, Doumeingts and Vernadat (2008) posit that Enterprise Architecture is a challenging but confusing concept. They compare it with the construction industry which uses architecture in the design and construction of all size buildings. This is unlike in most firms today. Enterprise Architecture is commonly used in larger organizations and less in smaller organizations (Chen, et al., 2008). Architects in the construction industry use standard symbols that can be recognized and understood by all members of the industry to carry out the construction work (Chen, et al., 2008).. However, the enterprise engineering community has not experienced this time tested structure (Chen, et al., 2008). Instead, since its beginning, many various architecture proposals have been developed. Similarities and differences between enterprise architectures cannot be perceived by users (Chen, et al., 2008). The lack of a generally agreed terminology in this domain is a bottleneck for efficient application (Chen et. al., 2008).

2.7. Approaches to EA Planning

Despite these pitfalls and failures associated with EA Planning, additional research has shown that a major contributing factor is a tendency to apply a one dimensional traditional approach of EA Planning implementation (Allen and Boynton, 1991). In most cases, this approach focuses on integration of subunits and centralization of IS management. However, literature reveals a different perspective to this traditional approach (Gouhue, Kirsch, Quillard, and Wybo; 1992). Chen et al. (2008) posit that architecture should be developed only to the point at which it is fit for purpose.

Allen et al. (1991) identified two approaches to EA Planning; the “High road” and the “Low Road”. The High road is described as the more common traditional approach that puts more emphasis on centralization of IS management and focuses on integration of information across business units (Allen et al. (1991). The core applications for this form of architecture are designed to be organizationally independent and immune to restructuring. Investments in IS infrastructure are built around central data collections, common application systems, common business practices, and standardized hardware, operating systems and databases (Allen et al. 1991). In contrast the Low road takes a more decentralized approach which favors management that is dispersed throughout the organization (Allen et al. 1991). The IS technology resources are pushed as far down in the organization as possible (Allen et al. 1991).

Both approaches have their strengths and weaknesses. The research shows that a balance of both approaches to IS architecture needs to be considered in relation to the nature of the organization (Allen et al. 1991). Allen et al. (1991) recommend that an organization that has intra unit relationships that are straightforward and limited are suited to the High road IS architecture approach. An organization that possesses complex and fast changing intra-company relationships is more likely to cope with the Low road IS Architecture approach (Allen et al. 1991).

Managers must be completely convinced that pursuing the High road adds value otherwise they best stay with the Low road approach as the High road is high-risk in nature (Allen et al., 1991).

2.8. Organizational Environment in Relation to EA Planning

Goodhue, Wybo and Kirsch (1992) advise that another important factor to be considered when deciding which EA Planning approach is to be used is Uncertainty and Equivocality within the organization. Uncertainty is defined as the absence of specific, needed information (Goodhue, Wybo and Kirsch, 1992). Equivocality is defined as multiple conflicting sources of information (Goodhue, Wybo and Kirsch, 1992). Thus Equivocality questions the quality of the information whilst Uncertainty questions the quantity of information. Information integration may therefore not always be the ideal information processing mechanism to resolve Equivocality as it influences the quantity more than the quality of information. However, organizations that exhibit high Uncertainty will have to rely on information integration across departments within the organization to provide more information.

A High road EA Planning approach to resolve Uncertainty will be more appropriate where subunits are very interdependent and not highly differentiated. Goodhue, Wybo and Kirsch (1992) advise that the basic design problem is to balance the costs of information processing capacity against the needs of the subunit's work—too much capacity will be redundant and costly; too little capacity will not get the job done. McLaren, Head, Yuan and Chan (2011) argue that EA Planning is not a static and once off exercise that organizations need to carry out, but a continuous process of aligning the organization's strategic objectives to the Information Systems Capabilities. Thus the organization will need to apply a more dynamic EA Planning technique that is able to adapt with the ever changing business challenges.

Thus contrary to traditional approaches to EA Planning, which suggest a one dimensional High road - high risk approach, the literature above implies a consideration of two balanced EA Planning implementation perspectives that takes into account the organizational environment as a determinant factor of the intensity level of either the High road or the Low road EA Planning implementation approach. This is an important revelation towards understanding what factors determine the use of EA Planning and the effect it has on IT and the organization as a whole.

Understanding the determinants of use of EA Planning techniques is crucial because all the other outcomes such as satisfaction and impact are predicated upon use of the technique. Various adoption and use theories have been applied to Information Systems research. However, this paper will use the Diffusion of Innovations theory to determine the factors that influence the use of EA Planning. Literature shows that DOI is a commonly used theory in Information Systems adoption and use research (Chew, Grant and Tote, 2004; Thong, 1999; Argawal et al., 1997).

2.9. Diffusion of Innovation

The Diffusion of Innovations (DOI) is defined as the "process by which an innovation is communicated through certain channels over time among members of a Social System" (Chew, Grant and Tote, 2004:646).

Chew et al. (2004) posit that an innovation is determined by three variables; namely compatibility, ease of use and relative advantage. An innovation is any product or process that has been put into practice and is non-trivial to the business (Thong, 1999). Thus, not only is an innovation a renewal by means of technology, but it can also refer to renewal in terms of thought and action (Thong, 1999). EA Planning can therefore be considered as an innovation, since it is a process put into practice that is non-trivial to business.

Compatibility is defined as the degree to which an innovation is perceived as being consistent with the values, past experiences, and needs of potential users (Thong, 1999). If the EA Plan is not compatible or consistent with the values and norms of the potential users in the firm it will not be used. Thus we hypothesize the following:

<u>H1: The Compatibility of EA Planning relative to IT projects will positively influence use of EA Planning for IT by the Firm.</u>

"Ease of Use" is defined as the degree to which a potential user views usage of the target innovation to be relatively free of effort (Argawal et al., 1997). It is similar in definition to the complexity of an innovation (Argawal et al., 1997). Innovations that are perceived to be easier to use and less complex have a higher chance of being accepted and used by potential users. Thus we hypothesized that:

<u>H2: The Ease of Use of the EA Planning relative to IT projects will positively influence use of EA Planning for IT by the Firm.</u>

Relative advantage is defined as the degree to which an innovation is perceived as better than the idea it supersedes (Thong, 1999). The users of EA Planning in enterprises must appreciate some form of economic advantage of using the instrument for them to successfully implement it in their organization. The more they appreciate the economic advantages, the more they are likely to use EA Planning for their IT projects. Thus we put forwards the following hypothesis:

<u>H3: The Relative Advantage of EA Planning relative to IT projects will positively influence use of EA Planning for IT by the Firm.</u>

2.10. Resource Based View of IT

The Resource Based View (RBV) Theory is based on the assumption that a firm's performance is founded on its capabilities (Zhuang and Lederer, 2006). RBV posits that the firm's resources must be valuable, heterogeneous, and immobile (Lux, Riempp and Urbach, 2010). Thus its competitors must have difficulties in imitating its resources. The resources must therefore provide benefits such as reduced costs or increased revenue. A subset of these capabilities or resources will enable the firm to achieve competitive advantage (Ravichandran, and Lerwongsatien, 2005). Competencies develop when such resources are combined to develop organizational abilities (Tarafdar and Gordon, 2007). According to the theory, resources cannot be assessed in isolation, but as a combination (Ravichandran et al., 2005). Rivard et al. (2006) suggest that the growth of the firm relies on the ability of management to search for the best usage of available resources.

The basic unit of analysis in this research using this theory is resources. However, this study does not consider all resources. It only considers those specific to EA Planning and how they work to influence IT performance. Previous research literature was used to determine which resources were appropriate for this study. Literature from previous Resource Based View studies was used for this exercise. The resources referred to in the literature are the constructs for the dependent variables. The table below summarizes a list of sources used to identify possible candidate resources for EA Planning.

Table 1: Constructs (Resources) for RBV in previous studies

Source	Independent Variables	Dependent Variables
Lux et al. (2010)	EA Management-related Human Resources EA Management-related Intangibles EA Management-related Technological IT resources (IT Infrastructure resources and business applications)	EAM Capability Business Process Performance
Rivachadran et al. (2005)	IS Human Capital IT Infrastructure Flexibility IS Partnership quality	IS Capabilities Firm Performance
Zhuang et al. (2006)	E-Commerce Resources Human Resources Business Resources	E-Commerce Performance Firm Performance
Tarafdar et al. (2007)	IS Competencies -Knowledge Management -Collaboration -Project Management -Ambidexterity -IT/Innovation Governance -Business-IS Linkage -Process Modelling	Process Innovation

Bhatt and Grover (2005)	IT infrastructure IT business experience Relationship infrastructure	Competitive advantage

The above literature shows significant similarity between the constructs. However, this research is mainly concerned with picking those relevant for EA Planning. A model similar to Rivachandran et al.’s (2005) seemed to be the ideal and most comprehensive model for EA Planning. The constructs cover most of the ones included in previous literature. The constructs are also relevant to EA Planning. The model for this research replaced IS with EA Planning for the RBV independent variables. It replaces firm performance with IT performance as the dependent variable. Thus, consistent with Rivachandran et al.’s (2005) model, the following three broad categories of independent variables for IT performance were identified and included in this research model: EA Planning Human Capital, EA Planning related IT Infrastructure Flexibility and EA Planning Partnership Quality. Also consistent with Rivachandran et al.’s (2005) model, the following three broad categories of determinants of IT performance were also identified and included in this research model: Heterogeneity of Physical IT Infrastructure, Replication of IT Infrastructure Services, Business Application Integration, and Enterprise Data Integration.

EA Planning Human Capital

Complementary human resources have a tendency to be more valuable, heterogeneous, and immobile, providing competitive advantage (Zhuang et al., 2006). Lux et al.’s (2010) study also confirms how human IT resources can be a particular source of competitive advantage and that there’s an implicit link between human IT resources and IT performance. As done in Rivachandran et al.’s (2005) study, this research report focuses on two areas of human capital – skills and specificity. Skills pertain to the extent to which EA Planning personnel have the requisite technical and business skills, whilst specificity refers to the extent to which EA Planning personnel have firm specific knowledge, such as an understanding of the culture and routines of the organization (Rivachandran et al., 2005).

IT managers and Enterprise Architects acquire EA Planning- related skills through training. These skills may include skills such as architectural modeling skills. It is therefore reasonable to suggest that organizations that have highly skilled EA Planning professionals are better positioned to develop strong functional capabilities that impact IT performance than those that do not. In addition to the skills, firm specific knowledge is critical in developing functional capabilities. A deep understanding of the organization’s culture and norm’s is necessary to develop routines that fit the organizational context in which EA Planning activities have to be carried out (Rivachandran et al., 2005). So it can be inferred that firm specific knowledge would be critical in the development of appropriate functional capabilities, and hence IT performance. Thus we hypothesize that:

H4: There is a positive relationship between EA Planning Human Capital and IT performance.

EA Planning IT Infrastructure Flexibility

IT Infrastructure comprises technological IT resources and business applications. Various studies have examined the relationships between IT Infrastructure and firm performance (Zhuang et al., 2006; Lux et al., 2010; Ravichandran et al., 2005). The focus areas for the EA Planning IT Infrastructure in this study are Network and Platform Sophistication, and Data and Application Sophistication. Ravichandran et al. (2005) posit that IT infrastructure flexibility will have a positive relationship with IS functional capability. Reusable data and application assets can speed up application delivery by reducing the need for new software and facilitating integration with legacy systems (Ravichandran et al., 2005). Thus we put forwards the following hypothesis.

H5: There is a positive relationship between EA Planning Infrastructure Flexibility and IT performance.

EA Planning Partnerships Quality

Ravichandran et al. (2005) posits that the ability of the IS unit to deliver its services is dependent on an effective partnership between IS and line managers. IS and line managers must appreciate and understand each other's environment for IS to deliver value to the firm (Ravichandran et al., 2005). In addition to internal relationships, the relationship that an EA unit has with an external vendor is an important determinant of its functional capabilities (Ravichandran et al., 2005). The rate at which new technologies emerge makes it impossible for EA units to assimilate and deploy these technologies effectively (Ravichandran et al., 2005). Thus technical knowledge and other resources needed to effectively deliver EA solutions might be dispersed within and outside the organization. Therefore EA units with good vendor relationships can be expected to tap into external resources better than those that do not.

H6: There is a positive relationship between EA Planning Partnerships and IT performance.

2.11. Summary of the Research Model and Research Hypotheses

Figure 1 bellow gives an overview of this study. It also gives the model showing the hypotheses that were put forwards to address the research questions.

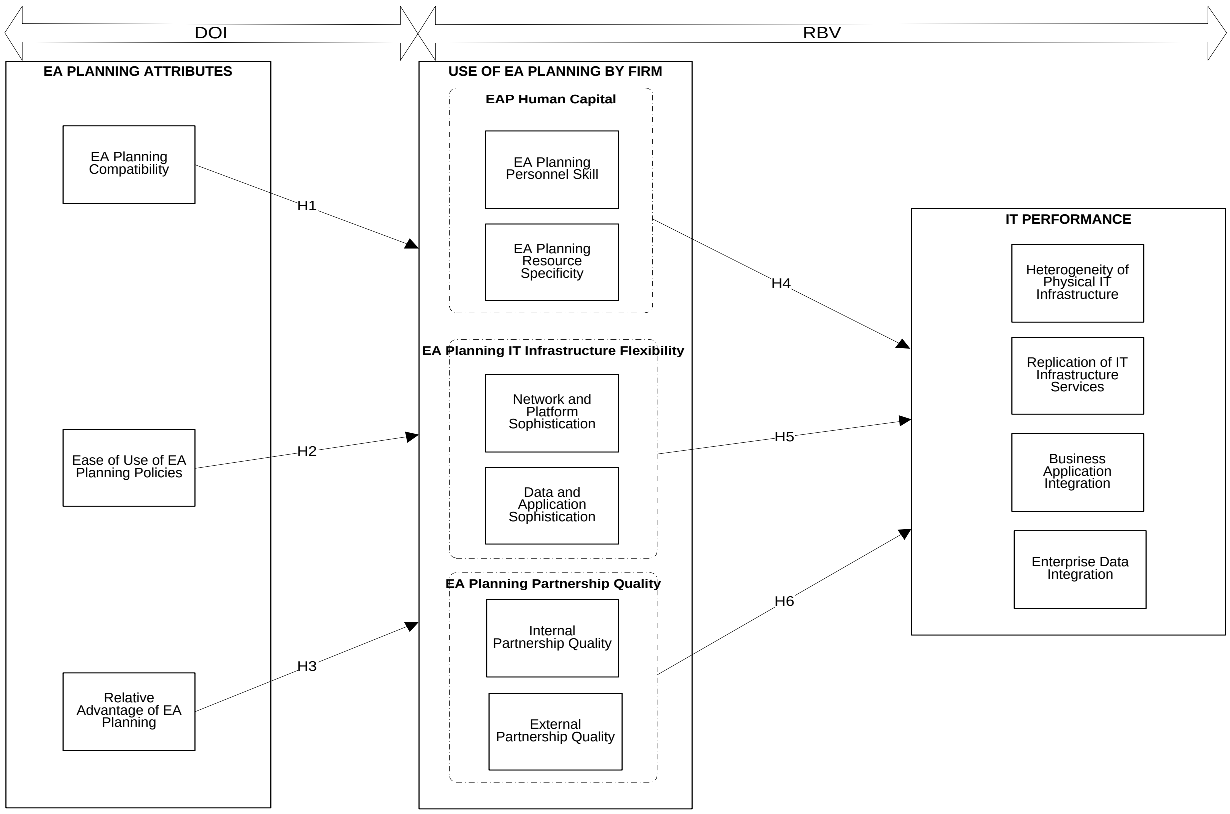

Figure 1: Research Model: Use of EA Planning and IT Performance

The Literature review has raised a number of questions and hypotheses have been proposed in an attempt to answer those questions. The table below outlines a summary of the hypotheses to be tested. The diagram presents the model with use of EA Planning as the mediator.

