Factors affecting adoption of service-oriented architecture (SOA) at an enterprise level

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Confidentiality statement

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Abstract

Service-oriented computing is an emerging IT innovation. Among its manifestations is service-oriented architecture (SOA), an architectural approach to designing and implementing IT solutions. Organizations adopting SOA are facing implementation challenges that are not well explored. Examining factors affecting SOA adoption at an organizational level can reduce uncertainty about SOA, its advantages and disadvantages, and implementation issues. Furthermore, the state of SOA adoption in the South African context is to a large extent unknown. No large-scale empirical research has been undertaken on the topic of SOA adoption in South Africa. While empirical research on SOA adoption is scarce, most of the studies conducted so far focus on qualitative analysis of SOA adoption. Therefore this study fills in the gap and explores SOA adoption via quantitative analysis. The study investigates organizational SOA adoption in South Africa from DOI theory and TOE framework perspectives. A model of SOA adoption is developed and, based on that model, a research instrument is designed. In order to validate the instrument and to gauge the state of SOA adoption, an online survey had been conducted among the South African organizations from May to September 2010. The results of the survey highlight a number of factors influencing SOA adoption. Use of multiple standards and platforms, complexity, compatibility, cost, top management support, good governance and strategy, adequate human and financial resources, vendor support for integration and development tools are significant factors for a successful SOA implementation. The findings of this study help to build a body of knowledge on organizational SOA adoption and create opportunities for future research in this field. The results of the study may also be relevant to industry practitioners who are planning to adopt SOA.

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1. Introduction

In today's world, business needs are constantly changing. Organisations require a certain degree of flexibility allowing them to quickly move into new markets, change their business strategies, and acquire new businesses (Barry, 2003). Currently, service oriented architecture (SOA) is viewed as the best architectural style that brings organizational agility, improves applications adaptability and systems interoperability, and allows reuse of legacy assets (Lewis, Simanta, Morris, Wrage, & Smith, 2007).

Service-oriented architecture (SOA), service-oriented computing (SOC), and web services have become buzz words in the business world and IT community, and the number of companies considering or implementing SOA projects is increasing (Erickson & Siau, 2008). Despite enthusiasm in the industry about the SOA concept (Luthria & Rabhi, 2009) and seemingly high adoption rates (Erickson & Siau, 2008), it seems that business potential of SOA is not fully understood as organizations are focusing on issues related to technical implementation rather than the broader business picture (Luthria & Rabhi, 2009).

While more organizations across the globe start exploring the SOA paradigm, a number of implementation issues are reported to be underestimated, such as complexity, cost, and the effort required for achieving even moderate improvements in the implementation of SOA (Lewis et al., 2007). One report suggested that while SOA positively affects interoperability, extensibility, and modifiability, at the same time it negatively impacts performance, testability, auditability, and security (O'Brien, Bass, & Merson, 2005). Many of the issues related to SOA are being researched and will take time to mature (Lewis et al., 2007, O'Brien et al., 2005)

1.1. The research purpose

Empirical research into SOA is very limited, which opens up numerous research opportunities in the area of SOA adoption and implementation. One of the research opportunities is studying factors influencing organizational adoption and implementation of SOA and business impacts of

adopting SOA. Along with a better understanding of the SOA concept, such studies could provide "frameworks, guidelines, and best practices for the effective adoption of SOA at an enterprise level" (Luthria & Rabhi, 2009).

Drawn from the Diffusion of Innovations (DOI) theory (Rogers, 2003) and Swanson's typology of IS innovations (Swanson, 1994), this study identifies factors critical for successful adoption of an IS innovation. Using the technology-organization-environment (TOE) framework, those factors are grouped into three major categories: technological, organizational and environmental. After conducting extensive reviews of the current SOA and IS innovations literature, a final set of factors is identified. Based on the analysis of those factors, this study suggests a research model for SOA adoption based on the TOE framework.

The purpose of this research is to empirically test the proposed framework by means of surveying South African enterprises on factors influencing adoption of SOA at an organizational level. The survey will use a questionnaire as a survey instrument, which will allow for statistical testing and analysis.

1.2. Relevance of the research and expected contributions

Apart from developing a model to study organizational adoption of SOA, another contribution of this study is the development of a research instrument that helps to gauge SOA adoption. To the best of the author's knowledge, no surveys on SOA adoption in the South African context were conducted before. Thus, this study is expected to contribute to the body of knowledge that can be used as a basis for further research on the topics related to SOA adoption and its drivers and inhibitors.

1.3. Research questions

Since the aim of this study is to explore factors affecting organizational adoption and implementation of SOA, a number of research objectives that motivate this study are formulated. These objectives are:

- To what extent, if any, SOA has been adopted by South African Enterprises?
- Which critical factors for the successful adoption of SOA could be identified within the framework?
- Which implementation challenges do organizations in South Africa face with regards to SOA adoption?
- Are there major differences in the way South African organizations adopt SOA, compared to the developed countries?
- Have SOA applications passed the pilot stage and are they being used in production systems deployed in South Africa?

1.4. Overview of the thesis chapters

The next chapter reviews pertinent literature on SOA adoption. The chapter starts with the definition of SOA and its concepts, and proceeds with discussion on SOA adoption, maturity models, SOA governance, and SOA research challenges and opportunities.

Chapter 3 provides an overview of the theoretical framework utilised by the study. Diffusion of Innovations theory, Swanson typology of IS innovations, and the Technology-organization-environment (TOE) framework are examined. Then, factors influencing technology adoption are investigated.

Based on the factors identified, a research model and hypotheses are explained in Chapter 4. Chapter 5 focuses on research design and methodology. Research paradigm, sampling, instrument design, and data collection techniques are discussed.

Chapter 6 examines the survey data and explains statistical techniques used by the researcher. It then summarises the data analysis results and discusses the findings.

Chapter 7 provides the research summary and formulates conclusions. Based on the conclusions, recommendations for future research on SOA adoption are made.

2. Literature review and background

SOA adoption is a relatively large field that should include discussion on adoption benefits, adoption problems, case studies of successful implementations, industry surveys, and measuring SOA adoption and success. The following subsections will give an overview of the abovementioned aspects in detail.

2.1. SOA definition and concepts

In order to understand SOA, the terms 'service' and 'SOA' need to be defined. The following subsections will also give an overview of service-orientation principles, technology and standards.

2.1.1. Definition of service

There are numerous definitions of a service in the literature. The World Wide Web Consortium (W3C) (2004) describes a service as "an abstract resource that represents a capability of performing tasks that form a coherent functionality from the point of view of providers entities and requesters entities". One of the academic definitions of services provided by Papazoglou (2003) identified services as "self-describing, platform-agnostic computational elements that support rapid, low-cost composition of distributed applications".

A service has a service provider and one or more service consumers (Open Group, 2009). From a granularity point of view services can be classified as simple and composite (Papazoglou, 2003). The diagram of a basic SOA architecture is provided in Figure 1. Basic SOA architecture is modelled around the service requestor, service provider, and service registry (Erl, 2005, p.75; Luthria & Rabhi, 2009; Papazoglou, 2003) and uses the WSDL standard for service description, SOAP for messaging, and UDDI for service registration.

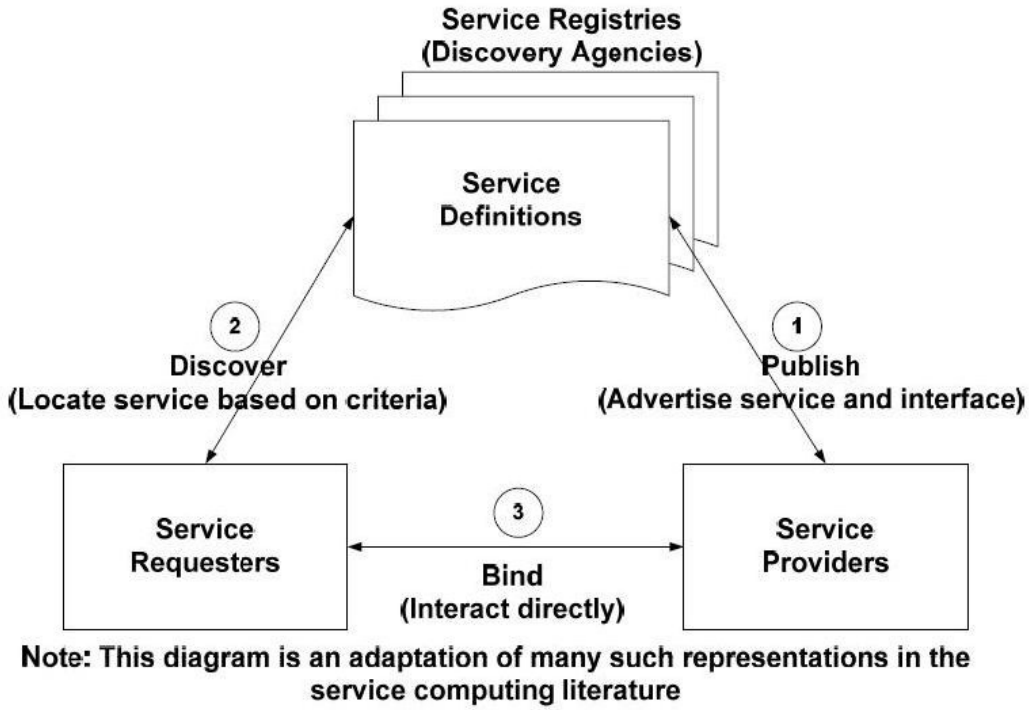

Figure 1: Basic SOA Architecture (Source: Luthria & Rabhi, 2009)

2.1.2. Service-orientation principles

The concepts of SOA provide the foundation for an on demand operating environment (Schmidt & Kalyana, 2004). Systems built on service-orientation principles are becoming the solution of choice to "bridge the gap between business models and the technical solution to support and adapt changing business needs" (Kontogiannis, Lewis, & Smith, 2007, p.1). Service-orientation is a "prerequisite for rapid integration of data and business processes; it enables situational development models, such as mashups; and it is the foundational architecture for SaaS and cloud computing" (Manes, 2009a).

Though there is no standard definition of service-orientation principles, services are most commonly described using the following set of characteristics and attributes. Services are (1) reusable, (2) composable, (3) discoverable, (4) autonomous, (5) stateless, (6) loosely coupled, (7) hiding underlying logic and (8) exposing a formal service contract defining the terms of information exchange (Erl, 2005, p.291).

2.1.3. Definition of SOA

There is no consensus on SOA definition between industry practitioners, vendors, standardization organizations such as W3C, OASIS, the Open Group, and academics (Ren & Lyytinen, 2008). As a result, SOA is defined in different contexts and from various perspectives and levels of abstraction. Here are some of the examples of SOA definition:

- "SOA is a set of components which can be invoked, and whose interface descriptions can be published and discovered" (W3C, 2004).
- SOA is a "paradigm for organizing and utilizing distributed capabilities that may be under the control of different ownership domains" (OASIS, 2006).
- SOA is "a style of IT architecture that delivers agility and boundaryless information flow" (The Open Group, n.d.).
- SOA is a "business-centric IT architectural approach that supports integrating your business as linked, repeatable business tasks, or services" (IBM, n.d.b)
- SOA is "an open, agile, extensible, federated, composable architecture comprised of autonomous, QoS-capable, vendor diverse, interoperable, discoverable, and potentially reusable services, implemented as Web services" (Erl, 2005, p.54).

SOA can be described as a set of logical layers. Figure 2 illustrates the IBM view on the SOA reference architecture (Arsanjani, Zhang, Ellis, Allam, & Channabasavaiah, 2007). The lower layers (services, service components and operational layer) are concerns for the service provider, while the upper layers (services, business processes, and consumers) are concerns for the service consumer. Five horizontal layers relate to the overall functionality of the SOA solution. The four vertical layers are non-functional in nature and support various concerns related to functional layers. In SOA a layer does not depend upon the layer below it and, as a result, a consumer can access the business process layer as a service or the service layer directly.

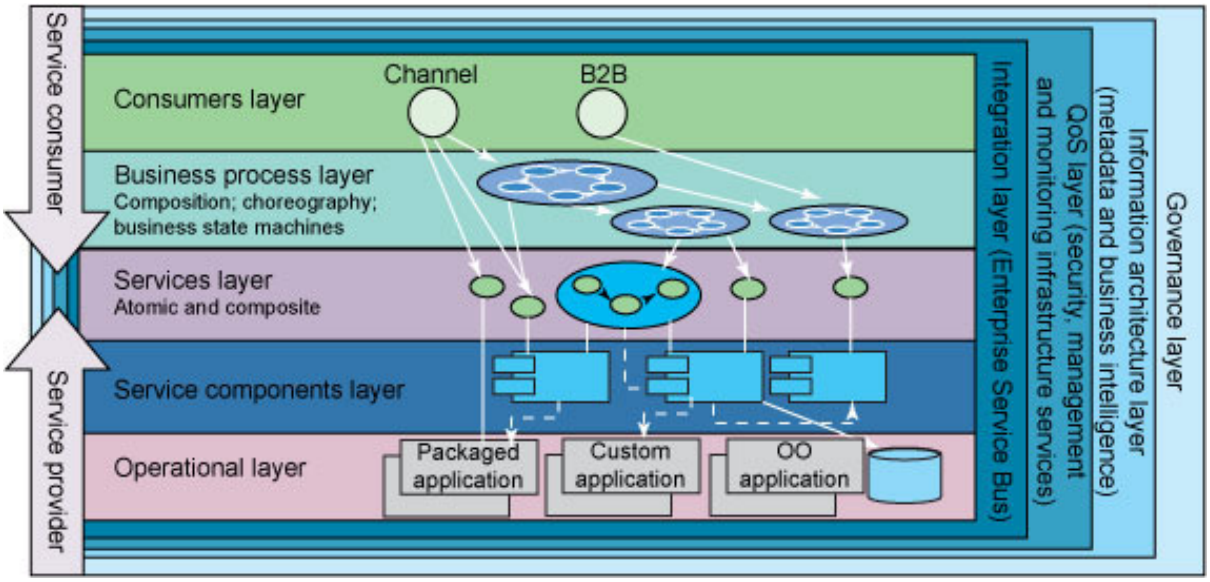

Figure 2: Layers of the SOA reference architecture: Solution stack view (Source: Arsanjani et al., 2007)

Some of the papers suggested that misinterpretations of the nature of SOA create confusion among managers and impede its adoption (Ren & Lyytinen, 2008; Gulledge & Deller, 2009). Others suggested that different interpretations of emerging complex concept such as SOA highlight the need to consider multiple aspects of SOA (Ren & Lyytinen, 2008).