Table 2: List of Hypotheses

H1	The Compatibility of EA Planning relative to IT projects will positively influence use of EA Planning for IT by the Firm.
H2	The Ease of Use of the EA Planning relative to IT projects will positively influence use of EA Planning for IT by the Firm.

H3	The Relative Advantage of EA Planning relative to IT projects will positively influence use of EA Planning for IT by the Firm.
H4	There is a positive relationship between EA Planning Human Capital and IT performance.
H5	There is a positive relationship between EA Planning Infrastructure Flexibility and IT performance
H6	There is a positive relationship between EA Planning Partnership Quality and IT performance.

3. RESEARCH METHODOLOGY

3.1. Introduction

The purpose of this chapter is to describe and explain the methodology, data collection and analysis approach chosen for this research. It explains the research strategy used to test the study's hypotheses, the construction of the questionnaire, the sampling procedures and respondents, the administration of the questionnaire and the methods of analysis.

3.2. Research Strategy

A quantitative research approach was used for this study. This type of methodology is appropriate for this study as the relationships between the variables are measurable and the purpose of this study is to explain and predict these relationships (Leedy and Ormord, 2005). Hypotheses that support this approach have been identified. They will be tested using a deductive approach. A deductive research approach is appropriate when a theory and hypotheses have been developed (Saunders, Lewis and Thornhill, 2003, p.85).

The research strategy usually associated with deductive research is the survey (Saunders et. al., 2003, p.92). The survey approach will therefore be applied to this study. The main intention of this type of approach is to “learn about a large population by surveying a sample of that population” (Leedy et. al., 2005, p.183). A number of data collection techniques can be employed in survey research including interviews and questionnaires. A major advantage of a questionnaire is that it allows for easier reach to large samples (Leedy et. al., 2005, p.185). It also permits this to be done in a very economical way (Saunders et. al., 2003, p.92). A questionnaire is a more appropriate method due to the study’s intented large sample size, the relatively simplistic and quantifiable nature of the data, the ease of coding the subsequent quantitative analysis and the senior status of the intended respondents. A questionnaire will therefore be appropriate for this study.

3.3. Questionnaire Construction and Operationalization of Variables

As mentioned above, a questionnaire was used as the appropriate survey instrument. A five point Likert scale was mainly used in the questionnaire. It has been argued that a five point Likert scale allows respondents to be neutral in their answers (Goddard and Melville, 2001). A four point Likert scale was also used. Goddard et al. (2001) argue that this will force a decision to be made.

The table below details the variables measured and the questions used to collect the data that measured these variables.

Table 3: Operationalization of Variables

Item	Measure	Coding	Source
EA Planning Attributes (H1-H3)			

Item	Measure	Coding	Source
1	Compatibility of EA Planning	2 scale items with the following questions were used: Using EA Planning would be compatible with all aspects of our work (COMP1); I think that using EA Planning would fit well with the way we like to work (COMP2); The following 5 point Likert Scale was used: 1 = Strongly Disagree; 2 = Disagree; 3 = Neither Agree or Disagree; 4 = Agree; 5 = Strongly Agree.	(Agarwal et al., 1997:580)
2	Ease of Use of EA Planning	3 scale items with the following questions were used: My interaction with Enterprise Architecture Planning is clear and understandable (EOU1); Overall, we believe Enterprise Architecture Planning would be easy to use (EOU2); Learning to use Enterprise Architecture Planning will be easy for us (EOU3). The following 5 point Likert Scale was used: 1 = Strongly Disagree; 2 = Disagree; 3 = Neither Agree or Disagree; 4 = Agree; 5 = Strongly Agree.	(Agarwal et al., 1997:580)
3	Relative Advantage of EA Planning	4 scale items with the following questions were used: Using Enterprise Architecture Planning would make it easier to do our work (RAL1); Using Enterprise Architecture Planning will help us to accomplish tasks more quickly (RAL2); Using Enterprise Architecture Planning would improve the quality of the work we do (RAL3); Using Enterprise Architecture Planning would give us greater control over our work (RAL4); The following 5 point Likert Scale was used: 1 = Strongly Disagree; 2 = Disagree; 3 = Neither Agree or Disagree; 4 = Agree; 5 = Strongly Agree.	(Agarwal et al., 1997:580)
Appears as question 1,2 and 3 in the questionnaire (Appendix A)			
Use of EA Planning (H1-H6)			

Item	Measure	Coding	Source
1	EA Planning Human Capital	8 scale items with the following questions were used: Our EA Staff has very good technical knowledge; they are one of the best technical groups an EA department could have (HC1); Our EA staff has the ability to quickly learn and apply new technologies as they become available (HC2); Our EA staff has the skills and knowledge to manage IT projects in the current business environment (HC3); Our EA staff has the ability to work closely with customers and maintain productive client or user relationships (HC4); Our EA staff has excellent business knowledge; they have a deep understanding of the business goals and priorities of our organization (HC5); Our EA staff understands our technologies and business processes very well (HC6); Our EA staff is aware of the core beliefs and values of our organization (HC7); Our EA staff is conversant with the routines and methods used in the IS department (HC8). The following 5 point Likert Scale was used: 1 = Strongly Disagree; 2 = Disagree; 3 = Neither Agree or Disagree; 4 = Agree; 5 = Strongly Agree.	(Ravichandran et al., 2005:269)
2	EA Planning IT Infrastructure Flexibility	3 scale items with the following questions were used: The technology infrastructure needed to link our firm with external business partners (i.e. key customers, suppliers, alliances) is present and in place today (FLEX1);The technology needed for current business operations is present and in place today (FLEX2); Corporate data is currently sharable across business units and organizational boundaries (FLEX4); The following 5 point Likert Scale was used:1 = Strongly Disagree;2 = Disagree;3 = Neither Agree or Disagree;4 = Agree;5 = Strongly Agree.	(Ravichandran et al., 2005:269)

Item	Measure	Coding	Source
3	EA Planning Partnership Quality	3 scale items with the following questions were used: Our Enterprise Architecture Planning department and business units understand the working environment of each other very well (FLEX7); There is a high degree of trust between our Enterprise Architecture Planning department and business units (FLEX8); The goals and plans of IT projects are jointly developed by both the IS department and business units (FLEX9); The following 5 point Likert Scale was used: 1 = Strongly Disagree; 2 = Disagree; 3 = Neither Agree or Disagree; 4 = Agree; 5 = Strongly Agree.	(Ravichandran et al., 2005:269)
Appears as question 4,5 and 6 in the questionnaire (Appendix A)			
IT Performance (H4-H6)			
1	Heterogeneity of Physical IT Infrastructure	3 scale items with the following questions were used: There is heterogeneity in the hardware and network components used across projects or lines of business (HET1); There is heterogeneity in the middleware (including application servers and messaging brokers) used across projects or lines of business (HET2); There is heterogeneity in the tools (including network management and software development tools) used across projects or lines of business (HET3). The following 5 point Likert Scale was used: 1 = Strongly Disagree; 2 = Disagree; 3 = Neither Agree or Disagree; 4 = Agree; 5 = Strongly Agree.	(Ravichandran et al., 2005:269)

Item	Measure	Coding	Source
2	Replication of IT Infrastructure Services	3 scale items with the following questions were used: Multiple groups in different lines of business are providing similar security, disaster planning, and business recovery services (REP1); Multiple groups in different lines of business are providing similar services to manage electronic linkages to suppliers or customers (REP2); Multiple groups in different lines of business are providing similar infrastructure services (supporting hardware and middleware) (REP3). The following 5 point Likert Scale was used: 1 = Strongly Disagree; 2 = Disagree; 3 = Neither Agree or Disagree; 4 = Agree; 5 = Strongly Agree.	(Ravichandran et al., 2005:269)
3	Business Application Integration	3 scale items with the following questions were used: What percentage of the key applications systems are integrated by a common middleware approach? (BAI1); To what extent do you agree that the functional boundaries of individual applications and components have been clearly defined? (BAI2); Infrastructure services are present (supporting hardware and middleware) (BAI3).The following 5 point Likert Scale was used:1 = Strongly Disagree;2 = Disagree;3 = Neither Agree or Disagree;4 = Agree;5 = Strongly Agree.A Percentage Scale was also used for BAI1:(1) 0–25 percent, (2) 26–50 percent, (3) 51–75 percent, (4) 76–100 percent)	(Ravichandran et al., 2005:269)
4	Enterprise Data Integration	4 scale items with the following questions were used: My company has formally and sufficiently identified data to be shared across lines of business (EDI1); The customer entity is perceived and interpreted in a common fashion by all systems and lines of business (EDI2); Key business performance indicators extracted from IT systems are readily available to decision makers who require the information (EDI3); Among the set of data that the company would like to share across lines of business, is the data currently sharable across lines of business? (EDI4). The following 5 point Likert Scale was used: 1 = Strongly Disagree; 2 = Disagree; 3 = Neither Agree or Disagree; 4 = Agree; 5 = Strongly Agree.	(Ravichandran et al., 2005:269)
Appears as question 7,8,9 and 10 in the questionnaire (Appendix A)			

The items used for this study constituted a total of 43 questions. Survey instruments were adapted from prior literature where relevant.

3.4. Pre-testing and Pilot Testing

It was decided that the questionnaire was to be pretested with a small group of 5 business consultants. The Questionnaire in Appendix A as well as the research model was presented to the participants. They provided function of a pretest to confirm the content and face validity of the instrument to assess the adequacy of the measures in the instrument.

The final questionnaire given as Appendix A was produced after reviewing the literature and the process of pretesting and pilot testing. This process is described below.

The questionnaire was distributed to a group of business consultants to examine its content validity. The following adjustments were made to the questionnaire:

- The acronym EA Planning was expanded to Enterprise Architecture Planning throughout the questionnaire
- The Likert Scale explanation was repeated in each section to remind respondents
- Question 6: The phrase “There is heterogeneity in the” was repeated in each question
- Question 7: The phrase “ Multiple groups in different lines of business are providing similar” was repeated in each question
- Question 8: The question on infrastructure servers was rephrased to “Infrastructure Services are present”.

The following questions were removed from the questionnaire as the audience from the pretest could not understand the relevance of the questions:

- Question 1: Using EA Planning fits into our work style.
- Question 1: Using Enterprise Architecture Planning would enhance our effectiveness in our job.
- Question 3: My doctor encourages me to use the machine
- Question 5: The capacity of our network infrastructure adequately meets our current business needs.

- Question 5: The complexity of our current application systems seriously restricts our ability to develop modular systems with reusable software components.
- Question 5: We have standardized the various components of our technology infrastructure (i.e., hardware, OS, network, database).
- Question 6: Conflicts between Enterprise Architecture Planning department and business units are rare and few in our organization
- Question 6: Conflicts with our IT vendors and service providers are resolved through discussion and not through litigation
- Question 6: We get timely information from our vendors about unexpected problems that could affect their ability to meet our technology needs

3.5. Sampling Procedures and Respondents

The target of the research questionnaire was the architect or a person in the organization who had broad architecture responsibilities. The roles that fit this description included Architecture Consultants, Business Architects, Process Architects, Chief Information Officers, Solutions Architects and Enterprise Architects.

Based on past research that used very similar approaches to collect quantitative data (Ravichandran et al., 2005; Boh et al. 2007), a response rate of 23% was therefore expected. A total of 410 questionnaires were distributed to respondents through the methods described below. This included 160 from the IBM virtual community, 140 from the Open Group virtual community and 110 from South African consulting firms.

Virtual forums and communities targeted included the IBM virtual community and the Open Group virtual community. Invitations were also sent to business architects, enterprise architects, solutions architects and from various consulting companies on the virtual communities.

The IBM virtual community uses an email address mailing list to keep architects informed about the latest updates in the topic area. Through this mailing list, consultants were requested to engage with their client organization whilst they completed the survey. The consultants were asked to inform us about their client organizations. A random sample of 160 invitations was sent out via email using the IBM virtual community.

The Open Group, an international consortium that focuses on helping organizations to integrate new technology across the enterprise, was also used to disseminate information about the survey to their members. The Open Group maintains an email address mailing list for each of their virtual community.

Members have access to this mailing list. The Open Group includes a wide range of organizations committed to encouraging greater integration and sharing of IT resources, and one subgroup specializes in EA. A random sample of 140 invitations was sent out via email using the Open Group's virtual community.

A convenience sample of 110 invitations was sent out via email to architecture consultants in 11 South African consulting firms. The cover letter requested architecture consultants within the firms to complete the survey. The respondents were also requested to forward the questionnaire to architects within their client organizations to complete the survey if they did not fulfill the role of an architect.

We believe these samples are representative of the target population of architects, as they are particularly concerned with the use and impact of Enterprise Architecture and its impact on IT performance

3.6. Variables and measures

A structured questionnaire research instrument taken from Agarwal and Prasad's (1997) study was used to test the DOI side of the model (Appendix A; Section A). The RBV side of the model was tested using questionnaires taken from Ravichandran et al.'s (2005) study (Appendix A; Section B). IT performance was measured using questionnaires taken from Boh et al. (2005) (Appendix A, Section C).

3.7. Respondents questionnaire administration

The survey letter indicated that the survey targeted enterprise architects, business architects, process architects and solutions architects, or a person in the organization who had broad architecture responsibilities.

To assist the respondents in answering the questionnaire, a simple definition of what is meant by the "use of EA Planning" was included in the questionnaire.

Participants were informed that their participation was voluntary and that there was no penalty for not participating.

The cover letter explained the purpose of the survey and asked the respondent to reply within two weeks. It was decided that if the overall response was still not adequate, a follow up email would be sent after 4 weeks to participants who had not yet responded.

3.8. Data Analysis

3.8.1. Data Screening

It was decided that once the data had been collected and coded, it would be checked for missing data. Missing data could result in a responded not wanting to respond to a question, not knowing the answer or missing the question by mistake (Saunders et al., 2003). All missing data will be given a specific code to indicate one of these instances. A decision would be made on whether missing values would be estimated, or whether responses should be discarded. Items which consistently received no response would also need to be dropped from the analysis.

As part of the screening process, it was decided that box plots would be used to detect outliers. Outliers may be the result of an error in the recording of the data, a respondent who should not have been included in the sample (does not actually represent the target population), or an accurate recording of a respondent with an unusually high or low value (Keller and Warrack, 2003, p.645). In the first instance, the data would be corrected. In the second instance, the response would be discarded, and in the third instance, the data would be left as is and regarded as valid.

Distribution of values was also established. This determined whether the data was positively or negatively skewed and whether it is symmetrically distributed before statistical analysis is conducted.

Non response was tested by comparing whether variances existed between early and late responses. This ensured that data collected was an accurate representation of the population.

3.8.2. Reliability and Validity

Prior to hypotheses testing, construct validity of multi-item variables was tested using Principal Components Analysis (PCA), and then reliability was tested using a Cronbach alpha score of 0.65 to ensure internal consistency (Ravichandran et al., 2005). This also ensured that the data was more likely to yield significant results (Leedy and Ormrod, 2005).

Composite scores were calculated as follows:

- EA Planning Compatibility: by taking the average of the item scores for EAP Compatibility
- EA Planning Relative Advantage: by taking the average of the item scores for EAP Relative Advantage

- EA Planning Ease of Use: by taking the average of the item scored for EA Planning Ease of Use
- EA Planning Human Capital: by taking the average of the item scores for EAP Human Capital.
- EA Planning IT Infrastructure Flexibility: by taking the average of the item scores for EAP IT Infrastructure Flexibility
- EA Planning Partnership Quality: by taking the average of the item scores for EAP Partnership Quality
- Use of EA Planning by the firm: by taking the average of the item scores for EA Planning Human Capital, EA Planning IT Infrastructure Flexibility and EA Planning Partnership Quality
- IT Performance: by taking the average of the items scores for Heterogeneity of Physical IT Infrastructure, Replication of IT Infrastructure Services, Business Application Integration and Enterprise Data Integration

A bivariate Pearson's correlation test was used to test the direct standalone relationships for each of the hypotheses in the research model. A t-test at the $p<0.05$ level revealed if there was a significant relationship in each of the hypotheses.

3.8.3. Hypothesis Testing

For each hypothesis tested, it was decided that results would only be considered statistically significant at a 95% confidence level. Structural Equation Modeling technique was a possible consideration to have been employed in this model. According to Gefen et al. (2000), SEM assumes linear relationships whereas regression handles non-linear relationships. In addition to this, regression also handles multi-collinearity, outliers, heteroscedasticity, and polynomial relationships (Gefen et al., 2000). It was therefore decided that multiple regression tests were to be used to test the joint relationships and effects of the independent variables. This was similar to the approach used in Thong et al.'s (1995) study.

Hypothesis 1

Hypothesis 1 involves the analysis of the relationship between the three measures of Use of EA Planning, as well as the composite Use of EA Planning, as dependent variables, and the independent measure of Compatibility of EA Planning. The measures of Use of EA Planning include EA Planning Human Capital, EA Planning IT Infrastructure Flexibility and EA Planning Partnership Quality. An appropriate analysis method was therefore multiple regression. Multiple regression tests enabled examining of whether a greater extent of the independent variables will result in a greater extent of each of the three dependent variables separately, and then the Use of EA Planning (as a composite variable).

Hypothesis 2

Hypothesis 2 involves the analysis of the relationship between the three measures of Use of EA Planning, as well as the composite Use of EA Planning, as dependent variables, and the independent measure of the Ease of Use of EA Planning. The measures of Use of EA Planning include EA Planning Human Capital, EA Planning IT Infrastructure Flexibility and EA Planning Partnership Quality. An appropriate analysis method is therefore multiple regression. Multiple regression tests enable examining of whether a greater extent of the independent variables will result in a greater extent of each of the three dependent variables separately, and then the Use of EA Planning (as a composite variable).

Hypothesis 3

Hypothesis 3 involves the analysis of the relationship between the three measures of Use of EA Planning, as well as the composite Use of EA Planning, as dependent variables, and the independent measure of the Relative Advantage of EA Planning. The measures of Use of EA Planning include EA Planning Human Capital, EA Planning IT Infrastructure Flexibility and EA Planning Partnership Quality. An appropriate analysis method is therefore multiple regression. Multiple regression tests enable examining of whether a greater extent of the independent variables will result in a greater extent of each of the three dependent variables separately, and then the Use of EA Planning (as a composite variable).

Hypothesis 4

Hypothesis 4 involves the analysis of the relationship between the three measures of IT Performance, as well as the composite IT Performance, as dependent variables, and the independent measure of the EA Planning Human Capital. The measures of IT Performance include Heterogeneity of Physical IT Infrastructure, Replication of IT Infrastructure Services, Business Application Integration and Enterprise Data Integration. An appropriate analysis method is therefore multiple regression. Multiple regression tests enable examining of whether a greater extent of the independent variables will result in a greater extent of each of the three dependent variables separately, and then IT Performance (as a composite variable).

Hypothesis 5

Hypothesis 5 involves the analysis of the relationship between the three measures of IT Performance, as well as the composite IT Performance, as dependent variables, and the independent measure of the EA Planning IT Infrastructure Flexibility. The measures of IT Performance include Heterogeneity of Physical IT Infrastructure, Replication of IT Infrastructure Services, Business Application Integration and Enterprise Data Integration. An appropriate analysis method is therefore multiple regression. Multiple regression tests enable examining of whether a greater extent of the independent variables will result in a greater extent of each of the three dependent variables separately, and then IT Performance (as a composite variable).

Hypothesis 6

Hypothesis 6 involves the analysis of the relationship between the three measures of IT Performance, as well as the composite IT Performance, as dependent variables, and the independent measure of the EA Planning Partnership Quality. The measures of IT Performance include Heterogeneity of Physical IT Infrastructure, Replication of IT Infrastructure Services, Business Application Integration and Enterprise Data Integration. An appropriate analysis method is therefore multiple regression. Multiple regression tests enable examining of whether a greater extent of the independent variables will result in a greater extent of each of the three dependent variables separately, and then IT Performance (as a composite variable).

3.8.4. Limitations of the Methodology

There are a number of limitations to the study. The first is that there may be a bias in terms of the organizational size and culture of the organization. Organizational size may have a significant contribution towards the use and influence of EA Planning. These measures may therefore not be an accurate reflection and will affect the reliability of the results. This is referred to in literature as participant bias (Saunders et al., 2003).

A second limitation is that questionnaire used to collect data could have concepts/questions misinterpreted by the respondents

A third is that the Likert scales used to measure constructs are subject to perceptual error which may skew results. Likert Scales are however acceptable for large survey studies and were therefore appropriate for achieving the objectives of this study.

A fourth limitation is that data d was collected from individuals and therefore perceptions could have been biased.

A fifth limitation is that the majority of the identified respondents were consultants from the IBM virtual forum, the Open Group virtual forum and different South African consulting companies. The results can therefore not be generalized across other types of organizations and companies. The respondents were given the choice to pass the questionnaire on to someone else to complete on their behalf, thus not truly reflecting the Architect sample required for this study.

3.9. Conclusion

This chapter has described the research strategy, the construction of the questionnaire as the research instrument, the pilot and pre-testing, the sampling procedures and respondents, the questionnaire administration, the data analysis methods and the limitations of the study. The next chapter will describe the response to the questionnaire and analyze the data collected.

4. RESEARCH RESULTS

The purpose of this chapter is to present the results of the data collected from the targeted respondents and test the hypotheses.

4.1. Data Screening

Of the 98 responses received, 59 were received in the first 4 weeks. A follow-up email was then sent to the respondents who had not yet responded and a further 39 responses were received. 32 responded that they did not have an Architect within their organization. 8 of the responses were discarded as the participants did not fulfill the role of an Architect. The remaining 90 responses were then captured into OpenStat (a statistical software tool) for analysis.

In a few cases, the data was obviously entered incorrectly by the respondents. This data was corrected where possible in the following ways:

- A blank answer was recorded as 99999 (which were later on adjusted using the mean replacement strategy in OpenStat).
- If a respondent indicated a title that was not one of the five provided as options, they were asked to confirm that they fulfilled that of an Architect role. In all cases, except 6, the respondents confirmed that they did in fact fulfill the role of an Architect.

4.2. Missing Data

The captured data revealed a number of missing data items. In all these instances, a value of 99999 was captured. No respondents answered less than 90% of their questionnaire and there were no items that were missed out more than 10% of the time. No cases were therefore deleted. Missing data was replaced by using the mean replacement strategy. Please refer to Appendix B for the tables of missing data by variable and by respondent.

4.3. Outliers

Box Plots were used to determine whether there were any outliers. No outliers were found and therefore no data was corrected or discarded in terms of outliers.

4.4. Response Profile

The table below shows the response profile as per the job title:

Table 4: Job Titles

Title	Frequency	Percentage
Business Architect	38	42.2%
Process Architect	27	30.0%
Solutions Architect	14	15.6%
Enterprise Architect	5	5.6%
CIO	4	4.4%
Other	2	2.2%
Total	**90**	**100.0%**

According to the table above, the majority of the respondents were Business Architects

4.5. Data Distribution

Skewness and Kurtosis were examined to determine whether the data was distributed normally. Skewness must be between +1 and -1. Kurtosis can be between +3 and -3. One of the item variables fell outside these defined values; HET3 (Skewness = 1.399; Kurtosis = 0.891). Except for this item, all the other items were reasonable in terms of distribution. Refer to Appendix C for more detail.

It was decided that the data for HET3 must be transformed to give a more normal distribution. The Skewness and Kurtosis values for HET3 (Skewness = 0.012; Kurtosis = -1.066) then fell within the defined values. Subsequent analysis used the transformed data for these two measures.

4.6. Non-Response Bias

The sample frame of 410 respondents included 110 invitations to South African consulting firms, 160 we from the IBM virtual community and 140 using Open Group virtual community. Thirty-one from South African consulting firms responded (28%). 35 from the IBM virtual community responded (22%). 24 from the Open Group responded (17%). Of the 410 invitations sent, a total of 90 responded. Thus a total of 22% responded. This was close to the expected rate of 23%. The response rates were relatively high and this may possibly be attributed to the broad worldwide sample base which was not just limited to the local South African context.

In order to test for non-response bias, the data file was split into two groups consisting of early and late responses. Early responses refer to respondents who completed the questionnaire without a reminder

(Round 1). Late respondents refer to respondents who required a follow up email before they completed the questionnaire (Round 2).

A Chi-Squared test was used to test whether the Round was not affected by the Response Source (IBM, SA Consulting and Open Group) . The Chi-squared value is 1.441. This value is not significant (p = 0.486) indicating that the Response Sources were not affected by the Round. Refer to Appendix D for a summary of the results.

It was thus felt that no non-response bias was evident.

4.7. Reliability and Validity

4.7.1. Validity

To measure construct validity, Principal Components Analysis (using Varimax rotation) was applied to the constructs measuring multiple items. These constructs include:

- EA Planning Compatibility
- EA Planning Relative Advantage
- EA Planning Ease of Use
- Use of EA Planning by the firm
    - This included EA Planning Human Capital, EA Planning IT Infrastructure Flexibility and EA Planning Partnership Quality
- EA Planning Human Capital
- EA Planning IT Infrastructure Flexibility
- EA Planning Partnership Quality
- IT Performance

The cumulative variance for all variables was above the acceptable level of 60% (Refer to Appendix E).

4.7.2. Reliability

Following Principal Components, to measure reliability of multiple item scales, Cronbach's Alpha was calculated. The results described below can be found in Appendix F.

The alpha coefficient is 0.702 for Relative Advantage (measured by RAL1, RAL2, RAL3 and RAL4). This is acceptable as it is above 0.6.

The alpha coefficient is 0.652 for Compatibility (measured by Comp1 and Comp2). This is acceptable as it is above 0.6.

The alpha coefficient is 0.816 for Ease of Use (measured by EOU1, EOU2 and EOU3). This is acceptable as it is above 0.6.

The alpha coefficient is 0.618 for Human Capital (measured by HC1, HC2, HC3, HC4, HC5, HC6, HC7 and HC8). This is acceptable as it is above 0.6.

The alpha coefficient is 0.688 for Infrastructure Flexibility (measured by FLEX1, FLEX2 and FLEX4). This is acceptable as it is above 0.6.

The alpha coefficient is 0.690 for Partnership Quality (measured by FLEX7, FLEX8 and FLEX9). This is acceptable as it is above 0.6.

The alpha coefficient is 0.728 for Use of EA Planning (measured by HC1, HC2, HC3, HC4, HC5, HC6, HC7, HC8, FLEX1, FLEX2, FLEX4, FLEX7, FLEX8 and FLEX9). This is acceptable as it is above 0.6.

The alpha coefficient is 0.804 for IT Performance (measured by HET1, HET2, HET3, REP1, REP2, REP3, BAI1, BAI2, BAI3, ED1, ED2, ED3 and ED4). This is acceptable as it is above 0.6.

Composite scored for the above variables were calculated using as explained in Chapter 3 (section 3.7.2.). The composites were used in subsequent hypothesis testing.

4.8. Hypothesis 1-3

H_1: The Compatibility of EA Planning relative to IT projects will positively influence the Use of EA Planning for IT by the Firm.

H_2: The Ease of Use of the EA Planning relative to IT projects will positively influence the Use of EA Planning for IT by the Firm.

H_3: The Relative Advantage of EA Planning relative to IT projects will positively influence the Use of EA Planning for IT by the Firm.