2.1.4. SOA technology and standards

Web services technologies are far from mature (Phippen, Taylor, and Allen, 2005) and continue to evolve. The following image (Figure 3) gives an indication of how many standards and specifications are used in a web services framework (innoQ, 2007). Major standards categories are business processes, management, reliability, security, transportation, interoperability, and messaging. Standards and specifications are developed by standards bodies, such as W3C, OASIS, Web Services Interoperability Organization (WS-I) and the Internet Engineering Task Force (IETF). Major IT vendors are also actively involved and promote their own specifications. Some of the specifications have become industry standards.

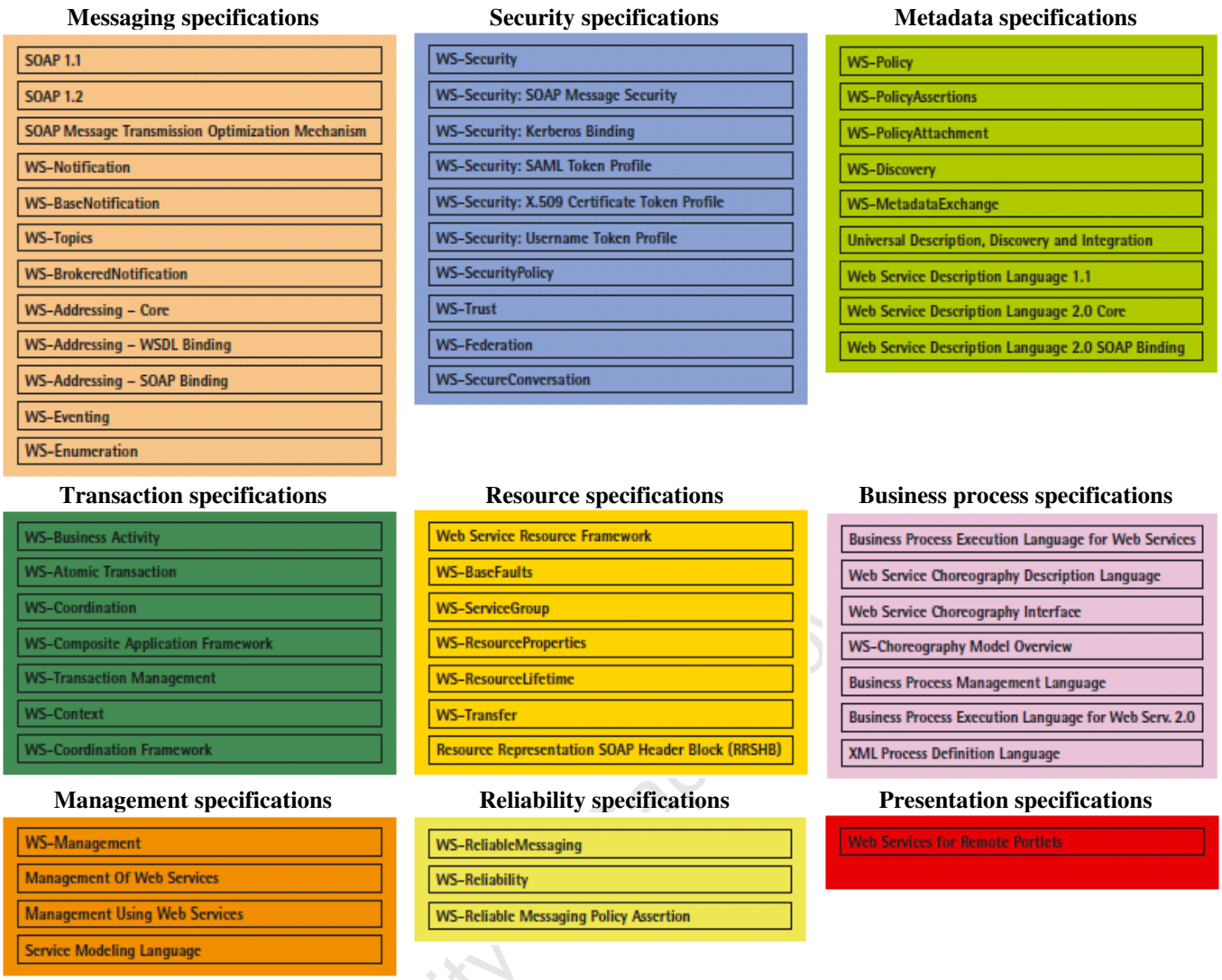

Figure 3: Web Services Standards Overview (adapted from innoQ, 2007)

Many organizations face technological and operational challenges when they embark on large-scale SOA development (Haines, 2007; Phippen et al., 2005). The lack of a reliable implementation framework (Haines, 2007) and case studies on the orchestration of web services, as well as problems with interoperability and operational efficiency (Phippen et al., 2005) were identified as major challenges. The complexity of SOA (Baer, 2008) and the large number of overlapping or even competing specifications (Haines, 2007, Kontogiannis et al., 2007) were highlighted as problems for organizations adopting web services and SOA.

Quite often the terms SOA and web services are used interchangeably, however, in terms of level of abstraction SOA lies between web services and Enterprise Architecture (EA) (Salasin & Madni, 2007). The following image (Figure 4) demonstrates the position of SOA in the enterprise abstraction hierarchy.

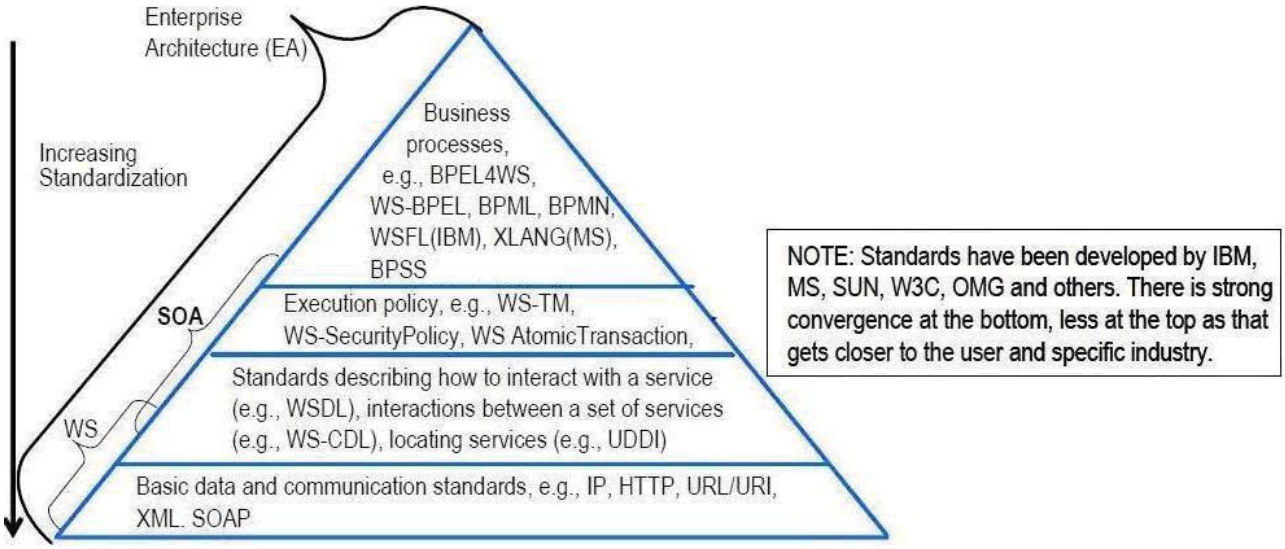

Figure 4: SOA position in the enterprise abstraction hierarchy (Source: Salasin & Mandi, 2007)

2.2. SOA adoption

In order for SOA to be successful, organizations need to develop an upfront SOA strategy, implement SOA governance, make thorough technology evaluations, and take into account that SOA requires a shift in mindset (Lewis & Smith, 2007; Manes, 2009a). Emerging industry-wide standards and proliferation of Web services drive the adoption of SOA, however, organizations are still left with issues ranging from business-IT alignment to systems design and change management. (Barry, 2003, p.118).

The process of adopting Web services and SOA is gradual and incremental (see Figure 5). It starts at the ad hoc stage of projects (Arsanjani & Holley, 2005), then evolves into technology adoption, and moves into lines of business (LOB) adoption and enterprise adoption respectively. Value-net adoption implies that at that stage services operate across organizational boundaries.

Services and levels of reuse are linked to the scopes of adoption. Legacy applications are technology focused, however, at the technology adoption stage, legacy applications could be wrapped and could expose application functionality via project specific services. Common services start to emerge at the LOB adoption stage, where they span different lines of

businesses. At the enterprise adoption scope, a greater number of common enterprise-wide services are emerging. Matured common services could be then offered to clients and business partners.

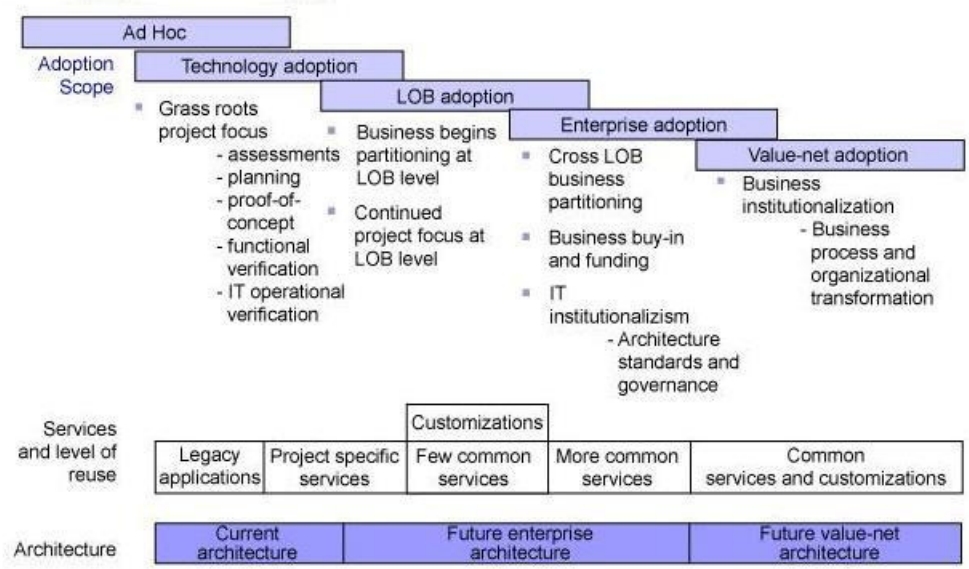

Figure 5: Scopes of adoption (Source: Arsanjani & Holley, 2005).

2.2.1. SOA adoption benefits

Erl (2005, p.59) suggested that benefits of SOA adoption are the reasons "why the IT community is going through the trouble of changing so much of its philosophy and technology in an effort to adopt SOA". SOA adoption will provide organizations with improved interoperability, reuse, composability, legacy integration, organizational agility, standardized data representation and vendor-neutral communications infrastructure (Erl, 2005, pp.60-63).

Improved flexibility, increased speed to market, incremental deployments, and improved productivity were among the other expected benefits (Walker, 2007). The 2008 Gartner SOA survey (Gartner, 2009) recommended that organizations choose one of the key SOA benefits and focus on achieving it one at a time. According to Gartner, SOA adoption improves an organization's business processes, shortens project life cycles, lowers cost of maintenance and development, and promotes reuse and adoption of new business models.

2.2.2. SOA adoption issues

Quite often organizations decide to embark on SOA projects without proper upfront analysis and understanding of all the implications of their decisions (Lewis et al., 2007). IBM summarized their experience with a number of organizations adopting SOA and suggested four areas of adoption challenges: (1) technology, (2) program management, (3) organization, and (4) governance (Varadan, Channabasavaiah, Simpson, Holley, & Allam, 2008). Organization and governance challenges are considered to be the most difficult as they require the entire organization or LOBs to "change their methods, modes of communication, means of cooperating, and methods of reporting relationships" (Varadan et al., 2008).

Some of the most common problems of adopting SOA include misunderstanding the differences between SOA and distributed architecture, building SOA in an old-fashioned way, misunderstanding SOA performance requirements and Web services security. Committing to SOA without a clear strategy and transition plan, not embracing different platforms and standards, not setting SOA standards within an organization and not using XML as a standard and a foundation for SOA architecture are among the major reasons of SOA project failures (Erl, 2005, pp.64-70).