Hypothesis 1 to 3 involves the analysis of the relationship between the dependent variable, Use of EA Planning for IT (Human Capital, IT Infrastructure Flexibility and Partnership Quality), and the independent variables, Compatibility, Ease of Use and Relative Advantage.

Before carrying out the regression tests needed to test H_1, H_2 and H_3, bivariate correlation analysis was performed on the data and is provided in the table 5 below. This analysis was performed to determine if collinearity exists between the independent EA Planning Attribute variables. Since there was no evidence of collinearity, multiple regression could therefore be used to analyze data.

Table 5: Hypothesis 1 to 3 Correlations

			1	2	3	4	5	6	7
1	RELATIVE ADVANTAGE	Pearson Correlation	1						
		Sig. (2-tailed)							
		N	90						
2	EASE OF USE	Pearson Correlation	0.257	1					
		Sig. (2-tailed)	0.015						
		N	90	90					
3	COMPATIBILITY	Pearson Correlation	0.05	0.521	1				
		Sig. (2-tailed)	0.64	0					
		N	90	90	90				
4	HUMAN CAPITAL	Pearson Correlation	0.227	0.472	0.034	1			
		Sig. (2-tailed)	0.031	0	0.75				
		N	90	90	90	90			
5	IT INFRASTRUCTURE FLEXIBILITY	Pearson Correlation	0.131	-0.136	0.112	0.123	1		
		Sig. (2-tailed)	0.217	0.203	0.293	0.249			
		N	90	90	90	90	90		
6	PARTNERSHIP QUALITY	Pearson Correlation	0.212	-0.167	-0.044	0.44	0.461	1	
		Sig. (2-tailed)	0.045	0.116	0.678	0	0		
		N	90	90	90	90	90	90	
7	USE OF EA PLANNING BY THE FIRM	Pearson Correlation	0.261	0.229	0.049	0.856	0.564	0.751	1
		Sig. (2-tailed)	0.013	0.03	0.646	0	0	0	
		N	90	90	90	90	90	90	90

4.8.1. Use Of EA Planning As a Dependent Variable

Linear regression was first run to test the effect of the independent EA Attributes variables on the composite variable, Use of EA Planning. An R^2 value of 0.100 was calculated. This shows that Compatibility, Ease of Use and Relative Advantage explain about 10% of the variance in Use of EA Planning. Refer to Appendix G for more detailed results of this analysis.

The individual contribution of each of the variables, Compatibility, Ease of Use and Relative Advantage showed levels of significance of significance of 0.052, 0.091 and 0.549 respectively. All of these values are greater than 0.05 and are therefore **not significant**. None of the variables have a significant influence on Use of EA Planning for $p<0.05$.

Table 6: Use of EA Planning as Dependent Variable

	B	Std. Error	Beta	t	Significance
(Constant)	2.497	0.288	0	8.678	0
RELATIVE ADVANTAGE	0.15	0.076	0.21	1.974	0.052
EASE OF USE	0.096	0.056	0.213	1.712	0.091
COMPATIBILITY	-0.031	0.052	-0.072	-0.601	0.549

a: Dependent Variable: Use of EA Planning

4.8.2. EA Planning Human Capital

Linear regression was run to test the effect of the independent EA Planning Attributes variables and the dependent variable, EA Planning Human Capital (one measure of Use of EA Planning).

An R2 value of 0.291was calculated (more detail can be found in Appendix G). This shows that Relative Advantage, Ease of Use and Compatibility explain 29.1% of the variance in EA Planning Human Capital. The individual contributions of each variable, Relative Advantage, Ease of Use and Compatibility showed levels of significance of 0.35, 0 and 0.01 respectively (see table 7). Relative Advantage is greater than 0.05 and is therefore *not significant*. Compatibility and EA Planning Human Capital have a *negative significant* relationship at $p<0.05$. This suggests that over emphasizing EA Planning Compatibility will have negative implications for EA Planning Human Capital. This is discussed further in Chapter 5.Ease of Use and EA Planning Human Capital is however *significant.*

Table 7: EA Planning Human Capital as Dependent Variable

Coefficients	B	Std. Error	Beta	T	Significance
(Constant)	2.556	0.307	0	8.319	0
RELATIVE ADVANTAGE	0.076	0.081	0.089	0.94	0.35
EASE OF USE	0.323	0.06	0.595	5.384	0
COMPATIBILITY	-0.146	0.056	-0.28	-2.621	0.01

4.8.3. EA Planning IT Infrastructure Flexibility

Linear regression was run to test the effect of the independent EA Planning Attributes variables and the dependent variable, EA Planning IT Infrastructure Flexibility (one measure of Use of EA Planning).

An R2 value of 0.102 was calculated (more detail can be found in Appendix G). This shows that Relative Advantage, Ease of Use and Compatibility explain 10.2% of the variance in EA Planning IT Infrastructure Flexibility. The individual contributions of each variable, Relative Advantage, Ease of Use and Compatibility showed levels of significance of 0.06, 0.009 and 0.025 respectively (see table 8). Relative Advantage is greater than 0.05 and is therefore *not significant*. Ease of Use and EA Planning IT Infrastructure Flexibility have a *negative significant* relationship at $p<0.05$. This suggests that over emphasizing EA Planning Ease of Use will have negative implications for EA Planning IT Infrastructure Flexibility. This is discussed further in Chapter 5.Compatibility and EA Planning IT Infrastructure Flexibility is however *significant.*

Table 8: EA Planning IT Infrastructure Flexibility as Dependent Variable

Coefficients	B	Std. Error	Beta	t	Significance
(Constant)	2.626	0.461	0	5.692	0
RELATIVE ADVANTAGE	0.232	0.122	0.202	1.904	0.06
EASE OF USE	-0.239	0.09	-0.33	-2.656	0.009
COMPATIBILITY	0.19	0.084	0.274	2.278	0.025

4.8.4. EA Planning Partnership Quality

Linear regression was run to test the effect of the independent EA Planning Attributes variables and the dependent variable, EA Planning Partnership Quality (one measure of Use of EA Planning).

An R2 value of 0.103 was calculated (more detail can be found in Appendix G). This shows that Relative Advantage, Ease of Use and Compatibility explain 10.3% of the variance in EA Planning Partnership Quality. The individual contributions of each variable, Relative Advantage, Ease of Use and Compatibility showed levels of significance of 0.01, 0.024 and 0.454 respectively (see table 9). Compatibility is greater than 0.05 and is therefore *not significant*. Ease of Use and EA Planning Partnership Quality have a *negative significant* relationship at $p<0.05$. This suggests that over emphasizing EA Planning Ease of Use will have negative implications for EA Planning Partnership Quality. This is discussed further in Chapter 5.Relative Advantage and EA Planning Partnership Quality is however *significant*.

Table 9: EA Planning Partnership Quality as Dependent Variable

Coefficients	B	Std. Error	Beta	t	Significance
(Constant)	2.183	0.392	0	5.57	0
RELATIVE ADVANTAGE	0.273	0.103	0.281	2.642	0.01
EASE OF USE	-0.176	0.077	-0.286	-2.301	0.024
COMPATIBILITY	0.053	0.071	0.091	0.753	0.454

H_1, H_2 and $H_3$are partially supported. A significant relationship was found between Compatibility and EA Planning IT Infrastructure Flexibility. A significant relationship was found between Ease of Use and EA Planning Human Capital. A significant relationship was found between Relative Advantage and EA Planning Partnership Quality. However, no significant relationship was found between the EA Planning Attributes independent variables and the Use of EA Planning Composite variable. Further discussion around these findings can be found in Chapter 5.

4.9. Hypotheses 4 to 6

H_4: There is a positive relationship between EA Planning Human Capital and IT performance.

H_5: There is a positive relationship between EA Planning Infrastructure Flexibility and IT performance.

H_6: There is a positive relationship between EA Planning Partnerships and IT performance.

Hypotheses 4 to 6 involves the analysis of the relationship between the independent variable, Use of EA Planning (EA Planning Human Capital, EA Planning IT Infrastructure Flexibility and EA Planning Partnerships Quality) and the dependent variable IT Performance (Heterogeneity of Physical IT Infrastructure, Replication of IT Infrastructure Services, Business Application Integration and Enterprise Data Integration).

Once again, before carrying out regression analysis to test H1, H2 and H3, bivariate correlation analysis was performed to determine if collinearity exists between the independent Use of EA Planning variables. No evidence of collinearity between the measures of EA Planning Use were found and therefore multiple regression could be used to analyze the data.

Table 10: Hypotheses 4 to 6 Correlations

			1	2	3	4	5	6	7	8
1	HUMAN CAPITAL	Pearson Correlation	1							
		Sig. (2-tailed)								
		N	90							
2	INFRASTRUCTURE FLEXIBILITY	Pearson Correlation	0.123	1						
		Sig. (2-tailed)	0.249							
		N	90	90						
3	PARTNERSHIP QUALITY	Pearson Correlation	0.44	0.461	1					
		Sig. (2-tailed)	0	0						
		N	90	90	90					
4	HETEROGENEITY	Pearson Correlation	-0.201	-0.364	-0.338	1				
		Sig. (2-tailed)	0.057	0	0.001					
		N	90	90	90	90				
5	REPLICATION OF IT	Pearson Correlation	0.205	-0.09	-0.055	0.536	1			
		Sig. (2-tailed)	0.052	0.398	0.609	0				
		N	90	90	90	90	90			
6	BUSINESS APPLICATION INTEGRATION	Pearson Correlation	0.383	0.325	0.265	0.238	0.559	1		
		Sig. (2-tailed)	0	0.002	0.011	0.024	0			
		N	90	90	90	90	90	90		
7	ENTERPRISE DATA INTEGRATION	Pearson Correlation	0.384	0.11	-0.038	0.164	0.694	0.526	1	
		Sig. (2-tailed)	0	0.301	0.72	0.121	0	0		
		N	90	90	90	90	90	90	90	
8	IT PERFORMANCE	Pearson Correlation	0.236	-0.023	-0.08	0.651	0.91	0.735	0.767	1
		Sig. (2-tailed)	0.025	0.827	0.455	0	0	0	0	
		N	90	90	90	90	90	90	90	90

4.9.1. IT Performance as a Dependent Variable

Linear regression was run to test the effect of the independent Use of EA Planning variables, Human Capital, IT Infrastructure Flexibility and Partnership Quality, and the dependent variable, IT Performance.

An R2 value of 0.10 was calculated (more detail can be found in Appendix H). This shows that Human Capital, IT Infrastructure Flexibility and Partnership Quality explain 10% of the variance in IT Performance. The individual contributions of each variable, Human Capital, IT Infrastructure Flexibility and Partnership Quality showed levels of significance of 0.004, 0.656 and 0.05 respectively (see table 11). IT Infrastructure Flexibility is greater than 0.05 and is therefore **not significant**. Partnership Quality and IT Performance have a **negative significant** relationship at $p<0.05$. This suggests that over emphasizing Partnership Quality will have negative implications for IT Performance. This is discussed further in Chapter 5.The relationship between Human Capital and IT Performance is however **significant**.

Table 11: IT Performance as a Dependent Variable

	B	Std. Error	Beta	T	Significance
(Constant)	2.43	0.458	0	5.306	0
HUMAN CAPITAL	0.387	0.13	0.342	2.983	0.004
IT INFRASTRUCTURE FLEXIBILITY	0.044	0.098	0.052	0.447	0.656
PARTNERSHIP QUALITY	-0.254	0.128	-0.254	-1.983	0.05

4.9.2. Heterogeneity of Physical IT Infrastructure as a Dependent Variable

Linear regression was run to test the effect of the independent Use of EA Planning variables, Human Capital, IT Infrastructure Flexibility and Partnership Quality, and the dependent variable, Heterogeneity of Physical IT Infrastructure.

An R^2 value of 0.176 was calculated (more detail can be found in Appendix H). This shows that Human Capital, IT Infrastructure Flexibility and Partnership Quality explain 17.6% of the variance in Heterogeneity of Physical IT Infrastructure. The individual contributions of each variable, Human Capital, IT Infrastructure Flexibility and Partnership Quality showed levels of significance of 0.404, 0.016 and 0.164 respectively (see table 12). Human Capital and Partnership Quality are greater than 0.05 and are therefore **not significant**. The relationship between IT Infrastructure Flexibility and Heterogeneity of Physical IT Infrastructure is however **significant**.

Table 12: Heterogeneity of Physical IT Infrastructure as a Dependent Variable

Coefficients

	B	Std. Error	Beta	T	Significance
(Constant)	5.882	0.707	0	8.322	0
HUMAN CAPITAL	-0.168	0.2	-0.092	-0.838	0.404
IT INFRASTRUCTURE FLEXIBILITY	-0.374	0.152	-0.273	-2.462	0.016
PARTNERSHIP QUALITY	-0.277	0.197	-0.172	-1.403	0.164

4.9.3. Replication of IT Infrastructure Services as a Dependent Variable

Linear regression was run to test the effect of the independent Use of EA Planning variables, Human Capital, IT Infrastructure Flexibility and Partnership Quality, and the dependent variable, Replication of IT Infrastructure Services.

An R^2 value of 0.071 was calculated (more detail can be found in Appendix H). This shows that Human Capital, IT Infrastructure Flexibility and Partnership Quality explain 7.1% of the variance in Replication of IT Infrastructure Services. The individual contributions of each variable, Human Capital, IT Infrastructure Flexibility and Partnership Quality showed levels of significance of 0.019, 0.647 and 0.244 respectively (see table 13). IT Infrastructure Flexibility and Partnership Quality are greater than 0.05 and are therefore **not significant**. The relationship between Human Capital and Replication of IT Infrastructure Services is however **significant**.

Table 13: Replication of IT Infrastructure Services as a Dependent Variable

Coefficients

	B	Std. Error	Beta	t	Significance
(Constant)	2.12	0.637	0	3.328	0.001
HUMAN CAPITAL	0.433	0.18	0.279	2.4	0.019
IT INFRASTRUCTURE FLEXIBILITY	-0.063	0.137	-0.054	-0.459	0.647
PARTNERSHIP QUALITY	-0.209	0.178	-0.153	-1.173	0.244

4.9.4. Business Application Integration as a Dependent Variable

Linear regression was run to test the effect of the independent Use of EA Planning variables, Human Capital, IT Infrastructure Flexibility and Partnership Quality, and the dependent variable, Business Application Integration.

An R2 value of 0.225 was calculated (more detail can be found in Appendix H). This shows that Human Capital, IT Infrastructure Flexibility and Partnership Quality explain 22.5% of the variance in Business

Application Integration. The individual contributions of each variable, Human Capital, IT Infrastructure Flexibility and Partnership Quality showed levels of significance of 0.001, 0.008 and 0.814 respectively (see table 14). Partnership Quality is greater than 0.05 and is therefore *not significant*. The relationship between Human Capital and Business Application Integration is however *significant*. The relationship between IT Infrastructure Flexibility and Business Application Integration is also *significant.*

Table 14: Business Application Integration as a Dependent Variable

	B	Std. Error	Beta	t	Significance
(Constant)	0.308	0.547	0	0.563	0.575
HUMAN CAPITAL	0.524	0.155	0.359	3.379	0.001
IT INFRASTRUCTURE FLEXIBILITY	0.321	0.117	0.294	2.731	0.008
PARTNERSHIP QUALITY	-0.036	0.153	-0.028	-0.236	0.814

4.9.5. Enterprise Data Integration as a Dependent Variable

Linear regression was run to test the effect of the independent Use of EA Planning variables, Human Capital, IT Infrastructure Flexibility and Partnership Quality, and the dependent variable, Enterprise Data Integration.

An R2 value of 0.237 was calculated (more detail can be found in Appendix H). This shows that Human Capital, IT Infrastructure Flexibility and Partnership Quality explain 23.7% of the variance in Business Application Integration. The individual contributions of each variable, Human Capital, IT Infrastructure Flexibility and Partnership Quality showed levels of significance of 0, 0.047 and 0.003 respectively (see table 15). Partnership Quality and Enterprise Data Integration have a *negative significant* relationship at $p<0.05$. This suggests that over emphasizing Partnership Quality will have negative implications for Enterprise Data Integration. The relationship between Human Capital and Enterprise Data Integration is however *significant*. The relationship between IT Infrastructure Flexibility and Enterprise Data Integration is also *significant*.

Table 15: Enterprise Data Integration as a Dependent Variable

	B	Std. Error	Beta	t	Significance
(Constant)	1.834	0.438	0	4.186	0
HUMAN CAPITAL	0.61	0.124	0.519	4.919	0
IT INFRASTRUCTURE FLEXIBILITY	0.19	0.094	0.215	2.016	0.047
PARTNERSHIP QUALITY	-0.38	0.122	-0.366	-3.103	0.003

H_4: There is a positive relationship between EA Planning Human Capital and IT performance.

H_5: There is a positive relationship between EA Planning IT Infrastructure Flexibility and IT performance.

H_6: There is a positive relationship between EA Planning Partnerships and IT performance.

H_4 is supported. A significant relationship was found between Human Capital and IT Performance. A significant relationship was found between Human Capital and Replication of IT Infrastructure Services. A significant relationship was found between Human Capital and Business Application Integration (a component of IT Performance). A significant relationship was found between Human Capital and Enterprise Data Integration.

H_5 was partially supported. The relationship between IT Infrastructure Flexibility and Heterogeneity of Physical IT Infrastructure (a component of IT Performance) was significant. The relationship between IT Infrastructure Flexibility and Business Application Integration (a component of IT Performance) is also significant.

H_6 was rejected. However, a negative significant relationship was found between Partnership Quality and Enterprise Data Integration.

Further discussion around these findings can be found in Chapter 5.

4.10. Summary of Hypothesis Findings

The following table summarizes the findings of the hypothesis testing:

Table 16: Summary of Hypotheses Testing Results

Hypothesis		Supported/Rejected
H_1	The Compatibility of EA Planning relative to IT projects will positively influence the Use of EA Planning for IT by the Firm.	Partially Supported (significant relationship between Compatibility and EA Planning IT Infrastructure Flexibility)
H_2	The Ease of Use of the EA Planning relative to IT projects will positively influence the Use of EA Planning for IT by the Firm.	Partially Supported (significant relationship was found between Ease of Use and EA Planning Human Capital)
H_3	The Relative Advantage of EA Planning relative to IT projects will positively influence the Use of EA Planning for IT by the Firm.	Partially Supported (significant relationship was found between Relative Advantage and EA Planning Partnership Quality)
H_4	There is a positive relationship between EA Planning Human Capital and IT performance.	Supported
H_5	There is a positive relationship between EA Planning IT Infrastructure Flexibility and IT performance.	Partially Supported (significant relationship between IT Infrastructure Flexibility and Heterogeneity of Physical IT Infrastructure. Significant relationship between IT Infrastructure Flexibility and Business Application Integration)
H_6	There is a positive relationship between EA Planning Partnerships and IT performance.	Rejected (although a negative significant relationship was found between Partnership Quality and Enterprise Data Integration)

5. DISCUSSION

5.1. Introduction

This chapter will discuss the results presented in Chapter 4. A summary of the significant findings are shown in the research model below (indicated by a *).

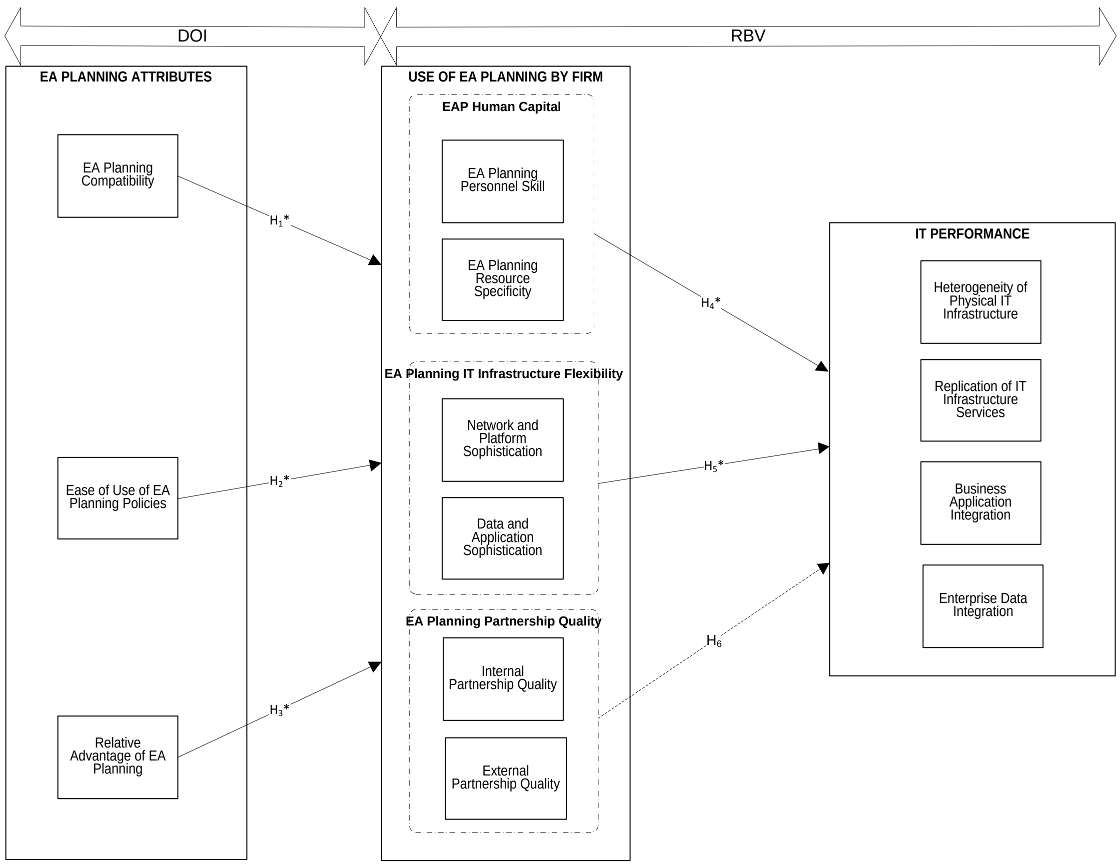

Figure 2: Tested Research Model

5.2. Hypothesis 1: Partially Supported

Hypothesis H_1 was partially supported as a significant relationship was found between Compatibility and IT Infrastructure Flexibility. This finding suggests that the Compatibility of Enterprise Architecture Planning relative to IT Projects will positively influence Enterprise Architecture Planning IT Infrastructure Flexibility. The higher the likelihood that Enterprise Architecture Planning is fit for purpose, the higher the chances the technology needed for current business operations is present and in place. If Enterprise Architecture Planning is fit for purpose it will likely influence the ability to develop modular systems with reusable software. This is also consistent with literature which suggests that

Compatibility of an innovation has a positive influence on the use of a particular innovation (Thong, 1999). However, in this case, Enterprise Architecture Planning IT Infrastructure Flexibility is a component of Enterprise Architecture Planning.

This study proposes that Enterprise Architecture Planning IT Infrastructure Flexibility can be achieved by taking the Compatibility or the fit for purpose of the Enterprise Architecture Planning approach into consideration. IS professionals and Architects will also need to consider the importance of Enterprise Architecture Planning Compatibility relative to IT projects as a determinant of the use of Enterprise Architecture Planning.

5.3. Hypothesis 2: Partially Supported

Hypothesis H_2 was partially supported as a significant relationship was found between Ease of Use of EA Planning Policies and EA Planning Human Capital. This finding suggests that Enterprise Architecture Planning Policies that are easy to apply will positively influence Enterprise Architecture Planning Human Capital. This finding is not surprising. Enterprise Architecture staff members will quickly be able to learn and apply new technologies if the Enterprise Architecture Planning Policies are clear and understandable. It is more likely that the Enterprise Architecture staff will have the skills and the knowledge to manage IT projects in the current business environment if the Enterprise Architecture Planning Policies are clear and understandable. Enterprise Architecture staff will understand the organizations business processes and technologies very well if it's easier to apply Enterprise Architecture Planning Policies to the organization. This finding is also consistent with literature which suggests that Ease of Use of an innovation will positively influence the use of that innovation (Thong, 1999). However, in this case, Enterprise Architecture Planning Human Capital is a component of Enterprise Architecture Planning.

This study suggests that Enterprise Architecture Planning Human Capital can be achieved by making the Enterprise Architecture Planning easier to apply or implement. IS professionals and Architects also need to consider the Ease of Use of Enterprise Architecture Planning by the firm as a determinant of the use of Enterprise Architecture Planning.

5.4. Hypothesis 3: Partially Supported

Hypothesis H_3 was partially supported. A significant relationship was found between Relative Advantage and Enterprise Architecture Planning Partnership Quality (which is made up internal and external Partnership Quality). This is consistent with literature. The Diffusion of Innovation Theory suggests that the Relative Advantage of an innovation will positively influence the use of that innovation (Thong, 1999). However, in this case, Enterprise Architecture Planning Partnership Quality is a component of Enterprise Architecture Planning. A high degree of trust between the Enterprise Architecture Planning department and business units is likely to improve if Enterprise Architecture Planning helps the organization to improve the quality of the work they do. The more effective Enterprise Architecture Planning is, the less likely that there will be conflicts between the Enterprise Architecture Planning department and the business units. This will improve the working relationship and working environment between the Enterprise Architecture Planning department and the business units.

This study suggests that Enterprise Architecture Planning Partnership Quality can be achieved by making the Relative Advantage of Enterprise Architecture Planning within the Firm more explicit. IS professionals and Architects need to consider the importance of Enterprise Architecture Planning Relative Advantage as a determinant of the use of Enterprise Architecture Planning by the firm.

It must be noted that none of the above independent variables contributed to the Use Enterprise Architecture Planning as a composite variable. However, each independent variable contributed partially to the Use of Enterprise Architecture Planning.

5.5. Hypothesis 4: Supported

Hypothesis H_4 was supported. A strong significant relationship was found between Enterprise Architecture Planning Human Capital and IT Performance. This finding is not surprising.. The results suggest that a higher quality of skilled Enterprise Architecture Planning staff contribute positively towards a combination Enterprise Data Integration, Business Application Integration, the Replication of IT Infrastructure Services and the Heterogeneity of Physical IT Infrastructure Services. Enterprise Architecture Planning staff that is able to quickly learn and apply new technologies will contribute significantly to IT Performance. Enterprise Architecture Planning staff that has excellent business knowledge will contribute to the Business Application Integration and hence improve the IT Performance. This finding is also consistent with literature which suggests that firm specific knowledge would be critical in the development of the appropriate functional capabilities (Rivachandran et al., 2005).

This study suggests that improving the Enterprise Architecture Planning Human Capital significantly improve the IT Performance of the firm (a combination of Heterogeneity of Physical IT Infrastructure, Replication of IT Infrastructure Services, Business Application Integration and Enterprise Data

Integration). It must also be noted that Enterprise Architecture Planning Human Capital was the only independent variable that had a significant relationship with IT Performance as a composite variable.

5.6. Hypothesis 5: Partially Supported

Hypothesis 5 was partially supported. A significant relationship was found between Enterprise Architecture Planning IT Infrastructure Flexibility and the Heterogeneity of Physical IT Infrastructure. A significant relationship was also found between Enterprise Architecture Planning IT Infrastructure Flexibility and Business Application Integration. This is not surprising. Reusable data and application assets can speed up application delivery by reducing the need for new software and facilitating integration with legacy systems (Ravichandran et al., 2005). The less complex the IT Infrastructure the greater the diversification of tools used across projects or lines of business. The less complex the IT Infrastructure the greater the hardware and middleware support on business applications. If the IT infrastructure is more flexible it will allow more diversified middleware, hardware and networks to be used across projects or lines of business.

This study suggests that improving the Enterprise Architecture Planning IT Infrastructure Flexibility will significantly improve the Heterogeneity of Physical IT Infrastructure and the Business Application Integration. IS professionals and Architects will therefore need to consider the importance of Enterprise Architecture Planning IT Infrastructure Flexibility as a determinant of IT Performance.

5.7. Hypothesis 6: Rejected.

Hypothesis 6 was rejected. No positive significant relationship was found between Enterprise Architecture Planning Partnership Quality and IT Performance. However, a negative significant relationship was found between Enterprise Architecture Planning Partnership Quality and Enterprise Data Integration. Although literature has shown that Enterprise Architecture units with good vendor relationships can be expected to tap into external resources better and improve IT Performance (Ravichandran et al., 2005), the findings from this study suggest that it is not necessarily the Partnership Quality that contributes to IT Performance.

The negative significant relationship between Enterprise Architecture Planning Partnership Quality and Enterprise Data Integration could suggest that firms that have greater vendor partnerships are more likely to have Enterprise Data Integration challenges. So although Ravichandran et al.(2005) suggested that Partnership Quality is one of the effective means of improving IT Performance, this study reveals that

Partnership quality has a negative influence on Enterprise Data Integration and does not therefore contribute positively towards IT Performance.