According to Lewis et al. (2007), most common misconceptions about SOA are: (1) that SOA provides an architecture for a system or can be bought off the shelf; (2) that legacy integration is easily achieved; (3) that SOA is only about standards and technology; (4) that interoperability is guaranteed if standards are used, and (5) that testing of SOA applications is similar to testing of a standard application.

"The lack of planning and clear business case, lack of understanding of what services are available, the lack of governance, and the lack of standards" (Ren & Lyytinen, 2008) were mentioned as reasons of dissatisfaction among organizations adopting SOA.

2.2.3. SOA adoption case studies and surveys

In order to promote SOA strategy and help businesses successfully adopt SOA, a number of SOA related initiatives were started in the IT industry in recent years. The SOA Consortium, a SOA advocacy group, was established in 2007. The consortium identified its main strategy as building awareness of costs, benefits, challenges, and success factors of adopting SOA. As part of its tactics, the SOA Consortium and CIO magazine sponsored annual SOA Case Study Competitions. The winning case studies were used to highlight best practices and to provide insights for organizations to pursue their own SOA projects.

IBM and Software AG, large IT vendors, both hold their own annual SOA conferences: IMPACT and SOA Summit respectively, where they share their SOA knowledge with IT community, summarize the state of the art in the field, and promote success stories of early SOA adoption.

Despite the presence of many compelling stories of individual organizational success with SOA adoption (Schindler, 2008; Flowers, 2009), it's somewhat difficult to get an accurate picture of SOA adoption in the industry. It was suggested that organisations of all sizes, small and large, can use SOA. In fact small and medium-sized companies can benefit the most from SOA, as it gives them an opportunity to provide fee-based services (Barry, 2003, p.21). However, the 2009 Forrester SOA survey showed that SOA adoption is much lower in smaller organizations with total number of employees less than 1000 (McKendrick, 2009).

It was suggested that SOA adoption in the industry is slower than desired (Kontogiannis et al., 2007) and is not commonplace (Haines, 2007). Some reports suggested that SOA failed to deliver its promised benefits and is too expensive (Gartner, 2009; Meehan, 2008).

The 2008 CA Willy SOA adoption survey results demonstrated that different countries were at different stages of SOA adoption. The majority of the organizations in the USA (40.6%) and Australia (32.9%) had deployed a business-unit SOA application under IT control, while the majority of the organizations in the UK (40.6%) had deployed a SOA application that is part of

an enterprise-wide initiative. The majority of the organizations in France (45.2%) and Germany (30.6%) had their SOA applications in the pilot stage.

2.2.4. Evaluating and measuring adoption

There is no consensus in the industry on the ways and metrics of measuring SOA business value as well as the level of SOA adoption and success (Gartner, 2009). The SOA Consortium defines SOA success in terms of "business value generation, business agility, IT agility, IT productivity, and business and IT collaboration" (SOA Consortium, 2008), while others argue that positive return on investment (ROI) is the only measure of success of SOA adoption (Manes, 2009b).

Some authors suggested that the best way to evaluate SOA is not ROI, but intangible factors such as competitive necessity, agility, on-demand abilities, and responsiveness (Erickson & Siau, 2008). Many authors tried to come up with innovative metrics that would help organizations to measure SOA and business outcomes effectively. Some IT vendors (Smith, 2009; Little, 2009) and academics (Salasin & Madni, 2007) offered a set of business-oriented metrics that can be used to make a business case, justify the cost of the project and to measure the progress of SOA strategy. Smith (2009) suggested metrics that include (1) service vitality index, (2) revenue per service, (3) number of new services generated and used as a percentage of total services, (4) mean time to service development (MTTSD), (5) mean time to service change (MTTSC), (6) service reuse, (7) cost of not using or stopping a service and (8) service availability. Little (2009) suggested similar business-driven metrics: (1) ROI per service, (2) revenue per service, (3) service growth rate/reuse, (4) business agility, (5) reliability, (6) service inter-dependencies.

Apart from metrics to quantify the business value of SOA initiative, industry practitioners and academics are in need of an evaluation framework that can help to measure SOA adoption. The SOA domain includes business, engineering and operations domains, so it has to be evaluated from different perspectives and points of view: technical, business, and operational (Kontogiannis et al., 2007).

Another view on the multi-domain nature of SOA was suggested by Valcamp (2009) in a way of a measurement matrix comprised of a set of measurements spanning financial, operational and behavioural vertical areas as well as strategic and tactical horizontal areas (see Figure 6).

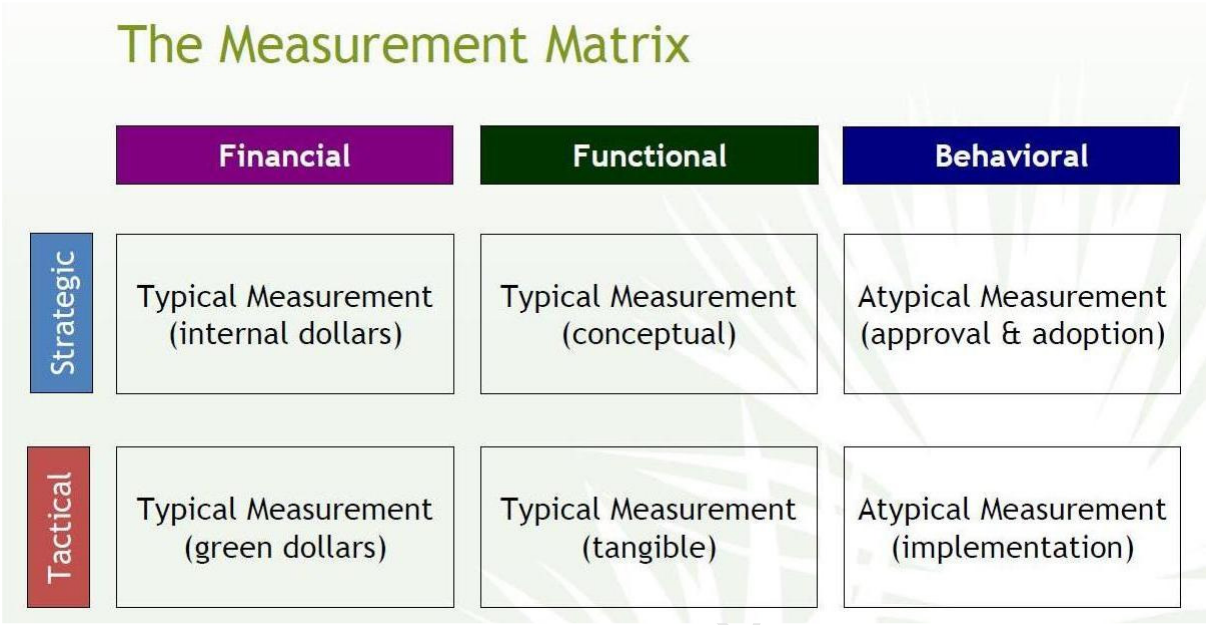

Figure 6: SOA Adoption measurement matrix (Source: Valcamp, 2009)

In the matrix, financial measurements deal with budgets, expense/capital and return; functional – with infrastructure, services and efficiencies; behavioural – with approval, adoption and culture. Strategic measurements relate to culture, focus on efficiencies and deal with virtual money, while tactical measurements relate to assets, focus on implementation/ decommission and deal with real money.

2.2.5. SOA adoption in a South African context

There is virtually no academic research on SOA adoption in the South African context available. That does not mean, however, that South African enterprises are not experimenting with SOA. According to the SOA Industry Case Studies (SOA Consortium, 2007, p.24), the Standard Bank of South Africa had successfully implemented a mega SOA (high level of complexity and business sponsorship) project. The bank reported an improved customer management capability, reduced process complexity, increased stability, adaptiveness, and control of banking processes. It seems reasonable to assume that other South African enterprises may be

adopting SOA; hence research in that field could provide interesting and valuable insights into the state of SOA adoption in the South African context.

2.3. SOA maturity models

A SOA maturity model can be viewed as a roadmap that helps organizations evaluate where they stand on their journey towards SOA adoption. It is defined as a set of "criteria, parameters and factors that can be used to measure and describe an effective SOA implementation" (Beack, 2006). A SOA maturity model "identifies phases that characterize the scope of SOA adoption and experience" (CIO Council, 2008). The role of a SOA maturity model is to guide SOA implementation improvements and to benchmark SOA adoption within an organization (Sonic Software, 2005; Beack, 2006).

There is no industry accepted standard for a SOA maturity model (Beack, 2006). Many organizations created their own maturity models which reflect their ideas and views of SOA. As a result several SOA maturity models are available: the Open Group Services Integration Maturity Model (OSIMM), the SOA Maturity Model (SOA MM), as well as maturity models from Oracle, BEA and Everware-CBDI (CIO Council, 2008). Development of all the maturity models was initiated by vendors. IBM developed its own maturity model, the Service Integration Maturity Model (SIMM), which was adopted by the Open Group as "the basis for the first collaborative maturity model for SOA adoption in industry" - OSIMM (The Open Group, 2009). SOA MM was created through the collaboration of Sonic Software, Systinet, AmberPoint, and BearingPoint (Sonic Software, 2005).

SOA MM (see Figure 7) classifies SOA implementation into 5 different levels of maturity: (1) initial services, (2) architectured services, (3) business services and collaborative services, (4) measured business services, and (5) optimized business services. Mapping to the CMMI maturity levels is provided on the left of the image.

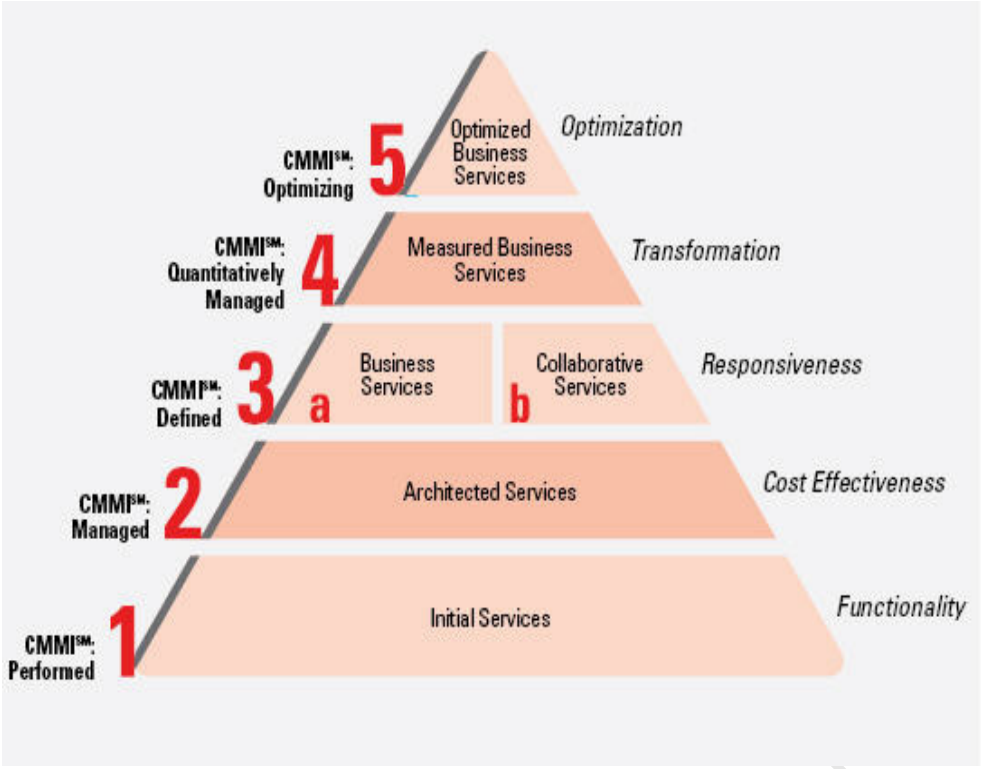

Figure 7: Overview of SOA MM (Source: Sonic Software, 2005)

OSIMM (see Figure 8) lists seven abstract levels of an organization's readiness in services integration. According to OSIMM, services and SOA start to emerge on level 4. On level 5 and 6 composite and virtualized services are built respectively, while level 7 is characterised by the availability of dynamically re-configurable services. Levels 1 to 3 form pre-SOA, prerequisite stages that organizations need to go through in order to transform their data, processes and technologies and to set up the foundation of future SOA implementations.

Maturity models show significant differences in existing views on service ontology which results in the absence of a common language that can be understood by business and IT communities. As with the definition of SOA, there is no consensus on how services are classified and grouped. Cohen (2007) suggested the ontology of services in SOA; yet his classification was done from a technical point of view which is of little value to business-decision makers.