Although Ravichandran et al.(2005) suggest that Replication of IT Infrastructure Services is a component of IT Performance, none of the determinants of IT performance showed a significant relationship with Replication IT Infrastructure Services. This suggests that IT Performance consists of the following components: Heterogeneity of Physical IT Infrastructure, Business Application Integration and Enterprise Data Integration.

6. CONCLUSIONS

6.1. Introduction

This chapter provides a summary of the findings and describes the implications for practice and proposes future research that could be undertaken.

6.2. Summary

The purpose of this research was to determine whether the use of EA Planning by IS professionals will have a positive impact on IT Performance. It also aimed at assisting IS professionals in understanding the factors influence the use of EA Planning within organizations. The proposed determinants of the Use of EA Planning (Human Capital, IT Infrastructure Flexibility and Partnership Quality) from literature were Compatibility of EA Planning, Relative Advantage of EA Planning and Ease of Use of EA Planning. Although many determinants may exist for IT Performance, Human Capital, IT Infrastructure Flexibility and Partnership Quality were found from literature as the important determinants of IT Performance (Heterogeneity of Physical IT Infrastructure, Replication of IT Infrastructure Services, Business Application Integration and Enterprise Data Integration).

For the determinants of Use of EA Planning, a significant relationship was found between Compatibility and IT Infrastructure Flexibility, between Ease of Use of EA Planning Policies and EA Planning Human Capital, and between Relative Advantage and EA Planning Partnership Quality.

For the determinants of IT Performance, a significant relationship was found between EA Planning Human Capital and IT Performance (a combination of Enterprise Data Integration, Business Application Integration, Replication of IT Infrastructure Service and Heterogeneity of Physical IT Infrastructure), between EA Planning IT Infrastructure Flexibility and the Heterogeneity of Physical IT Infrastructure, and between EA Planning IT Infrastructure Flexibility and Business Application Integration. However, no significant relationship was found between EA Planning Partnership Quality and IT Performance (although a negative significant relationship was found between EA Planning Partnership Quality and Enterprise Data Integration).

6.3. Implications for Practice and Academia

This study can contribute to the knowledge of practitioners and academic disciplines in a number of ways. The guidelines and implications from the study are outlined below.

The study shows that EA Planning IT Infrastructure Flexibility can be achieved by taking the Compatibility or the fit for purpose of the EA Planning approach into consideration. Academics and Architects will also need to consider the importance of EA Planning Compatibility relative to IT projects as a determinant of the use of EA Planning. Chen et al. (2008) posit that architecture should be developed only to the point at which it is fit for purpose. The greater the fit for purpose (Compatibility) of EA Planning relative to the organization the greater the IT Infrastructure Flexibility..

Architects and Enterprise Architecture practitioners should therefore consider how the type of Enterprise Architecture framework will fit the type of **current** IT projects before embarking on EA Planning exercise. Allen et al. (1991) confirm that there are different approaches to EA Planning and that organizations need to select an approach that's suits their current environment challenges. The findings also imply that EA practitioners need to apply their minds and consider modifying EA Planning practices to ensure that the goals of EA Planning are aligned to solving the current challenges associated with the IT Projects within the organization. The approach needs to not only focus on long term EA Planning goals but must also have a link with practice and be able to solve urgent IT problems.

As shown in this study, Enterprise Architecture human resource skills can be improved by making the Enterprise Architecture discpipline easier to apply or implement. Academics and Architects will also need to consider how easy and simple it is for the firm to use Enterprise Architecture in order for the firm to make Enterprise Architecture more useful to the firm.

Architects need to consider the use of EA Planning frameworks which provide guidelines and make use of EA Planning easier to implement (Chen et al., 2008). Previous research has shown that one of the main reasons why EA Planning fails is because it is not easy to use (Gouhue et al, 1992; Van der Raadt et al., 2010). Academics and practitioners should therefore consider this correlation and how they can make it easier for practitioners to implement EA Planning.

This study shows that EA Planning Partnership Quality can be improved when people have a clear understanding the benefits of EA Planning. . Academics and Architects will therefore need to consider the importance of EA Planning Relative Advantage as a determinant of the use of EA Planning by the firm.

The specific product and benefits of EA Planning must be well articulated in order to get top management commitment. EA Planning practitioners in enterprises must appreciate some form of economic advantage of using the instrument for them to successfully implement it in their organization. The more they appreciate the economic advantages, the more they are likely to use EA Planning for their IT projects.

According the our findings in this study, improving the EA Planning Human Capital will significantly improve the IT Performance of the firm (a combination of Heterogeneity of Physical IT Infrastructure, Replication of IT Infrastructure Services, Business Application Integration and Enterprise Data Integration). Academics and Architects will therefore need to consider the importance of EA Planning Human Capital as a determinant of the use of IT Performance.

Lux et al.'s (2010) study also confirms how human IT resources can be a particular source of competitive advantage and that there's an implicit link between human IT resources and IT performance. IT managers and Enterprise Architects acquire EA Planning- related skills through training. These skills may include skills such as architectural modeling skills. It is therefore reasonable to suggest that organizations that have highly skilled EA Planning professionals are better positioned to develop strong functional capabilities that impact IT performance than those that do not. Organizations should therefore consider continuous training of their EA Planning resources to improve IT performance.

Improving the EA Planning IT Infrastructure Flexibility will significantly improve the Heterogeneity of Physical IT Infrastructure and the Business Application Integration. Academics and Architects will therefore need to consider the importance of EA Planning IT Infrastructure Flexibility as a determinant of IT Performance.

Ravichandran et al. (2005) posit that IT infrastructure flexibility will have a positive relationship with IS functional capability. Reusable data and application assets can speed up application delivery by reducing the need for new software and facilitating integration with legacy systems (Ravichandran et al., 2005). Departments within an organization must benefit from economies of scale via EA Planning IT Infrastructure Flexibility. Business units must not have similar customer information residing in different database systems across business units as this will result in information redundancy and increased IT infrastructure costs.

The fact that a negative significant relationship was found between EA Planning Partnership Quality and Enterprise Data Integration suggests that managers and Architects who focus solely on improving their IT Performance through EA Planning Partnership Quality, may lose sight of perhaps the more important type of EA Planning approaches, namely Human Capital and IT Infrastructure Flexibility. The fact that no significant relationship was found between EA Planning Partnership Quality and IT Performance also raises questions about the effectiveness of partnerships. Practitioners should consider this when implementing EA Planning.

6.4. Limitations of this Study

In interpreting the above recommendations, readers should bear in mind the limitations of the study. Specifically:

- Organizational size and culture were not considered in this research
- A questionnaire was used to collect data and concepts/questions may have been misinterpreted by the respondents
- Likert scales were used to measure constructs and these are subject to perceptual error which may skew results
- Data was collected from individuals and therefore perceptions could have been biased.
- Some variables were measured using two items which increased the probability of measurement error.
- Although the survey was initially intended to be worldwide, a significant majority of the respondents were based in South Africa. The results can therefore not be generalized across other countries.
- This research focused on the use and impact of EA Planning as a whole and not necessarily on specific frameworks and methodologies
- The impact of specific subsets of EA Planning such as Business Architecture, Process Architecture, Information Systems Architecture and Solutions Architecture were not examined.
- The majority of respondents were consultants from the IBM virtual forum, the Open Group virtual forum and different South African consulting companies. The results can therefore not be generalized across other types of organizations and companies.
- Data was cross-sectional and therefore causality cannot be confirmed.
- The survey tended to attract those organizations interested in improving their EA Planning capabilities. Therefore there may be a response bias among the sampled respondents towards those who are more advanced in the use of EA Planning. This bias was confirmed by our analysis of early versus late respondents. Late respondents and those who provided incomplete responses tended to have fewer years of experience in using EA Planning. This may not be representative of the entire population of companies.

6.5. Suggestions for Future Research

This study has made significant contributions to the area of knowledge concerned with the relationships between Use of EA Planning and IT Performance. It has also provided more knowledge into determining what factors influence the use of EA Planning within organizations.

The influence of organizational size and culture where not explicitly considered examined in this research. Future research is required to determine if organizational size and culture influences the Use of EA Planning.

Compatibility, Relative Advantage and Ease of Use were identified through literature to be the three fundamental determinants of Use of EA Planning. A significant relationship was found between these determinants and constituents of Use of EA Planning. Other variables that may be potential determinants of Use of EA Planning include other characteristics of innovation such as peer influence and trialability. Further research is required

Given that the use of EA Planning is not prevalent among organizations at this time (Ravichandran et al. 2005), the results of this study provide an opportunity for further research to be carried out that differentiates the responses between early adopters of EA Planning and late adopters of EA Planning.

Although this study focused on the concept of EA Planning as a whole, future research may need to consider the impact of specific Enterprise Architecture methodologies and frameworks such as TOGAF and Zachman on IT Performance. The impact of specific Enterprise Architecture subsets such as Business Architecture, Process Architecture, Information Systems Architecture and Solutions Architecture on IT Performance will also need to be considered in future research as these subsets may have different implications for IT Performance.

While this study focused on the impact of EA Planning use on IT Performance, EA Planning use can also have the potential to influence other organizational outcomes such as how EA Planning helps organizations align their use of IT to business strategy and needs, and overall organizational performance. Future research therefore needs to examine the impact of EA Planning on other organizational outcomes.

6.6. Conclusion

This research study has investigated whether the use of EA Planning by IS professionals will have a positive impact on IT Performance. It has also assisted IS professionals to understand what factors influence the use of EA Planning within organizations. Compatibility was found to be a determinant of IT Infrastructure Flexibility. Ease of Use of EA Planning Policies was found to be a determinant of EA Planning Human Capital. Relative Advantage was found to be a determinant of EA Planning Partnership Quality. EA Planning Human Capital was found to be a significant contributor to IT Performance (a combination of Enterprise Data Integration, Business Application Integration, Replication of IT Infrastructure Service and Heterogeneity of Physical IT Infrastructure). EA Planning IT Infrastructure Flexibility was found to be a significant contributor to the Heterogeneity of Physical IT Infrastructure. EA Planning IT Infrastructure Flexibility was found to be a significant contributor towards Business Application Integration. EA Planning Partnership Quality was rejected as a determinant of IT Performance.

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8. APPENDIX A: SAMPLE QUESTIONNAIRE

Name (Optional)	
Position	
Organization	
Date	

QUESTIONNAIRE

The questions in this questionnaire are for research purposes only. No part of the information will be revealed to anyone apart from the researcher. Confidentiality will be assured. Please answer all questions in an honest and transparent manner.

The objective of this questionnaire is to study the factors that influence the use of Enterprise Architecture Planning (EA) by IS professionals and the impact they have on IT performance.

The use of Enterprise Architecture Planning implies the use of a set of policies, rules and guidelines that provide the organizing logic for application, data, and infrastructure technologies.

An Enterprise Architecture (EA) is a rigorous description of the structure of an enterprise, which comprises enterprise components (business entities), the externally visible properties of those components, and the relationships (e.g. the behaviour) between them.

Section A: Enterprise Architecture Planning Attributes

1.) Relative Advantage (Likert scale. 1: Strongly Disagree; 2: Disagree; 3: Neither Agree or Disagree; 4: Agree; 5: Strongly Agree. Please circle the relevant answer)

Using Enterprise Architecture Planning would make it easier to do our work.					
	1	**2**	**3**	**4**	**5**
Using Enterprise Architecture Planning will help us to accomplish tasks more quickly.					
	1	**2**	**3**	**4**	**5**
Using Enterprise Architecture Planning would improve the quality of the work we do.					
	1	**2**	**3**	**4**	**5**
Using Enterprise Architecture Planning would give us greater control over our work.					
	1	**2**	**3**	**4**	**5**
Using Enterprise Architecture Planning would enhance our effectiveness in our job.					
	1	**2**	**3**	**4**	**5**

2.) Ease of Use (Likert scale. 1: Strongly Disagree; 2: Disagree; 3: Neither Agree or Disagree; 4: Agree; 5: Strongly Agree. Please circle the relevant answer)

My interaction with Enterprise Architecture Planning is clear and understandable.					
	1	**2**	**3**	**4**	**5**
Overall, we believe Enterprise Architecture Planning would be easy to use.					
	1	**2**	**3**	**4**	**5**

Learning to use Enterprise Architecture Planning will be easy for us.					
	1	**2**	**3**	**4**	**5**
3.) Compatibility (Likert scale. 1: Strongly Disagree; 2: Disagree; 3: Neither Agree or Disagree; 4: Agree; 5: Strongly Agree. Please circle the relevant answer)					
Using Enterprise Architecture Planning would be compatible with all aspects of our work.					
	1	**2**	**3**	**4**	**5**
I think that using Enterprise Architecture Planning would fit well with the way we like to work.					
	1	**2**	**3**	**4**	**5**
Section B: Use of Enterprise Architecture Planning by Firm					
4.) Enterprise Architecture Planning (EA) Human Capital (Likert scale. 1: Strongly Disagree; 2: Disagree; 3: Neither Agree or Disagree; 4: Agree; 5: Strongly Agree. Please circle the relevant answer)					
Our EA Staff has very good technical knowledge; they are one of the best technical groups an EA department could have.					
	1	**2**	**3**	**4**	**5**
Our EA staff has the ability to quickly learn and apply new technologies as they become available.					
	1	**2**	**3**	**4**	**5**
Our EA staff has the skills and knowledge to manage IT projects in the current business environment.					
	1	**2**	**3**	**4**	**5**
Our EA staff has the ability to work closely with customers and maintain productive client or user relationships.					
	1	**2**	**3**	**4**	**5**
Our EA staff has excellent business knowledge; they have a deep understanding of the business goals and priorities of our organization					
	1	**2**	**3**	**4**	**5**
Our EA staff understands our technologies and business processes very well.					
	1	**2**	**3**	**4**	**5**
Our EA staff is aware of the core beliefs and values of our organization.					
	1	**2**	**3**	**4**	**5**
Our EA staff is conversant with the routines and methods used in the IS department.					
	1	**2**	**3**	**4**	**5**
5.) Enterprise Architecture Planning IT Infrastructure Flexibility (Likert scale. 1: Strongly Disagree; 2: Disagree; 3: Neither Agree or Disagree; 4: Agree; 5: Strongly Agree. Please circle the relevant answer)					
The technology infrastructure needed to link our firm with external business partners (i.e. key customers, suppliers, alliances) is present and in place today.					
	1	**2**	**3**	**4**	**5**
The technology needed for current business operations is present and in place today.					