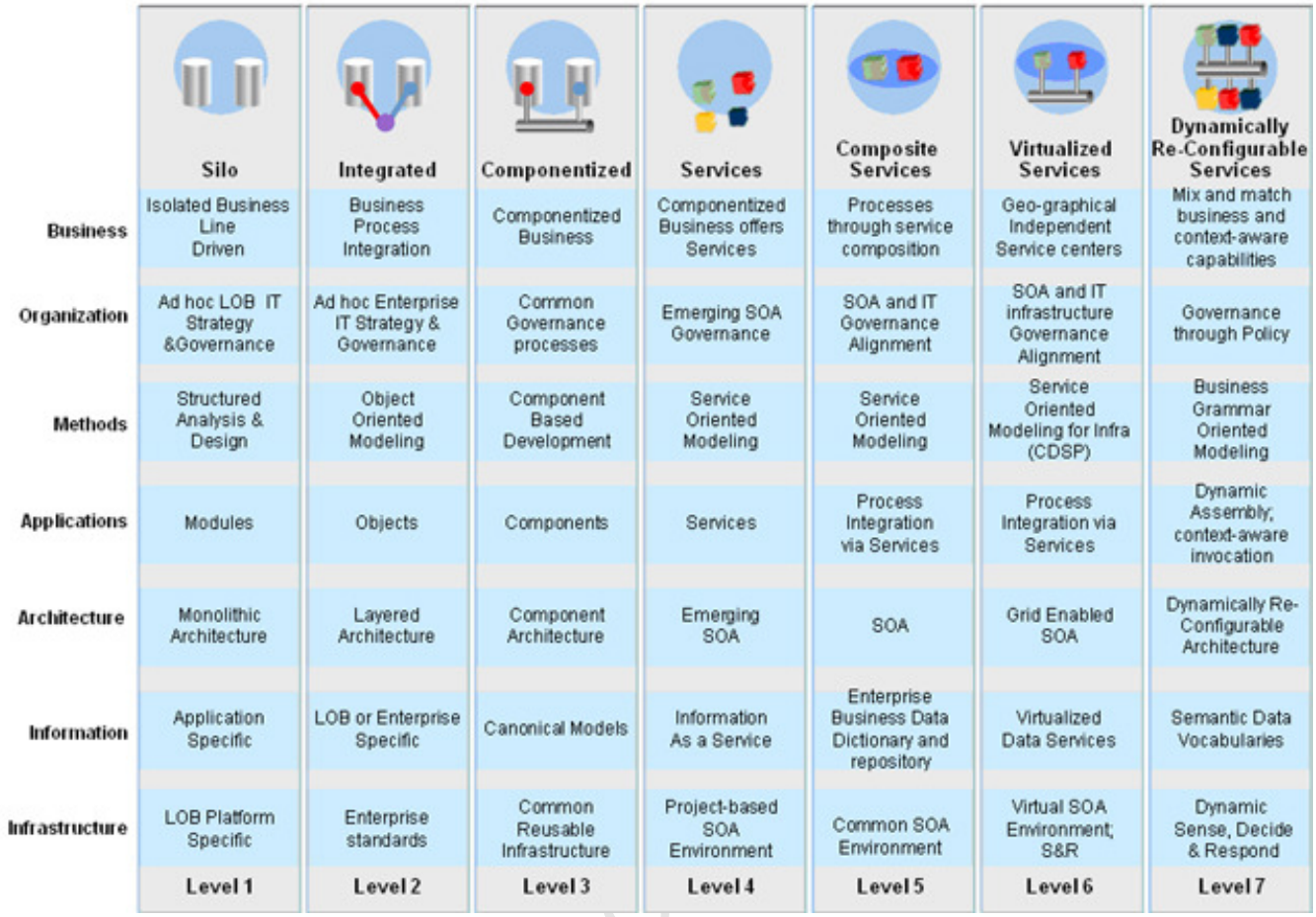

Figure 8: The Open Group Services Integration Maturity Model (OSIMM) (Source: The Open Group, 2009)

There was some critique of the limited scope of existing maturity models, which focus on services, business processes and infrastructure and don't address organizational, life cycle and governance aspects (Beack, 2006). Beack (2006) suggested that the maturity model should be viewed as a multi-dimensional model in which other dimensions are included: (1) organizational maturity, (2) technology maturity, (3) architectural maturity, (4) life cycle maturity, and (5) governance maturity.

2.4. SOA governance

Due to the "cross-domain nature of services" (Luthria & Rabhi, 2009), when services are being used across different lines of business (LOB) and entities external to an organization, maintaining control of SOA is a complex task (Schepers, Iacob, & Van Eck, 2008; Luthria & Rabhi, 2009). SOA governance is viewed as a subset of IT governance (Luthria & Rabhi, 2009) and is considered to be a "way to implement control mechanisms in a SOA" (Schepers et al., 2008). SOA governance is an important aspect of the SOA adoption process and is considered

to be essential for realizing the benefits of such adoption (Varadan et al., 2008). Some papers addressed the concept and identified the scope of effective SOA governance (Schepers et al., 2008; Varadan et al., 2008).

Varadan et al. (2008) suggested a SOA governance model that is identified as a framework that aids organizations in agreement upon the scope of SOA governance. The SOA governance model presents a "check-list" on what needs to be done to achieve the promised benefits and expected business outcomes (see Figure 9). It illustrates a list of possible processes that could be considered for SOA governance, such as service strategy, service design, service transition, and service operation.

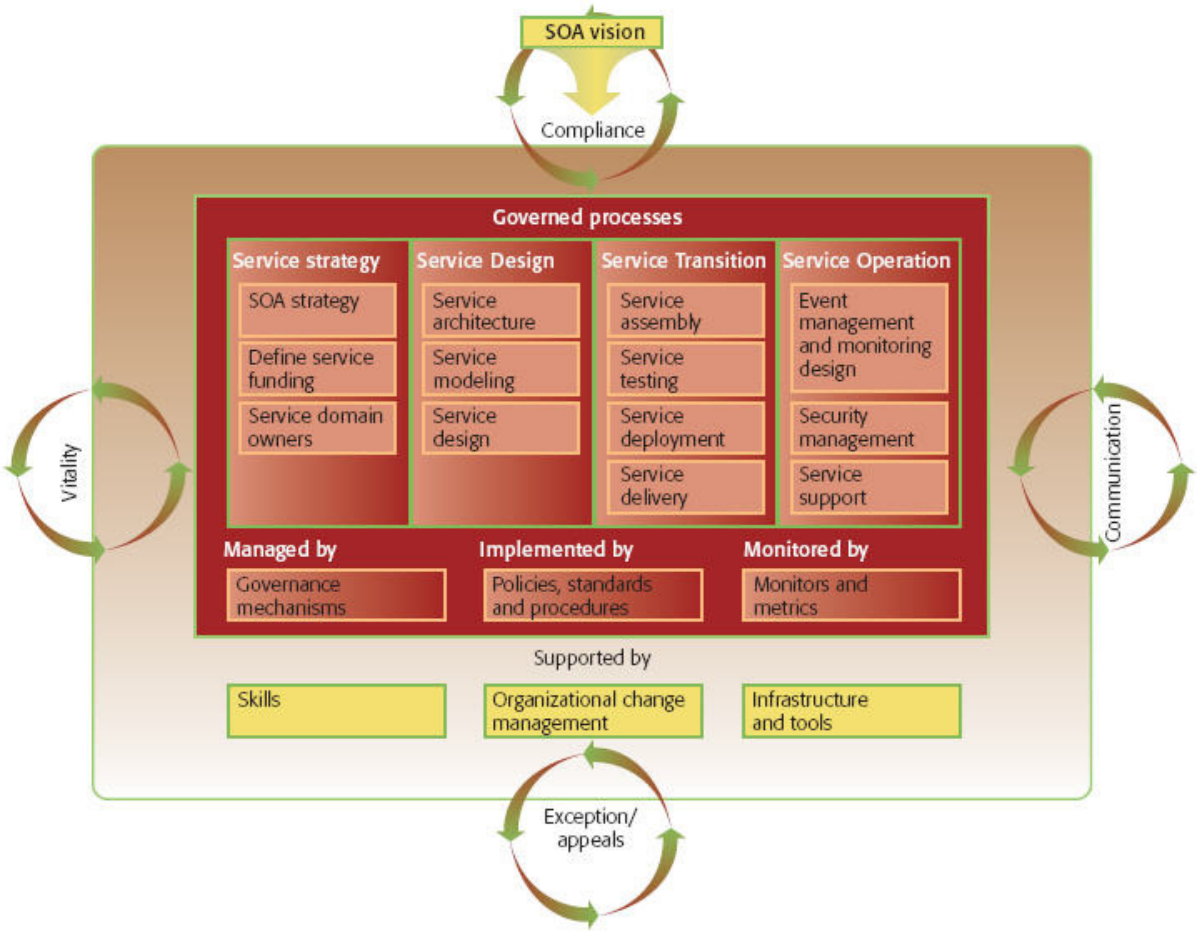

Figure 9: SOA Governance Model (Source: Varadan et al., 2008)

2.5. SOA research challenges and opportunities

Despite the fact that understanding of the SOA concept among industry practitioners and academics is improving and the underlying SOA technologies are maturing (Viering, Legner, &

Ahlemann, 2009), research into SOA and the issues surrounding it is still limited (Luthria & Rabhi, 2009; Erickson & Siau, 2008; Kontogiannis et al., 2007). Erickson and Siau (2008) reported that only 25 out of 800 articles, found as a result of library database search, came from research journals, while the rest came from practitioner-oriented sources. Most of SOA research is technology-oriented (Viering et al, 2009; Luthria & Rabhi, 2009) and concentrated in the engineering and operational domain (Kontogiannis et al., 2007). Business aspects of SOA, such as strategic, organizational and managerial, remain underserved and require further research from the IS community (Viering et al, 2009, Luthria & Rabhi, 2009; Kontogiannis et al., 2007). Some attempts were made to classify the current SOA research into distinct categories (Erickson & Siau, 2008; Viering et al, 2009).

Erickson and Siau (2008) found three distinct areas, which they classified as (1) exploratory and how-to studies on SOA development or deployment, (2) studies on vendor specific technologies and tools, and (3) empirical research. They suggested that there was virtually no research done regarding SOA benefits and drawbacks and cultural and structural impacts of SOA adoption on organizations.

Viering et al. (2009) analyzed 175 papers on SOA and web services research that were focused on adoption, practices, and impact issues, and were found in peer-reviewed academic journals and conference proceedings since the year 2000. They found that 112 (64%) of all the articles referred to web services and their specific technologies, while 63 (36%) articles covered SOA. The authors classified SOA research areas into 4 categories, namely SOA concepts (18% of papers), SOA adoption (21%), SOA practices (49%), and SOA impact (11%). In the SOA adoption category the most prominent sub-categories were case descriptions or case documentations of SOA implementations in practice (7% of papers) and assimilation/adoption of SOA (7%). The authors also classified research methods used in the studied sample, and concluded that the majority of the research used conceptual-deductive method (43%), argumentative-deductive method (18%), and case studies (14%). They concluded that “large-scale empirical studies using surveys or qualitative and quantitative cross-section analysis were

scarce" (Viering et al., 2009). The authors highlighted the need for a conceptual framework that would help to explore SOA adoption and factors affecting it.

Luthria & Rabhi (2009) said that there is a paucity of academic research on practical challenges of SOA adoption at an enterprise level and highlighted the need for empirical research on SOA adoption and factors affecting it. They suggested that SOA adoption may be influenced by (1) the perceived value of SOA to the organization, (2) the organizational strategy, (3) organizational context or culture, (4) organizational structure, (5) potential implementation challenges, and (6) the governance or the management of technology. The authors proposed a conceptual model that could provide a research framework to study adoption and implementation of SOA at an enterprise level (see Figure 10). Based on the proposed framework Luthria & Rabhi (2009) suggested that research on SOA adoption may focus on (1) factors influencing the decision to adopt SOA, and (2) factors affecting the implementation of SOA at an enterprise level.

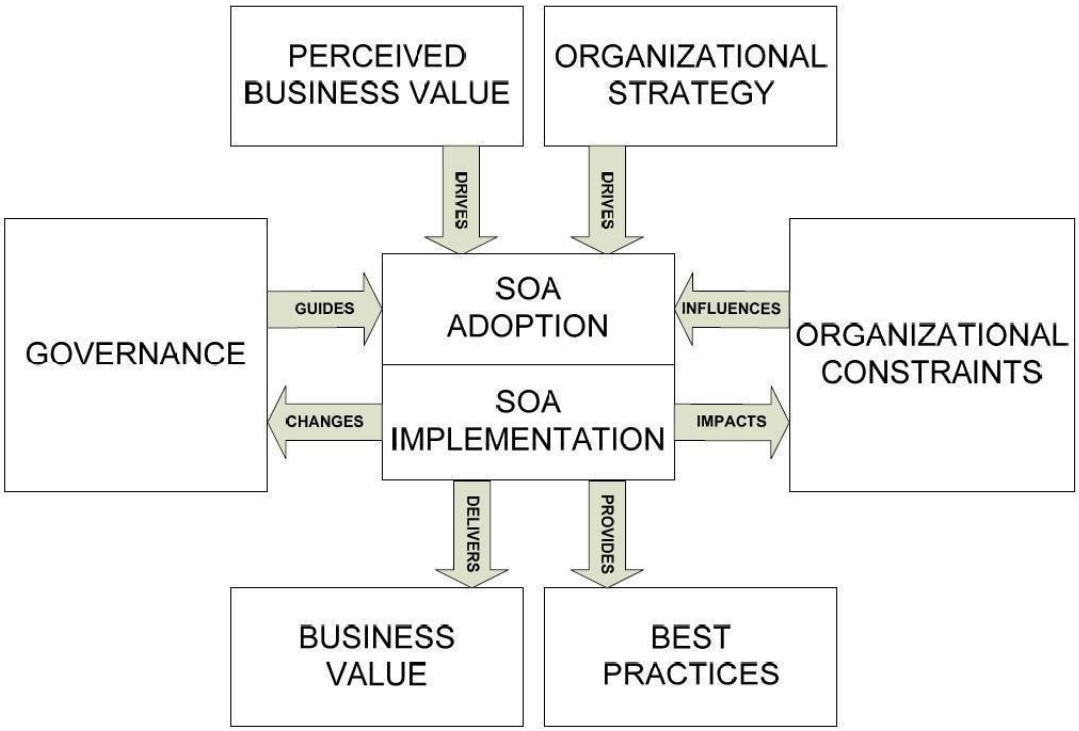

Figure 10: Conceptual model of the research agenda for the organizational adoption of SOA (Source: Luthria & Rabhi, 2009)

3. Theoretical framework

This section discusses Rogers's Diffusion of Innovations theory, Swanson's typology of IS innovations, and the technology-environment-organization framework. It also discusses factors identified by previous empirical research as important for successful adoption of an innovation.