	1	2	3	4	5
Corporate data is currently sharable across business units and organizational boundaries.					
	1	2	3	4	5
6.) Enterprise Architecture Planning Partnership Quality (Likert scale. 1: Strongly Disagree; 2: Disagree; 3: Neither Agree or Disagree; 4: Agree; 5: Strongly Agree. Please circle the relevant answer)					
Our Enterprise Architecture Planning department and business units understand the working environment of each other very well.					
	1	2	3	4	5
There is a high degree of trust between our Enterprise Architecture Planning department and business units.					
	1	2	3	4	5
The goals and plans of IT projects are jointly developed by both the IS department and business units.					
	1	2	3	4	5
Section C: IT Performance					
7.) Heterogeneity of Physical IT Infrastructure (Likert scale. 1: Strongly Disagree; 2: Disagree; 3: Neither Agree or Disagree; 4: Agree; 5: Strongly Agree. Please circle the relevant answer)					
There is heterogeneity in the hardware and network components used across projects or lines of business.					
	1	2	3	4	5
There is heterogeneity in the middleware (including application servers and messaging brokers) used across projects or lines of business.					
	1	2	3	4	5
There is heterogeneity in the tools (including network management and software development tools) used across projects or lines of business.					
	1	2	3	4	5
8.) Replication of IT Infrastructure Services (Likert scale. 1: Strongly Disagree; 2: Disagree; 3: Neither Agree or Disagree; 4: Agree; 5: Strongly Agree. Please circle the relevant answer)					
Multiple groups in different lines of business are providing similar security, disaster planning, and business recovery services.					
	1	2	3	4	5
Multiple groups in different lines of business are providing similar services to manage electronic linkages to suppliers or customers.					
	1	2	3	4	5
Multiple groups in different lines of business are providing similar infrastructure services (supporting hardware and middleware).					
	1	2	3	4	5
9.) Business Application Integration (Please circle the relevant answer)					

What percentage of the key applications systems are integrated by a common middleware approach? (Scale: (1) 0–25 percent, (2) 26–50 percent, (3) 51–75 percent, (4) 76–100 percent)					
	0–20%	21–40%	41–60%	61–80%	81–100%
To what extent do you agree that the functional boundaries of individual applications and components have been clearly defined? (Likert scale. 1: Disagree; 5: Agree.)					
	1	2	3	4	5
Infrastructure services are present (supporting hardware and middleware). (Likert scale. 1: Disagree; 5: Agree.)					
	1	2	3	4	5
10.) Enterprise Data Integration (Please circle the relevant answer)					
My company has formally and sufficiently identified data to be shared across lines of business. (Likert scale. 1: Strongly Disagree; 2: Disagree; 3: Neither Agree or Disagree; 4: Agree; 5: Strongly Agree. Please circle the relevant answer)					
	1	2	3	4	5
The customer entity is perceived and interpreted in a common fashion by all systems and lines of business. (Likert scale. 1: Strongly Disagree; 2: Disagree; 3: Neither Agree or Disagree; 4: Agree; 5: Strongly Agree. Please circle the relevant answer)					
	1	2	3	4	5
Key business performance indicators extracted from IT systems are readily available to decision makers who require the information. (Likert scale. 1: Strongly Disagree; 2: Disagree; 3: Neither Agree or Disagree; 4: Agree; 5: Strongly Agree. Please circle the relevant answer)					
	1	2	3	4	5
Among the set of data that the company would like to share across lines of business, what percentage of the data is currently sharable across lines of business? (Scale: (1) 0–25 percent, (2) 26–50 percent, (3) 51–75 percent, (4) 76–100 percent)					
	0–20%	21–40%	41–60%	61–80%	81–100%

9. APPENDIX B: MISSING DATA

TABLE 1: MISSING DATA-BY VARIABLE

Variable	Number of Missing Values	Variable	Number of Missing Values
RAL1	0	FLEX7	1
RAL2	0	FLEX8	1
RAL3	0	FLEX9	0
RAL4	0	HET1	2
EOU1	0	HET2	3
EOU2	0	HET3	3
EOU3	0	REP1	0
Comp1	0	REP2	0
Comp2	0	REP3	0
HC1	0	BAI1	0
HC2	0	BAI2	0
HC3	1	BAI3	1
HC4	0	EDI1	0
HC5	0	EDI2	0
HC6	0	EDI3	0
HC7	0	EDI4	0
HC8	1		
FLEX1	0		
FLEX2	0		
FLEX4	0		

TABLE 1: MISSING DATA-BY RESPONDENT

Respondent No.	No. of Missing Values	Respondent No.	No. of Missing Values	Respondent No.	No. of Missing Values
1	0	31	0	61	0
2	2	32	1	62	0
3	1	33	0	63	0
4	0	34	1	64	0
5	0	35	0	65	0
6	0	36	0	66	0
7	3	37	0	67	0
8	3	38	0	68	0
9	0	39	0	69	0
10	0	40	0	70	0
11	0	41	0	71	1
12	0	42	0	72	0
13	0	43	0	73	0
14	0	44	0	74	0
15	0	45	0	75	0
16	1	46	0	76	0
17	2	47	0	77	2
18	0	48	0	78	0
19	0	49	0	79	1
20	0	50	0	80	0
21	1	51	0	81	0
22	0	52	0	82	0
23	0	53	0	83	0
24	0	54	0	84	0
25	0	55	0	85	0
26	0	56	0	86	0
27	0	57	0	87	0
28	0	58	1	88	1
29	0	59	3	89	0
30	0	60	0	90	0

10. APPENDIX C: DISTRIBUTION

RAL1 (N = 90) Mean = 3.667 Variance = 0.652 Std.Dev. = 0.807 Range = 3.000 Minimum = 2.000 Maximum = 5.000 Skewness = -0.364 Std. Error of Skew = 0.254 Kurtosis = -0.217 Std. Error Kurtosis = 0.503	FLEX2 (N = 90) Mean = 3.567 Variance = 0.518 Std.Dev. = 0.720 Range = 3.000 Minimum = 2.000 Maximum = 5.000 Skewness = 0.316 Std. Error of Skew = 0.254 Kurtosis = -0.342 Std. Error Kurtosis = 0.503
RAL2 (N = 90) Mean = 3.522 Variance = 0.477 Std.Dev. = 0.691 Range = 3.000 Minimum = 2.000 Maximum = 5.000 Skewness = -0.291 Std. Error of Skew = 0.254 Kurtosis = -0.133 Std. Error Kurtosis = 0.503	FLEX4 (N = 90) Mean = 3.333 Variance = 0.787 Std.Dev. = 0.887 Range = 3.000 Minimum = 2.000 Maximum = 5.000 Skewness = -0.615 Std. Error of Skew = 0.254 Kurtosis = -1.277 Std. Error Kurtosis = 0.503
RAL3 (N = 90) Mean = 3.533 Variance = 0.611 Std.Dev. = 0.782 Range = 3.000 Minimum = 2.000 Maximum = 5.000 Skewness = 0.320 Std. Error of Skew = 0.254 Kurtosis = -0.418 Std. Error Kurtosis = 0.503	FLEX7 (N = 89) Mean = 2.719 Variance = 0.432 Std.Dev. = 0.657 Range = 2.000 Minimum = 2.000 Maximum = 4.000 Skewness = 0.368 Std. Error of Skew = 0.255 Kurtosis = -0.717 Std. Error Kurtosis = 0.506
RAL4 (N = 90) Mean = 3.567 Variance = 0.720 Std.Dev. = 0.849 Range = 3.000 Minimum = 2.000 Maximum = 5.000 Skewness = 0.181 Std. Error of Skew = 0.254 Kurtosis = -0.640 Std. Error Kurtosis = 0.503	FLEX8 (N = 89) Mean = 3.011 Variance = 0.466 Std.Dev. = 0.682 Range = 2.000 Minimum = 2.000 Maximum = 4.000 Skewness = -0.014 Std. Error of Skew = 0.255 Kurtosis = -0.807 Std. Error Kurtosis = 0.506
EOU1 (N = 90) Mean = 2.822 Variance = 1.002 Std.Dev. = 1.001 Range = 3.000 Minimum = 1.000 Maximum = 4.000 Skewness = -0.045 Std. Error of Skew = 0.254 Kurtosis = -1.377 Std. Error Kurtosis = 0.503	FLEX9 (N = 90) Mean = 2.756 Variance = 0.569 Std.Dev. = 0.754 Range = 2.000 Minimum = 2.000 Maximum = 4.000 Skewness = 0.440 Std. Error of Skew = 0.254 Kurtosis = -1.112 Std. Error Kurtosis = 0.503
EOU2 (N = 90) Mean = 2.822 Variance = 1.092 Std.Dev. = 1.045 Range = 3.000 Minimum = 1.000 Maximum = 4.000 Skewness = 0.003 Std. Error of Skew = 0.254 Kurtosis = -1.553 Std. Error Kurtosis = 0.503	HET1 (N = 89) Mean = 3.573 Variance = 0.952 Std.Dev. = 0.976 Range = 3.000 Minimum = 2.000 Maximum = 5.000 Skewness = -0.398 Std. Error of Skew = 0.255 Kurtosis = -0.861 Std. Error Kurtosis = 0.506
EOU3 (N = 90) Mean = 2.600 Variance = 1.231 Std.Dev. = 1.110 Range = 3.000 Minimum = 1.000 Maximum = 4.000	HET2 (N = 87) Mean = 3.368 Variance = 1.375 Std.Dev. = 1.173 Range = 4.000 Minimum = 1.000 Maximum = 5.000

Skewness = -0.057 Std. Error of Skew = 0.254 Kurtosis = -1.346 Std. Error Kurtosis = 0.503	Skewness = -0.715 Std. Error of Skew = 0.258 Kurtosis = -0.292 Std. Error Kurtosis = 0.511
Comp1 (N = 90) Mean = 2.578 Variance = 1.393 Std.Dev. = 1.180 Range = 4.000 Minimum = 1.000 Maximum = 5.000 Skewness = -0.002 Std. Error of Skew = 0.254 Kurtosis = -1.070 Std. Error Kurtosis = 0.503	HET3 (N = 87) Mean = 2.977 Variance = 1.744 Std.Dev. = 1.320 Range = 4.000 Minimum = 1.000 Maximum = 5.000 Skewness = 0.012 Std. Error of Skew = 0.258 Kurtosis = -1.066 Std. Error Kurtosis = 0.511
Comp2 (N = 90) Mean = 3.189 Variance = 0.986 Std.Dev. = 0.993 Range = 4.000 Minimum = 1.000 Maximum = 5.000 Skewness = 0.101 Std. Error of Skew = 0.254 Kurtosis = -0.663 Std. Error Kurtosis = 0.503	REP1 (N = 89) Mean = 2.730 Variance = 0.767 Std.Dev. = 0.876 Range = 2.000 Minimum = 2.000 Maximum = 4.000 Skewness = 0.560 Std. Error of Skew = 0.255 Kurtosis = -1.473 Std. Error Kurtosis = 0.506
HC1 (N = 90) Mean = 2.733 Variance = 0.737 Std.Dev. = 0.859 Range = 3.000 Minimum = 1.000 Maximum = 4.000 Skewness = -0.432 Std. Error of Skew = 0.254 Kurtosis = -0.313 Std. Error Kurtosis = 0.503	REP2 (N = 90) Mean = 3.022 Variance = 1.146 Std.Dev. = 1.070 Range = 3.000 Minimum = 1.000 Maximum = 4.000 Skewness = -0.551 Std. Error of Skew = 0.254 Kurtosis = -1.135 Std. Error Kurtosis = 0.503
HC2 (N = 90) Mean = 2.633 Variance = 1.111 Std.Dev. = 1.054 Range = 3.000 Minimum = 1.000 Maximum = 4.000 Skewness = 0.022 Std. Error of Skew = 0.254 Kurtosis = -1.266 Std. Error Kurtosis = 0.503	REP3 (N = 90) Mean = 2.500 Variance = 1.354 Std.Dev. = 1.164 Range = 3.000 Minimum = 1.000 Maximum = 4.000 Skewness = 0.022 Std. Error of Skew = 0.254 Kurtosis = -1.461 Std. Error Kurtosis = 0.503
HC3 (N = 89) Mean = 3.326 Variance = 0.745 Std.Dev. = 0.863 Range = 2.000 Minimum = 2.000 Maximum = 4.000 Skewness = -0.690 Std. Error of Skew = 0.255 Kurtosis = -1.308 Std. Error Kurtosis = 0.506	BAI1 (N = 90) Mean = 2.556 Variance = 1.194 Std.Dev. = 1.092 Range = 3.000 Minimum = 1.000 Maximum = 4.000 Skewness = 0.066 Std. Error of Skew = 0.254 Kurtosis = -1.315 Std. Error Kurtosis = 0.503
HC4 (N = 90) Mean = 3.533 Variance = 0.791 Std.Dev. = 0.889 Range = 3.000 Minimum = 2.000 Maximum = 5.000 Skewness = -0.397 Std. Error of Skew = 0.254 Kurtosis = -0.637 Std. Error Kurtosis = 0.503	BAI2 (N = 90) Mean = 3.178 Variance = 0.665 Std.Dev. = 0.815 Range = 2.000 Minimum = 2.000 Maximum = 4.000 Skewness = -0.340 Std. Error of Skew = 0.254 Kurtosis = -1.414 Std. Error Kurtosis = 0.503
HC5 (N = 90) Mean = 3.633 Variance = 0.684 Std.Dev. = 0.827 Range = 3.000 Minimum = 2.000 Maximum = 5.000	BAI3 (N = 89) Mean = 3.292 Variance = 0.618 Std.Dev. = 0.786 Range = 3.000 Minimum = 2.000 Maximum = 5.000