3.1. Diffusion of Innovations theory

Rogers (2003, p.5) identifies diffusion as "the process by which an innovation is communicated through certain channels over time among the members of a social system". This definition highlights the four main elements of the diffusion of innovations (DOI) theory, namely the innovation, communications channels, time, and the social system.

An innovation, according to Rogers (2003, p.12), is "an idea, or object that is perceived as new by individual or another unit of adoption". The potential advantage of a technological innovation motivates an individual to learn more about the innovation and to reduce uncertainty about the advantages and disadvantages of the innovation. A potential adopter goes through an innovation-decision process, which is described as a sequence of such steps as (1) acquiring the knowledge about the innovation, (2) formulating an attitude towards the innovation, (3) making a decision to adopt or reject, (4) implementing and using the innovation, and (5) confirmation of the decision. The innovation decision process can lead to either adoption or rejection of the innovation. The initial decision to adopt the innovation can be reversed at a later point which will result in discontinuance of the innovation.

Further, Rogers (2003, pp.15-16) identifies five perceived attributes of innovations: relative advantage, compatibility, complexity, trialability, and observability. The relative advantage is the degree to which an innovation is perceived to be superior to its predecessor. It may be measured using economic terms, social prestige factors, convenience, and satisfaction. Compatibility is the degree to which an innovation is perceived to be consistent with the existing norms, values, experiences, and needs of potential adopters. Complexity is the degree to which an innovation is perceived to be difficult to comprehend and use. Trialability is the degree to

which an innovation may be tested on a trial basis. Observability is the degree to which the product of an innovation is visible to others.

Innovation-decisions can be made by various adopting units, such as an individual, an organization, a community, or other adopting units. Depending on the adopting unit and the decision process, innovation-decisions could be classified as optional, collective, or authority decisions (see Table 1). Information required for an innovation-decision is received through various channels, such as radio, television, printed media, and interpersonal channels. This research studies an organizational adoption and, as a result, focuses on collective and authority innovation-decisions.

Type of the Innovation-decision	Decision making unit (DMU)	Description	Effect on the other members of a system
Optional	Individual	Made by an individual independent of the other members of a system.	The other members of a system are not directly affected.
Collective	Majority of the members of a system	Made by a collective decision of the members of a system.	All the members of a system have to comply with the decision.
Authority	A few decision makers with the highest power, social status or technical expertise	Made by a few individuals in a system.	All the members of a system have to comply with the decision.

Table 1: Innovation-decision types (adapted from Rogers, 2003, pp. 28-29)

An organization is defined as a "stable system of individuals who work together to achieve common goals though hierarchy of ranks and a division of labour" and is characterised by predetermined goals, prescribed roles, authority structure, rules and regulations, and informal patterns (Rogers, 2003, p.404). This definition also includes a notion of a virtual organization which is a network of geographically-dispersed employees who are linked to each other by electronic communication (Rogers, 2003, p.405).

Organizational innovativeness is affected by a set of independent variables: (1) individual characteristics of a leader within an organization; (2) internal characteristics of organizational structure, and (3) external characteristics of the organization (see Figure 11). Variables that constitute internal characteristics of the organizational structure are (1) centralization, (2) complexity, (3) formalization, (4) interconnectedness, (5) organizational slack, and (6) size.

One of the important factors of the success of an organizational innovation is the presence of an innovation champion, a leader within an organization, who drives the innovation process. Depending on the cost, visibility, and radicality of an innovation, a champion could be either a top or a middle manager (Rogers, 2003, p.414).

The innovation process within an organization consists of five stages: (1) agenda-setting, (2) matching, (3) redefining/restructuring, (4) clarifying, and (5) routinizing. The first two stages constitute the initiation sub-process, while the last three stages form implementation sub-process. The decision to adopt separates the two sub-processes from each other.

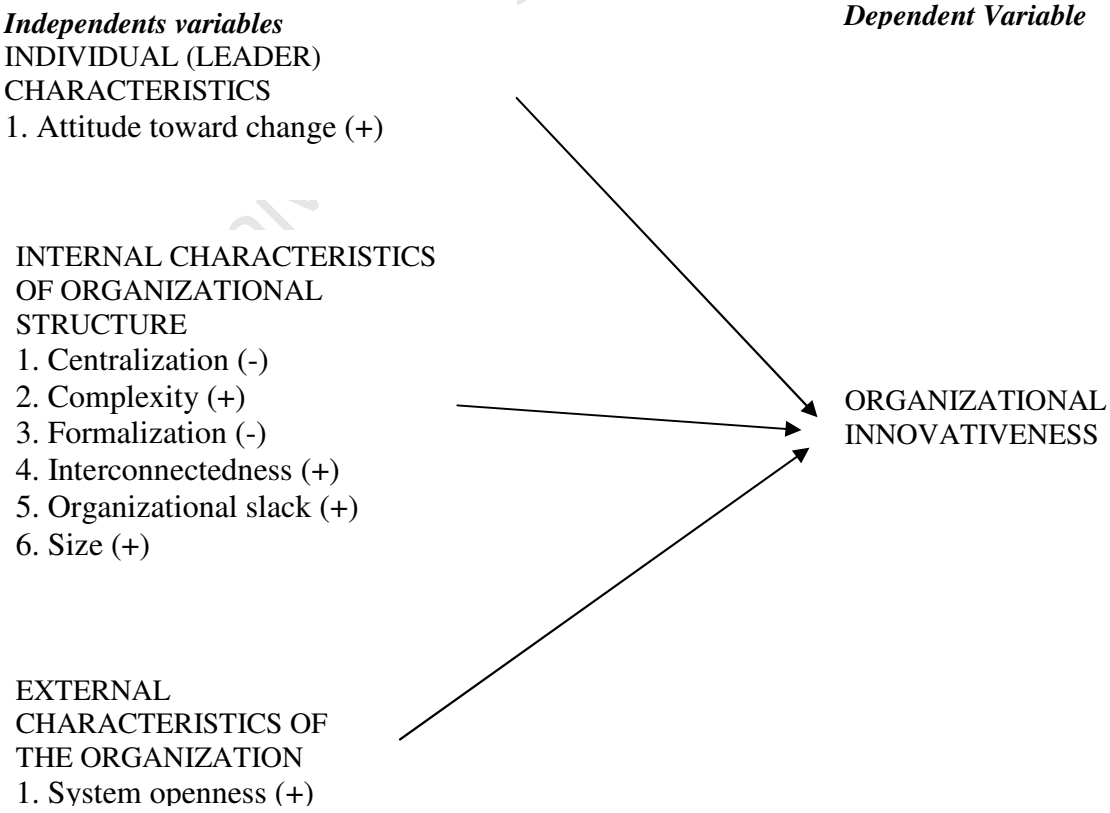

Figure 11: Independent variables related to Organizational Innovativeness (Rogers, 2003, p.411)

Among important drivers of organizational innovation is a performance gap which is described as "discrepancy between an organization's expectations and its actual performance" (Rogers, 2003, p.422). Implementation of an innovation in an organization usually leads to a mutual adaptation of the innovation and the organization. This happens because the innovation and the organization are never a perfect fit and both need to go through the process of evolution (Rogers, 2003, pp.424-425; Swanson, 1994).

There have been a few instances of criticism of diffusion research formulated in the past. Rogers (2003, p.134) discussed four major criticisms, such as:

- The pro-innovation bias that implies that an innovation should be adopted by all members of the social system and should be diffused rapidly.
- The individual-blame bias that overestimates individual responsibility to adopt an innovation and underestimates responsibility of the system that an individual belongs to.
- The recall problem that is caused by inaccuracies in respondents' self-reported recall data when the time variable is measured.
- The issue of equality that ignores the consequences of innovations and may lead to widening the socioeconomic gap between the members of the system.

To uncover motivations for adoption is a difficult task, as some adopters may not be able to explain why they decided to use the innovation; while others may be unwilling to do so. Furthermore, quantitative data collection techniques, such as survey data gathering, could not always provide a researcher with valid data about the motivations of adopters.

3.2. Swanson's typology of IS innovations

Swanson (1994) suggests that an organizational innovation is the means by which an enterprise responds to a fundamental change in its environment. IS innovation is defined as an "innovation in the organizational application of digital computer and communications technologies". IS innovation is primarily an organizational innovation, irrespective of whether it is analysed from the point of the entire organization or at the individual level within an organization.

According to Swanson (1994), IS innovations are classified into three major types: (1) IS process innovations, (2) IS innovations supporting business process administration, and (3) IS innovations integrated into core business technology (see Table 2). IS innovations significantly differ in terms of their impact upon the business and in their fundamental features. A Type 1 IS innovation arises within, and is limited to, an organization sub-unit. When IS innovation spreads across various business units and supports the administrative core of the business, it evolves into a Type 2 innovation. A Type 3 IS innovation intertwines with core business technology. At that stage it often becomes strategically important and offers competitive advantage. Fundamental features of IS innovations, such as technological and organizational, vary in proportion and evolve over time.

Type	Name	Scope
Type 1a	IS administrative process innovation	IS Process
Type 1b	IS technological process innovation	IS Process
Type 2	IS product and business administrative process innovation	Business process
Type 3a	IS product and business technological process innovation	Business process
Type 3b	IS product and business product innovation	Business product
Type 3c	IS product and business integration innovation	Business integration

Table 2: IS innovation types (Swanson, 1994)

Swanson (1994) suggested that certain innovation characteristics, such as an organization's size, diversity, availability of slack resources, IS unit's application system portfolio, and its professional and business orientation, could be used to explain organizational adoption of IS innovation.

Web services adoption, which could be viewed as the initial stage of broader SOA adoption, is initiated as an IS technological process innovation (Type 1b). When Web services become strategic to an enterprise and extend their scope beyond enterprise boundaries, then, according to the classification, Web services could be identified as an IS product and business integration innovation (Type 3). For that same reason, SOA should be considered as a Type 3 innovation,

in the sense that it spans multiple domains, is used across different lines of business and entities external to an organization, and is embedded in core business process.

3.3. Technology-organization-environment (TOE) framework

In the previous section, the Diffusion of Innovations theory was used to identify critical factors influencing the adoption and implementation of innovations. While the DOI theory provides a framework for organizational technology adoption, the framework was not widely utilised for innovation adoption studies in organizations. Often individual adoption variables were used instead, when technology adoption research was conducted at an organizational level (Tornatzky & Klein, 1982).

The Technology-Organization-Environment (TOE) framework offers researchers an alternative view on organizational adoption. Drawn from the DOI theory, the TOE framework classifies adoption factors into three related categories: technological, organizational, and environmental (see Figure 12).

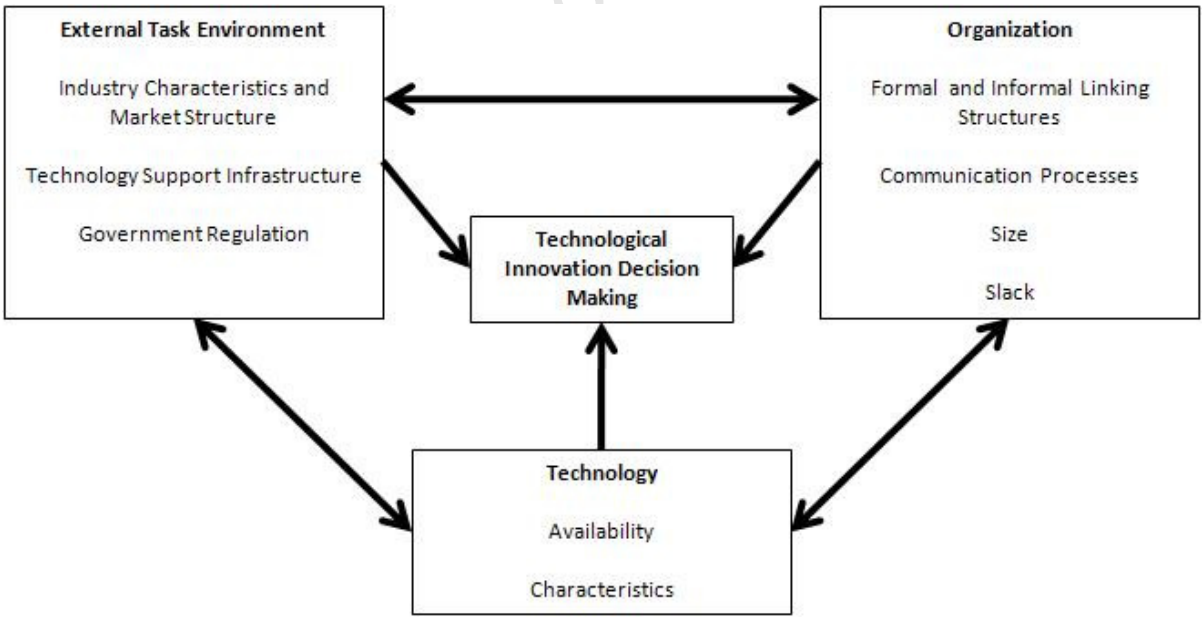

Figure 12: The Context of Technological Innovation: TOE framework (Source: Tornatzky and Fleischer 1990, p. 153)

The technological factors relate to the technology and information systems, as well as the pool of technologies available to the organization. Technological factors often cited as important for successful adoption are: relative advantage, complexity, compatibility with existing

infrastructure, and perceived benefits (Tornatzky & Klein, 1982). Organizational factors normally describe characteristics of the organization and include firm size, degree of centralization and formalization, organizational structure, skills and expertise of its human resources, and the amount of slack resource available (Hackney, Xu, & Ranchhod, 2006). External factors relate to the environment in which an organization operates and include market conditions, regulatory influence, industry pressure and vendor influence (Basole, 2005).

Basole (2005) suggested that organizational factors also contain individual factors and justified it with the fact that end-users within an organization have to adopt a technology as well (see Figure 13). This individual technology adoption within an organization is referred to as "intra-organizational acceptance" (Frambach & Schillewaert, 2002). Some researchers suggested studying innovation adoption decision at two levels: the organizational level and the individual level within an organization (Karahanna, Straub, & Chervany. 1999; Frambach & Schillewaert, 2002). While the claim that an adoption decision is made on behalf of an organization by a few individuals is valid, individual factors influencing organizational adoption are out of the scope of this study.

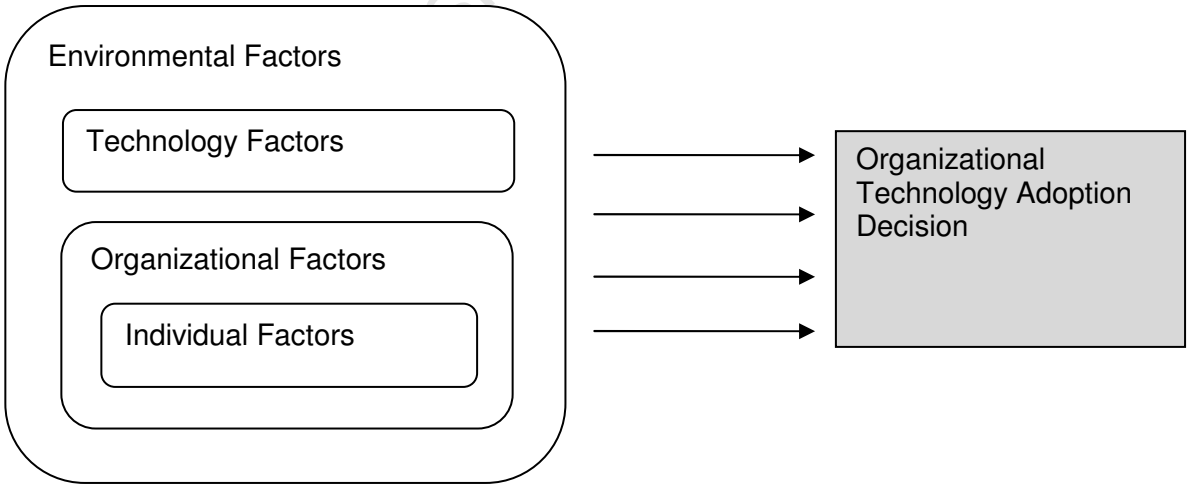

Figure 13: Categories of critical adoption factors (Basole, 2005)

3.4. Factors influencing technology adoption

Numerous studies of IS innovation at an organizational level had been conducted in the past. Those studies identified important characteristics of innovative organizations and gave focus to

further research of IS organizational innovation (see Table 3). However, most of those studies identified and used characteristics similar to those suggested by Rogers (2003), Tornatzky and Klein (1982), and Swanson (1994) (see Table 4).

Reference	Innovation	Adopting unit	Remarks
Basoglu, Daim, and Kerimoglu (2007)	Enterprise Resource Planning (ERP) system	Organization	Suggested a framework for studying organizational adoption of ERP
Basole (2005)	Mobile solutions	Organization	Examined factors leading to an organization's decision to adopt mobile solutions
Bradford and Florin (2003)	ERP	Organization	Suggested and tests model of ERP implementation success
Chwelos, Benbasat, and Dexter (2001)	Electronic Data Interchange (EDI)	Firm	Identified salient factors for EDI adoption and proposes an EDI adoption model
Iacovou, Benbasat, and Dexter (1995)	EDI	Firm	Suggested a framework of EDI adoption by small businesses
Kuan and Chau (2001)	EDI	Firm	Defined a perception-based EDI adoption model
Premkumar and Potter (1995)	Computer Aided Software Engineering (CASE) technology	Firm	Analysed the impact of organizational and technology characteristics on adoption of CASE
Xu, Sharma, and Hackney (2005)	Web services	Organization	Defined a dual-core model for studying web service innovation in organizations
Zhu, Kraemer, and Xu (2003)	E- business	Firm (electronic	Developed a conceptual model for E-business

		business) and individual (consumer)	adoption
Zhu, Kraemer, and Xu (2006)	E-business	Firm	Developed a model to analyse e-business innovation assimilation by firms in different countries

Table 3: Selected research papers on IS innovation

Reference	Unit of adoption	Variables affecting adoption and diffusion
Rogers (2003)	Individual	Relative advantage, compatibility, complexity, trialability, observability, type of innovation-decision, communication channels, nature of the social system, extent of change agents' efforts (p.221)
	Organization	Leader's attitude toward change, centralization, complexity, formalization, interconnectedness, organizational slack, size, system openness (p.411)
Tornatzky and Klein (1982)	Individual and organization	Compatibility, relative advantage, complexity, cost, communicability, divisibility, profitability, social approval, trialability, observability
Swanson (1994)	Organization	Size, diversity, slack resources, age of application system portfolio, professional orientation of IS unit, level of strategic importance of IS to an organization

Table 4: Variables affecting adoption and diffusion of innovations

A review of the prior academic publications on the adoption of SOA reveals paucity of empirical research on the topic. Since Web services are considered to be the building blocks of SOA implementations, academic literature on Web services adoption was reviewed as well. The list of the literature examined is provided in Table 5.

Reference	Research focus	Framework description
Chen (2003)	Factors affecting adoption and diffusion of XML and Web services standards	Adoption decision is influenced by input factors: stakeholders, organizational factors, and IT standards; as well as decision criteria and decision makers
Chen (2005)	Driving forces for	Technical factors, stakeholders of Web services

	Web services adoption	standards and technologies, and perceived benefits
Chen, Sen, Shao (2005)	Web services adoption	Organizational factors, technological factors, and special factors for extranet and Internet
Ciganek, Haines, and Haseman (2005)	Challenges of adopting Web services	Innovation, organizational, environmental, task, and individual factors (Kwon & Zmud, 1987)
Ciganek, Haines, and Haseman (2006)	Factors influencing web services adoption	TOE framework
Hackney et al. (2006)	Web services adoption	Drawn from TOE framework, external environment, technological context, organizational technology context, and organizations IS strategy
Lippert and Govindarajulu (2006)	Antecedents to Web services adoption	TOE framework
Wu (2004)	Web services adoption	Adoption-decision process theory (Zaltman, Duncan, & Holbek, 1973) and IS innovation theory (Swanson, 1994)

Table 5: Academic literature pertaining to Web Services adoption

Based on the review of the literature pertaining to Web services adoption and IS innovation literature, a list of variables identified in the relevant empirical research was compiled (see Table 6).

	Chen (2003)	Chen (2005)	Chen et al. (2006)	Ciganek et al. (2005)	Ciganek et al. (2006)	Hackney et al. (2006)	Lippert and Govindarajulu (2006)	Wu (2004)
Technology								
Relative advantage	+				+			+
Compatibility	+				+			+
Complexity	+			+	+	+		+
Trialability	+							
Visibility/observability	+			+	+			+
Divisibility								+
Customizability								+
Tool support		+	+	+				

Performance					+		+	
Security				+	+		+	
Standards maturity		+	+	+	+		+	
Reliability							+	
Organization								
Company size & industry type	+						+	
Company scope							+	
Organizational culture	+							
IT skills/ expertise	+		+	+	+		+	
Software development effectiveness				+		+		
IT architecture/ infrastructure	+	+	+	+		+		
IS strategy						+		
Financial justification/cost				+	+			+
Management awareness and support			+		+			
Financial & technology resources			+					
IT management maturity			+					
Perceived benefits						+	+	
Perceived barriers/risks						+		
Environment								
Business partners' demand/readiness	+			+	+	+	+	
Industry inertia/fragmentation				+	+			
Vendor support	+	+			+			
Competitive pressure						+	+	
Trust in Web service provider							+	
Regulatory influence							+	

Table 6: Variables used in empirical research on Web services adoption

Since no existing model of SOA adoption was available to the author, the Web services adoption variables were initially reviewed in relation to the SOA adoption model. After that, characteristics relevant to SOA adoption, which were identified in the literature review, were considered for the model. The process of the model creation is described below.

While services may be viewed as building blocks for SOA, SOA in itself is more complex, spans multiple domains, and is used across different organizational units. Although, the Web services adoption variables were used as a starting point in the model development, the literature review provided additional factors that were identified as important for SOA success. Subsequently, the following factors were included in the model: *use of standards and platforms* (H1), *strategy & plan* (H13), and *governance* (H14). A number of SOA implementation risks were identified in the

literature review, performance, testability, security, reliability, and interoperability, which were subsequently grouped in one construct *perceived risks* (H9).

Certain adoption variables, such as trialability, visibility, divisibility, and customizability, were excluded from the final model since these characteristics are the primary characteristics of a service and represent the very nature of SOA. Another variable that was excluded from the model was trust in Web service provider. In SOA, trust between services is ensured with SOA security specifications, for example WS-Trust. While trust in a service provider is relevant to SaaS model, SOA is concerned with a company's internal systems, therefore this variable is irrelevant.

Organizational culture is a complex concept, hard to operationalise, and more suitable for qualitative analysis. For these reasons, the variable was excluded from the final model.

A number of variables were grouped, as they seemed to describe similar constructs. Tool support variable was included in *vendor support* construct (H16). Competitive pressure and business partners' demand/readiness were grouped into *industry pressure* construct (H17). Industry inertia/fragmentation and regulatory influence were viewed as industry-specific characteristics and therefore were replaced with *industry* construct (H8). Two variables, IT management maturity and management awareness and support, were grouped into *top management support* construct (H11).

Standards maturity was included in SOA technology implementation challenges (H5) with other SOA technology characteristics, such as evaluating and selecting the appropriate tools and/or frameworks, establishing base line metrics, designing efficient and effective SOA security, crafting SOA development processes, understanding how to design high quality services, testing services/deploying services, ensuring effective design-time and run-time governance.

IT media influence was included in the model as many industry practitioners and analysts acknowledged the fact that SOA was overhyped, oversold, and often presented as a 'silver

bullet'. IT media was used as a communication channel by IT vendors to market and sell their products.

A list of the 18 factors chosen for the research model with their relevant literature references is provided in Table 7.

Construct	References
Use of standards and platforms	Erl (2005), Ren and Lyytinen (2008)
Complexity	Baer (2008), Chen (2003), Ciganek et al. (2005), Ciganek et al. (2006), Hackney et al. (2006), Lewis et al. (2007), Rogers (2003), Tornatzky and Klein (1982), Wu (2004)
Compatibility	Chen (2003), Ciganek et al. (2006), Rogers (2003), Tornatzky and Klein (1982), Wu (2004)
Cost	Ciganek et al. (2005), Ciganek et al. (2006), Lewis et al. (2007), Tornatzky and Klein (1982), Wu (2004)
Technology implementation challenges	Chen (2005), Chen et al. (2006), Ciganek et al. (2005), Ciganek et al. (2006), Haines (2007), Kontogiannis et al. (2007), Lippert and Govindarajulu (2006), Luthria and Rabhi (2009), O'Brien et a. 2005, Phippen et al. (2005)
Relative advantage	Chen (2003), Ciganek et al. (2006), Rogers (2003), Tornatzky and Klein (1982), Wu (2004)
Organization size	Chen (2003), Lippert and Govindarajulu (2006), Rogers (2003), Tornatzky and Fleischer (1990), Swanson (1994)
Industry	Tornatzky and Fleischer (1990)
Perceived risks	Hackney et al. (2006), O'Brien et a. 2005
IT skills/expertise	Chen (2003), Chen et al. (2006), Ciganek et al. (2005), Ciganek et al. (2006), Lippert and Govindarajulu (2006)
Top management support	Chen et al. (2006), Ciganek et al. (2006)
Strategy & plan	Erl (2005), Luthria and Rabhi (2009)
Governance	Lewis & Smith (2007), Luthria and Rabhi (2009) ,Ren and Lyytinen (2008), Varadan et al. (2008)
Resources	Chen et al. (2006), Rogers (2003), Swanson (1994), Tornatzky and Fleischer (1990)
Perceived benefits	Hackney et al. (2006), Lippert and Govindarajulu (2006), Tornatzky & Klein (1982)
Vendor support	Basole (2005), Chen (2003), Chen (2005), Ciganek et al. (2006)
Industry pressure	Basole (2005), Chen (2003), Ciganek et al. (2005), Ciganek et al. (2006), Hackney et al. (2006), Lippert and Govindarajulu (2006)
IT media influence	Manes (2009a), Neubarth (2010)

Table 7: Variables selected for the model

Based on the identified model variables, a conceptual model of SOA adoption drawn from the TOE framework was developed (see Figure 14).