Skewness = -0.316 Std. Error of Skew = 0.254 Kurtosis = -0.347 Std. Error Kurtosis = 0.503	Skewness = 0.289 Std. Error of Skew = 0.255 Kurtosis = -0.197 Std. Error Kurtosis = 0.506
HC6 (N = 90) Mean = 3.633 Variance = 0.684 Std.Dev. = 0.827 Range = 3.000 Minimum = 2.000 Maximum = 5.000 Skewness = -0.194 Std. Error of Skew = 0.254 Kurtosis = -0.429 Std. Error Kurtosis = 0.503	EDI1 (N = 90) Mean = 3.556 Variance = 0.811 Std.Dev. = 0.901 Range = 3.000 Minimum = 2.000 Maximum = 5.000 Skewness = -0.123 Std. Error of Skew = 0.254 Kurtosis = -0.712 Std. Error Kurtosis = 0.503
HC7 (N = 90) Mean = 3.856 Variance = 0.979 Std.Dev. = 0.989 Range = 3.000 Minimum = 2.000 Maximum = 5.000 Skewness = -0.557 Std. Error of Skew = 0.254 Kurtosis = -0.659 Std. Error Kurtosis = 0.503	EDI2 (N = 90) Mean = 3.344 Variance = 0.498 Std.Dev. = 0.706 Range = 2.000 Minimum = 2.000 Maximum = 4.000 Skewness = -0.604 Std. Error of Skew = 0.254 Kurtosis = -0.795 Std. Error Kurtosis = 0.503
HC8 (N = 89) Mean = 3.022 Variance = 1.181 Std.Dev. = 1.087 Range = 3.000 Minimum = 2.000 Maximum = 5.000 Skewness = 0.661 Std. Error of Skew = 0.255 Kurtosis = -0.898 Std. Error Kurtosis = 0.506	EDI3 (N = 90) Mean = 3.422 Variance = 0.561 Std.Dev. = 0.749 Range = 3.000 Minimum = 2.000 Maximum = 5.000 Skewness = 0.436 Std. Error of Skew = 0.254 Kurtosis = -0.099 Std. Error Kurtosis = 0.503
FLEX1 (N = 90) Mean = 3.133 Variance = 0.769 Std.Dev. = 0.877 Range = 3.000 Minimum = 2.000 Maximum = 5.000 Skewness = 0.144 Std. Error of Skew = 0.254 Kurtosis = -0.943 Std. Error Kurtosis = 0.503	EDI4 (N = 90) Mean = 3.300 Variance = 1.021 Std.Dev. = 1.011 Range = 3.000 Minimum = 2.000 Maximum = 5.000 Skewness = 0.231 Std. Error of Skew = 0.254 Kurtosis = -1.027 Std. Error Kurtosis = 0.503

TRANSFORMED
HET3 (N = 87) Mean = 2.977 Variance = 1.744 Std.Dev. = 1.320 Range = 4.000 Minimum = 1.000 Maximum = 5.000 Skewness = 0.012 Std. Error of Skew = 0.258 Kurtosis = -1.066 Std. Error Kurtosis = 0.511

11. APPENDIX D: TESTS FOR NON-RESPONSE BIAS

RESPONSE SOURCE AND ROUND

Chi-Square Tests

	Value	df	Asymp. Sig (2-sided)
Pearson Chi-Square	1.441	2	0.486
Likelihood Ratio	1.482	2	0.4766
Linear-by-Linear Association	0.539	1	0.4628
N of Valid Cases	90		

12. APPENDIX E: TEST FOR VALIDITY – PRINCIPAL COMPONENT ANALYSIS

RELATIVE ADVANTAGE Total Percent of Variance in Factors : 52.855 Communalities as Percentages 1 for RAL1 61.000 2 for RAL2 43.349 3 for RAL3 48.920 4 for RAL4 58.150	EASE OF USE Total Percent of Variance in Factors : 73.355 Communalities as Percentages 1 for EOU1 73.048 2 for EOU2 80.260 3 for EOU3 66.756	COMPATIBILITY Total Percent of Variance in Factors : 74.530 Communalities as Percentages 1 for Comp1 74.530 2 for Comp2 74.530	HUMAN CAPITAL Total Percent of Variance in Factors : 81.257 Communalities as Percentages 1 for HC1 86.048 2 for HC2 73.486 3 for HC3 84.644 4 for HC4 85.333 5 for HC5 87.640 6 for HC6 81.495 7 for HC7 68.401 8 for HC8 83.005
FLEXIBILITY Total Percent of Variance in Factors : 62.170 Communalities as Percentages 1 for FLEX1 59.756 2 for FLEX2 66.102 3 for FLEX4 60.653	PARTNERSHIP QUALITY Total Percent of Variance in Factors : 62.647 Communalities as Percentages 1 for FLEX7 75.527 2 for FLEX8 63.042 3 for FLEX9 49.372	IT PERFORMANCE Total Percent of Variance in Factors : 84.053 Communalities as Percentages 1 for HET1 86.649 2 for HET2 83.559 3 for HET3 86.975 4 for REP1 79.613 5 for REP2 89.946 6 for REP3 83.367 7 for BAI1 85.695 8 for BAI2	USE OF EA PLANNING Total Percent of Variance in Factors : 73.234 Communalities as Percentages 1 for HC1 83.616 2 for HC2 70.652 3 for HC3 89.929 4 for HC4 79.447 5 for HC5 80.561 6 for HC6 76.606 7 for HC7 72.240 8 for HC8 82.662

		83.449 9 for BAI3 94.292 10 for EDI1 71.716 11 for EDI2 87.434 12 for EDI3 77.490 13 for EDI4 82.511	9 for FLEX1 73.582 10 for FLEX2 66.025 11 for FLEX4 68.261 12 for FLEX7 60.891 13 for FLEX8 79.644 14 for FLEX9 41.155

13. APPENDIX F: TESTS FOR RELIABILITY

RALATIVE ADVANTAGE
TREATMENT (COLUMN) MEANS AND STANDARD DEVIATIONS

VAR.	MEAN	STD.DEV.
RAL1	3.667	0.807
RAL2	3.522	0.691
RAL3	3.533	0.782
RAL4	3.567	0.849

RELIABILITY ESTIMATES

TYPE OF ESTIMATE	VALUE
Unadjusted total reliability	0.702
Unadjusted item reliability	0.371
Adjusted total (Cronbach)	0.702
Adjusted item reliability	0.371

COMPATIBILITY
TREATMENT (COLUMN) MEANS AND STANDARD DEVIATIONS

VAR.	MEAN	STD.DEV.
Comp1	2.578	1.180
Comp2	3.189	0.993

RELIABILITY ESTIMATES

TYPE OF ESTIMATE	VALUE
Unadjusted total reliability	0.550
Unadjusted item reliability	0.379
Adjusted total (Cronbach)	0.652
Adjusted item reliability	0.483

INFRASTRUCTURE FLEXIBILITY
TREATMENT (COLUMN) MEANS AND STANDARD DEVIATIONS

VAR.	MEAN	STD.DEV.
FLEX1	3.133	0.877
FLEX2	3.567	0.720
FLEX4	3.333	0.887

RELIABILITY ESTIMATES

TYPE OF ESTIMATE	VALUE
Unadjusted total reliability	0.655
Unadjusted item reliability	0.387
Adjusted total (Cronbach)	0.688
Adjusted item reliability	0.424

EASE OF USE
TREATMENT (COLUMN) MEANS AND STANDARD DEVIATIONS

VAR.	MEAN	STD.DEV.
EOU1	2.822	1.001
EOU2	2.822	1.045
EOU3	2.600	1.110

RELIABILITY ESTIMATES

TYPE OF ESTIMATE	VALUE
Unadjusted total reliability	0.811
Unadjusted item reliability	0.588
Adjusted total (Cronbach)	0.816
Adjusted item reliability	0.596

HUMAN CAPITAL
TREATMENT (COLUMN) MEANS AND STANDARD DEVIATIONS

VAR.	MEAN	STD.DEV.
HC1	2.761	0.844
HC2	2.625	1.054
HC3	3.341	0.856
HC4	3.545	0.883
HC5	3.648	0.817
HC6	3.625	0.835
HC7	3.886	0.976
HC8	3.034	1.088

RELIABILITY ESTIMATES

TYPE OF ESTIMATE	VALUE
Unadjusted total reliability	0.511

PARTNERSHIP QUALITY
TREATMENT (COLUMN) MEANS AND STANDARD DEVIATIONS

VAR.	MEAN	STD.DEV.
FLEX7	2.727	0.656
FLEX8	3.000	0.678
FLEX9	2.761	0.758

RELIABILITY ESTIMATES

TYPE OF ESTIMATE	VALUE
Unadjusted total reliability	0.669
Unadjusted item reliability	0.403
Adjusted total (Cronbach)	0.690
Adjusted item reliability	0.426

	Unadjusted item reliability 0.115 Adjusted total (Cronbach) 0.618 Adjusted item reliability 0.168	
IT PERFORMANCE TREATMENT (COLUMN) MEANS AND STANDARD DEVIATIONS VAR. MEAN STD.DEV. HET1 3.600 0.966 HET2 3.388 1.156 HET3 2.988 1.332 REP1 2.741 0.875 REP2 3.106 1.024 REP3 2.576 1.148 BAI1 2.576 1.095 BAI2 3.224 0.807 BAI3 3.306 0.772 EDI1 3.588 0.904 EDI2 3.376 0.690 EDI3 3.447 0.748 EDI4 3.353 1.008 RELIABILITY ESTIMATES TYPE OF ESTIMATE VALUE Unadjusted total reliability 0.773 Unadjusted item reliability 0.207 Adjusted total (Cronbach) 0.804 Adjusted item reliability 0.240	**USE OF EA PLANNING** TREATMENT (COLUMN) MEANS AND STANDARD DEVIATIONS VAR. MEAN STD.DEV. HC1 2.756 0.839 HC2 2.605 1.055 HC3 3.337 0.862 HC4 3.547 0.890 HC5 3.651 0.823 HC6 3.628 0.841 HC7 3.895 0.958 HC8 3.035 1.089 FLEX1 3.140 0.897 FLEX2 3.570 0.728 FLEX4 3.337 0.889 FLEX7 2.733 0.658 FLEX8 2.988 0.677 FLEX9 2.756 0.750 RELIABILITY ESTIMATES TYPE OF ESTIMATE VALUE Unadjusted total reliability 0.657 Unadjusted item reliability 0.120 Adjusted total (Cronbach) 0.728 Adjusted item reliability 0.160	

14. Appendix G: HYPOTHESIS I TO 3 TEST RESULTS

14.1. Use of EA Planning as a Composite Variable

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.316[a]	0.1	0.079	0.392

a: Predictors: (Constant), Ease of Use, Relative Advantage, Compatibility

ANOVA[b]

	Sum of Squares	df	Mean Square	F	Significance
Regression	1.473	3	0.491	3.19	0.028
Residual	13.234	86	0.154		
Total	14.707	89			

a: Predictors: (Constant), Ease of Use, Relative Advantage, Compatibility
b: Dependent Variable: Use of EA Planning

14.2. EA Planning Human Capital as a Composite variable

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.54	0.291[a]	0.275	0.419

a: Predictors: (Constant), Ease of Use, Relative Advantage, Compatibility

ANOVA[b]

	Sum of Squares	df	Mean Square	F	Significance
Regression	6.195	3	2.065	11.776	0
Residual	15.08	86	0.175		
Total	21.274	89			

a: Predictors: (Constant), Ease of Use, Relative Advantage, Compatibility
b: Dependent Variable: EA Planning Human Capital

14.3. EA Planning IT Infrastructure Flexibility as a Composite variable

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.32	0.102	0.081	0.629

a: Predictors: (Constant), Ease of Use, Relative Advantage, Compatibility

ANOVA[b]

	Sum of Squares	df	Mean Square	F	Significance
Regression	3.867	3	1.289	3.259	0.025
Residual	34.011	86	0.395		
Total	37.878	89			

a: Predictors: (Constant), Ease of Use, Relative Advantage, Compatibility
b: Dependent Variable: EA Planning IT Infrastructure Flexibility

14.4. EA Planning Partnership Quality as a Composite variable

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.321	0.103	0.082	0.534

a: Predictors: (Constant), Ease of Use, Relative Advantage, Compatibility

ANOVA

	Sum of Squares	df	Mean Square	F	Significance
Regression	2.819	3	0.94	3.293	0.024
Residual	24.539	86	0.285		
Total	27.358	89			

a: Predictors: (Constant), Ease of Use, Relative Advantage, Compatibility
b: Dependent Variable: EA Planning Partnership Quality

15. Appendix H: HYPOTHESIS 4 TO 6 TEST RESULTS

15.1. IT Performance as a Composite Variable

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.316	0.1	0.079	0.534

a: Predictors: (Constant), Human Capital, IT Infrastructure Flexibility, Partnership Quality

ANOVA

	Sum of Squares	df	Mean Square	F	Significance
Regression	2.72	3	0.907	3.176	0.028
Residual	24.553	86	0.285		
Total	27.273	89			

a: Predictors: (Constant), Human Capital, IT Infrastructure Flexibility, Partnership Quality
b: Dependent Variable: IT Performance

15.2. Heterogeneity of Physical IT Infrastructure as a Composite Variable

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.419	0.176	0.157	0.825

a: Predictors: (Constant), Human Capital, IT Infrastructure Flexibility, Partnership Quality

ANOVA

	Sum of Squares	df	Mean Square	F	Significance
Regression	12.486	3	4.162	6.119	0.001

Residual	58.501	86	0.68		
Total	70.988	89			

a: Predictors: (Constant), Human Capital, IT Infrastructure Flexibility, Partnership Quality
b: Dependent Variable: Heterogeneity of Physical IT Infrastructure

15.3. Replication of IT Infrastructure Services as a Composite Variable

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.266	0.071	0.049	0.743

a: Predictors: (Constant), Human Capital, IT Infrastructure Flexibility, Partnership Quality

ANOVA

	Sum of Squares	df	Mean Square	F	Significance
Regression	3.61	3	1.203	2.178	0.096
Residual	47.514	86	0.552		
Total	51.124	89			

a: Predictors: (Constant), Human Capital, IT Infrastructure Flexibility, Partnership Quality
b: Dependent Variable: Replication of IT Infrastructure Services

15.4. Business Application Integration as a Composite Variable

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.475	0.225	0.208	0.638

a: Predictors: (Constant), Human Capital, IT Infrastructure Flexibility, Partnership Quality

ANOVA

	Sum of Squares	df	Mean Square	F	Significance
Regression	10.19	3	3.397	8.339	0
Residual	35.031	86	0.407		
Total	45.221	89			

a: Predictors: (Constant), Human Capital, IT Infrastructure Flexibility, Partnership Quality
b: Dependent Variable: Business Application Integration

15.5. Enterprise Data Integration as a Composite Variable

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.487	0.237	0.219	0.511

a: Predictors: (Constant), Human Capital, IT Infrastructure Flexibility, Partnership Quality

ANOVA

	Sum of Squares	df	Mean Square	F	Significance
Regression	6.976	3	2.325	8.899	0
Residual	22.471	86	0.261		
Total	29.447	89			

a: Predictors: (Constant), Human Capital, IT Infrastructure Flexibility, Partnership Quality
b: Dependent Variable: Enterprise Data Integration