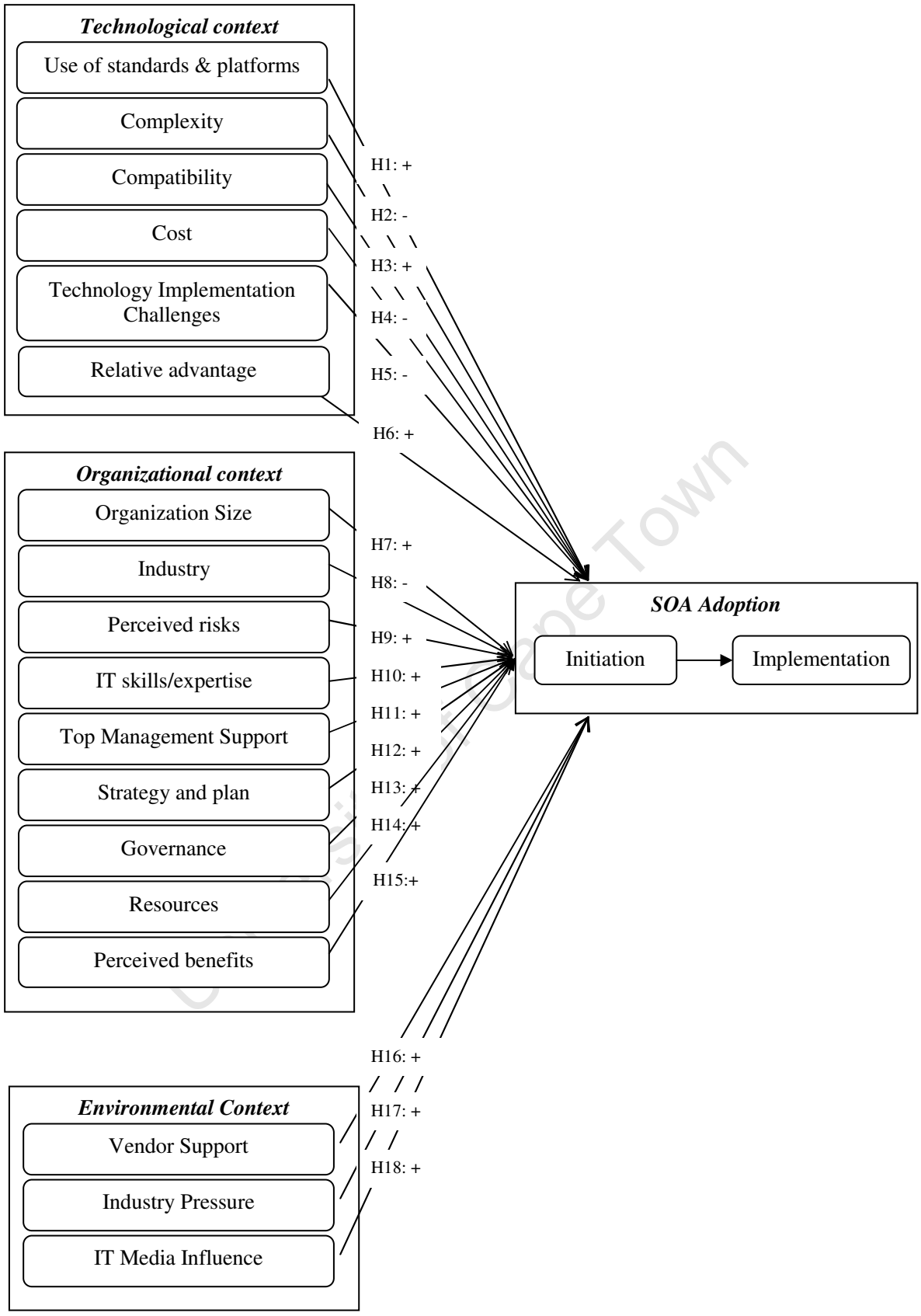

Figure 14: Research model for SOA adoption based on the TOE framework

4. Research model and Hypotheses

The proposed research model for this study is provided in Figure 14. This section discusses research hypotheses classified by technological, organizational and environmental factors.

4.1. Technological factors

Prior literature review has demonstrated that certain technological factors were critical for SOA adoption success. Standards maturity was named by a number of researchers (Chen, 2005; Chen et al., 2006; Ciganek et al., 2005; Ciganek et al., 2006, Lippert & Govindarajulu, 2006). Complexity of SOA technology, resulting from a large number of overlapping or even competing specifications, was cited as a major factor limiting adoption.

In this research, the following hypotheses related to the technological context are presented:

Hypothesis 1: The greater the degree of utilization of multiple standards and platforms, the greater the potential for SOA adoption.

Hypothesis 2: The higher the perceived complexity of SOA, the less likely SOA will be adopted.

Hypothesis 3: The higher the compatibility between SOA and the existing enterprise architecture (EA) and infrastructure, the greater the potential for SOA adoption.

Hypothesis 4: The higher the cost of SOA implementation, the less likely SOA will be adopted.

Hypothesis 5: The higher the perceived implementation challenges, the less likely SOA will be adopted.

Hypothesis 6: The greater the relative advantage of SOA as a technology, the greater the potential for SOA adoption.

4.2. Organizational factors

Many studies of organizational innovativeness found that large organizations are more innovative (Rogers, 2003, p.409; Swanson, 1994; Frambach & Schillewaert, 2002). This finding is surprising, especially in the light of the standard perception that small companies have less bureaucratic procedures and are more flexible in their activities. To explain this contradiction, Rogers (2003, p.411) suggested that size is a surrogate measure of other variables that affect innovativeness, but have not been properly identified and adequately measured. These variables may include total resources, slack resources, employee's level of technical expertise, organizational structure, and so on.

The company's scope, which is defined as the geographical extent of organizations' operations, positively affects adoption (Zhu et al., 2003). Organizational structure variables (see Figure 11), such as centralization, complexity, formalization, interconnectedness, organizational slack, and size, may have opposite directions during the initiation and implementation phases. For example, low centralization and low formalization could have positive effect during the initiation phase and negative effect during the implementation phase of the innovation process (Rogers 2003, pp.412-413).

One of the major drivers for technology adoption is its perceived value and potential benefits. As a result of that, tangible and intangible benefits of the new technology, its value and impacts require a careful evaluation (Basole, 2005).

In this research, the following hypotheses related to the organizational context are presented:

Hypothesis 7: The larger the size of the firm, the greater the potential for SOA adoption.

Hypothesis 8: Organizations that adopt SOA are more likely to come from certain industries/sectors.

Hypothesis 9: The higher the perceived risks of SOA implementation, the less likely SOA will be adopted.

Hypothesis 10: The higher the level of IT skills and expertise with the organization, the more likely the organization will adopt SOA.

Hypothesis 11: The higher the level of top management support for SOA initiatives, the more likely the organization will adopt SOA.

Hypothesis 12: The more effective the SOA strategy is in the organization, the greater potential for SOA adoption.

Hypothesis 13: The more effective the SOA governance procedures, the more likely the organization will adopt SOA.

Hypothesis 14: The greater the level of financial and technological resources available to the SOA initiatives, the greater the potential for SOA adoption.

Hypothesis 15: The greater the perceived SOA benefits by the organization, the greater the potential for SOA adoption.

4.3. Environmental factors

Industry pressure has been recognised to have a positive effect on adoption (Iacovou et al., 1995; Lippert & Govindarajulu, 2006). Vendor support early on in an adoption process is positively related to adoption (Zhu et al.,2006).

The following hypotheses related to the environmental context are presented:

Hypothesis 16: Organizations that adopt SOA are more likely to have higher levels of support from vendors.

Hypothesis 17: Organizations that adopt SOA are more likely to perceive higher levels of industry pressure.

Hypothesis 18: Organizations that adopt SOA are more likely to perceive higher levels of IT media influence.

The proposed research model was developed on the basis of the DOI theory, TOE framework, and extensive literature review. During the research, a new model of SOA adoption has emerged. The reviewed model is discussed in Data Analysis chapter (section 6.8).

5. Research design and methodology

This section explains different aspects of the research methodology related to the study. Research paradigm and approach, sampling, instrument design, instrument validity and reliability, data collection and data analysis techniques are covered in this section. Aspects related to limitations of the study and research ethics are also discussed.

5.1. Research paradigm and approach

For the purpose of studying factors influencing SOA adoption in South African context, this research examined the problem from a realist position in terms of ontology and took a positivist stance in terms of epistemology. This research was explanatory in its research purpose and adopted deductive approach to theory. The study used a survey research strategy and a quantitative approach to data collection and subsequent data analysis. It was cross-sectional in its time-frame.

5.2. Sampling

South African companies, that have considered or adopted SOA, constituted the sampling frame of the study, however, getting access to the companies that have initiated and implemented SOA projects was the major challenge of this research. No mailing lists of the South African companies were available to the researcher. It was considered to be too time consuming and costly to compile a list of the contact details of business and/or technical decision makers within the South African companies. Furthermore, in relation to SOA adoption, the researcher did not know enough about the target group to be able to use probability sampling. For the above reasons the researcher had decided on using non-probabilistic techniques. A combination of purposive and self-selection sampling techniques had been chosen.

Non-probabilistic sampling techniques discussed above posed a few issues to the research. The sample was not going to be representative of the wider population of the South African companies and would not provide a strong basis for generalisations. Furthermore, to avoid researcher's bias to the sample section, a decision was made to include all the questionnaires that were either fully completed or had more than 75% completed answers in the final sample. The issues related to non-probabilistic sampling were kept in mind and addressed when data was collected and analysed.

5.3. Instrument design

The research variables, the mini-item indicators used for measuring the variables and the pre-coded questionnaire answers were identified during the literature review. Prior to the questionnaire design, a number of survey instruments used to study technology adoption were analysed (Boh & Yellin, 2006; Bradford & Florin, 2003; Grandon & Pearson, 2004; Kajko-Mattsson, Lewis, & Smith, 2008; Kuan & Chau, 2001; Premkumar & Potter, 1995).

During the questionnaire design, a number of available industry questionnaires were reviewed. They included the questionnaire from the 2008 CA Wily TechWeb survey (CA Wily, 2008), the questionnaire from the IBM SOA Maturity Assessment Tool (IBM, n.d.a), the questionnaire from the 2008 AmberPoint "State of SOA adoption survey" (AmberPoint, 2008), and the questionnaire from the 2010 "SOA implementation Survey" conducted by Forrester Research and the TechTarget Application Development Media Group (TechTarget, 2010). A questionnaire from the Master's Thesis "A Stage Maturity Model for the adoption of an enterprise-wide Service-Oriented Architecture (SMM-SOA): a multi-case study research" (Veger, 2008) was also reviewed. These sources were used as a starting point in order to create a questionnaire template. After reviewing the pertinent literature and identifying the research model, the relevant questionnaire items from the above-mentioned sources were identified and included in the questionnaire draft.

The researcher adapted some of the multiple indicator items used to measure technology adoption constructs in the previously developed instruments. *Top management support* was

adapted from Boh and Yellin (2006). *Complexity* was adapted from Bradford and Florin (2003). *Industry pressure* was adapted from Kuan and Chau (2001). A number of the questionnaire items were adapted from the above-mentioned industry surveys and Master's Thesis. The list of the items and its sources are provided in Table 8.

Questionnaire	Source
Q1	Q1 modified, AmberPoint (2008)
Q5	Q8 modified, Veger (2008)
Q6	Q2 modified, AmberPoint (2008)
Q7	Q50, TechTarget (2010)
Q10	Q24, TechTarget (2010)
Q19	Q13, TechTarget (2010)
Q24	adapted from Q1.3, option 2, IBM (n.d.a)
Q27	adapted from Q2, Veger (2008)
Q28	adapted from Q3, Veger (2008)
Q30	adapted from Q4, Veger (2008)
Q34	adapted from Q12.1 TechTarget (2010)
Q35	adapted from Q12.2 TechTarget (2010)
Q36	adapted from Q12.8 TechTarget (2010)
Q46	adapted from Q27, CA Wily (2008)
Q47	adapted from Q28, CA Wily (2008)
Q49	adapted from Q29, CA Wily (2008)
Q50	adapted from Q30, CA Wily (2008)

Table 8: Sources of the questionnaire items

The remaining questionnaire items were developed by the author. All the items were based on the review of the current SOA and IS literature. The questionnaire was also adjusted to the South African context.

A list of questionnaire items and constructs is provided in Appendix A. The final version of the questionnaire sample can be found in Appendix C.

5.4. Instrument validity and reliability

The questionnaire was initially discussed with the supervisor. As a result of the discussion, a number of items were re-phrased, while some items were grouped together. Prior to administration, the questionnaire sample was pilot-tested with two industry practitioners to

confirm its content validity. Both of the industry practitioners have relevant experience and work as IT architects on WEB services related projects. The feedback from the pilot testing was generally positive. A few suggestions were made related to the wording of the certain questions and addition of a few SOA platform options to *use of standards and platforms* measure. After the feedback from the pilot testing, the questionnaire was refined, and all the necessary options were added, while questionnaire items were rephrased.

Construct validity and reliability of the questionnaire was later accessed using relevant statistical tests. The results of the validity and reliability analysis are presented in Data Analysis chapter (sections 6.4 and 6.6).

5.5. Data collection techniques

The final version of the questionnaire was used in the online survey that was conducted over the period from May to September 2010. The aim of the survey was to collect data from South African enterprises on the topic of SOA adoption. The survey was targeting two groups: IT executives, the decision makers initiating SOA projects, IT architects, and senior IT staff members implementing SOA projects.

The online survey was created using SelectSurveyASP software package and was posted online on the UCT Commerce faculty web site http://www.commerce.uct.ac.za (URL link http://www.commerce.uct.ac.za/Services/SelectSurveyASP/TakeSurvey.asp?SurveyID=35H6n86I9n511). The sample of the online questionnaire is provided in Appendix C.

The researcher was aiming at obtaining the final sample of at least 100 responses. In order to achieve the desired sample size, a number of approaches to data collection were used.

Faculty Training Institute (FTI) was contacted in order to get access to the mailing list of the FTI "Practical TOGAF" course delegates. The course targets enterprise architects who are also the target group of the survey. FTI agreed to send out emails with the survey link to their former delegates; however, it did not yield a noticeable number of responses.

The survey link was posted on a number of Web sites. Among these Web sites were the SA Architect Web site (http://www.saarchitect.net/) and the Enterprise Architecture Academic Forum Web Site (http://eaforum.ning.com/).

The Computer Society of South Africa (CSSA) was also contacted in order to get access to the mailing list of the society members. When the CSSA agreed to include the survey link in their newsletter, the two monthly newsletters were sent out to 2789 society members in June and July 2010.

At that point in time, it was unclear how many responses the above-mentioned strategies would yield, and, for that reason, alternative strategy of finding potential respondents was used. The starting point of the alternative data collection strategy was professional network Web site LinkedIn (http://www.linkedin.com). Only South African members (with location being listed as South Africa) were considered. Initially, SA members with job title "architect" or "development manager" were searched and contacted. Subsequently, when the first option was exhausted, any SA members with interest in SOA or Cloud Computing were contacted. The special interest groups that were used to find members were "Enterprise Architecture Forum", "The Enterprise Architecture Network", "iCMG Architecture World", "SOA Group", "Service Oriented Architecture Special Interest Group", "Software as a Service (SaaS) Group", "The Cloudsters", "Cloud Computing", "Conversations on Cloud Computing", and others.

Each member was contacted individually with an email explaining the survey and its purpose. The sample of the email is attached in Appendix D. Normally, after 2 weeks a member would be contacted again with a friendly reminder to complete the survey. A small database of survey contacts was maintained in order to avoid contacting the same person twice and to keep track of people to send survey reminders.

A total number of 468 potential respondents were contacted over the period 26.05.2010 – 21.08.2010 in a number of waves. A total number of 154 survey responses were collected, of which 109 were fully completed. Two of 154 questionnaires had more than 75% of the

questions answered, with only demographic data missing, and were considered suitable for data analysis. As a result, the final data sample of 111 responses was obtained.

Due to the different data collection approaches used, it is somewhat difficult to estimate a response rate that the survey has generated. Oates (2006) suggested that questionnaire response rate may vary from 10 to 30 %. With the data available to the researcher, the survey response rate can be estimated at 23.7% (111/468), however, it can be substantially lower, if other possible responses (e.g. those generated by the CSSA newsletters) are taken into account.

5.6. Data analysis techniques

Since the final data sample size was relatively large, statistical analysis of the data was appropriate. Data gathered from the all the respondents was exported from the online survey database to a CSV file, which was later imported to an Excel sheet. After the initial analysis of the data, the test items were coded, and the variables were operationalised by calculating the medians of the relevant items. After that, all the completed responses were imported to a Statistica spreadsheet.

Due to the ordinal nature of the test items and the use of Likert scales to measure them, non-parametric tests were chosen for inferential statistical analysis. While quite often Likert scales are treated as interval-level data, Blaikie in his study (as cited in Jamieson, 2004) argued that intervals between values are not equal, although, researchers make an assumption they are. Knapp in his study (as cited in Jamieson, 2004) recommended employing non-parametric tests for ordinal data, however, when a researcher makes an assumption that the data can be classified as interval, other factors, such as sample size and normality of data distribution, should nevertheless be considered.

Descriptive statistics analysis (including normality tests), reliability and item analysis, construct validity analysis, regression and correlation analysis, and analysis of variance have been

performed in the Statistica 9 software package. Data results were presented in a visual way by means of charts and tables. The results of the analyses are discussed in chapter 6.

5.7. Limitations

Due to non-probability sampling technique used, the results of the study could not be generalised to the whole population of the South African organizations. Therefore, no generalisations can be made about the state of the organizational SOA adoption in South Africa.

In addition, many respondents had existing interest in SOA related issues and were members of SOA and cloud computing special interest groups. This may be an indication that they represent organizations that are either planning or already implementing SOA projects.

When the abandonment rate of the questions was analysed, the question that caused almost 19.5% of all the respondents (30 out of 154) to dropout was question #9 which asked about SOA specifications and standards which organizations use in their implementations. It may also indicate that the respondents that completed their questionnaires represent adopters rather than general population. Despite the possible adopter's bias in the final sample, the researcher is of the opinion that the sample is representative of the companies that have adopted SOA or in the process of adoption.

5.8. Ethics and confidentiality

A sample of the questionnaire used in the study was approved by the University of Cape Town Ethics Committee. The online questionnaire included an introduction section, which addressed ethical aspects of the study. The respondents were informed that their participation in the study was voluntary. Respondents and organizations involved were assured that their anonymity is protected, and all the data obtained during the study would be treated as confidential. Only aggregated final data would be published and used in further research.

6. Data analysis and findings

The data collected from the questionnaires was analysed using the Statistica 9 software package. The results of the analysis are discussed in this section. The discussion starts with an overview of the survey results, it then proceeds to descriptive statistics analysis, which is followed by reliability and item analysis, construct validity analysis, regression analysis, correlation analysis, and analysis of variance. The chapter ends with a summary of findings.

During the construct validity analysis, the initial model was reviewed. Guided by the identified factors in the model, a number of test items were regrouped, and new variables were introduced. For example, SOA *implementation challenges* construct was split into *technology implementation challenges* and *organizational change implementation challenges* constructs. Similarly, SOA *perceived benefits* construct was split into *intra-organizational benefits* and *inter-organizational benefits* constructs, while *vendor support* construct was split into *vendor direct influence* and *vendor support for integration & development tools*. A new construct, *human & financial resources*, was created after merging two constructs, *resources* and *IT skills/expertise*, into one construct. Additionally, two more groups of items were merged: (1) *governance* and *strategy & plan* constructs were merged into *governance & strategy* construct, (2) *industry pressure* and *IT media influence* constructs were merged into *industry pressure & IT media influence* construct. A list of the test constructs of the revised model with its test items is provided in Appendix B. The revised model is discussed in section 6.8. All sections in this chapter analyse items from the reviewed model, except for section 6.4, which provides reliability analysis of the initial model

6.1. Profile of respondents

This section examines the general profile of respondents. It analyses respondent's job title, number of employees, number of IT staff, total revenue, and industry. Statistical analysis of significance of the relevant variables will be discussed in hypothesis testing section.

6.1.1. Job title

More than one-third of the responses (34.2%) came from IS/IT/Technical architects. The next largest groups of respondents were IT staff (17.1%) and CIO, CTO, and other C-level executives (16.2%). Consultants form 12.6% of the respondents, while IS managers, directors, and planners were represented by 9% and other IT managers in IS department by 7.2% of the respondents.

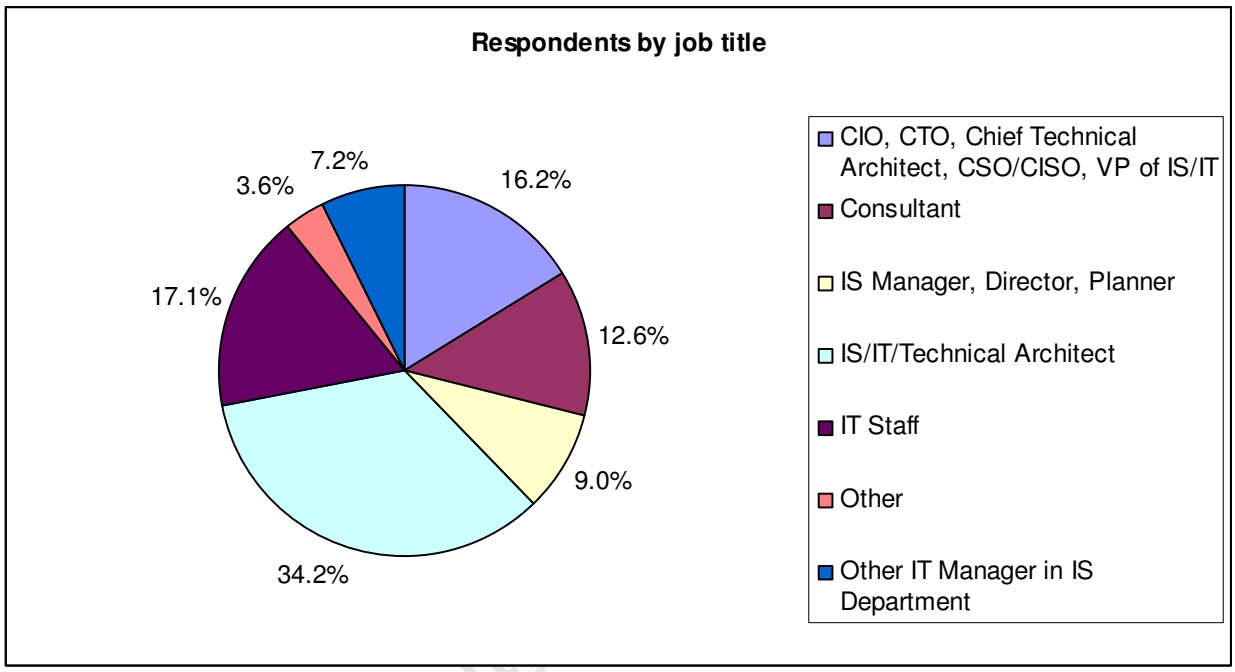

Figure 15: Respondents by job title (N=111)

6.1.2. Number of employees

Nearly 60% of all the respondents are from large and very large companies: 27.5% (500 to 5000 number of employees) and 32.1% (5000+ employees) respectively. Medium size companies are represented by 22.5% of the respondents: 11.0% (50 to 99) and 11.9% (100 to 499) respectively. Small companies constitute 17.4% of the respondents.

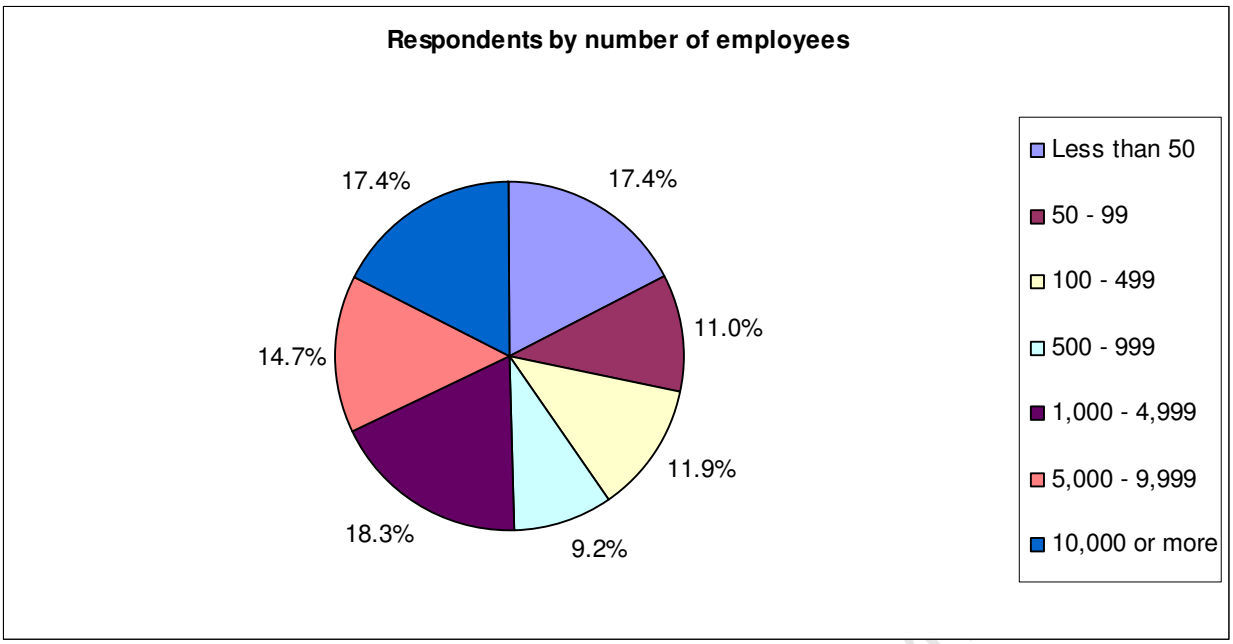

Figure 16: Respondents by number of employees (N=109)

6.1.3. Number of IT staff

More than half of the respondents (51.4%) work in very large IT teams with more than 100 people in the team. IT teams with 50 to 100 IT staff members constitute 12.8% of all the responses, while teams with 20 to 50 IT staff form 13.8%. Small IT teams represent just under a quarter of all the responses: 10 to 20 - 6.4%, 5 to 10 – 8.3%, and less than 5 – 7.3%.

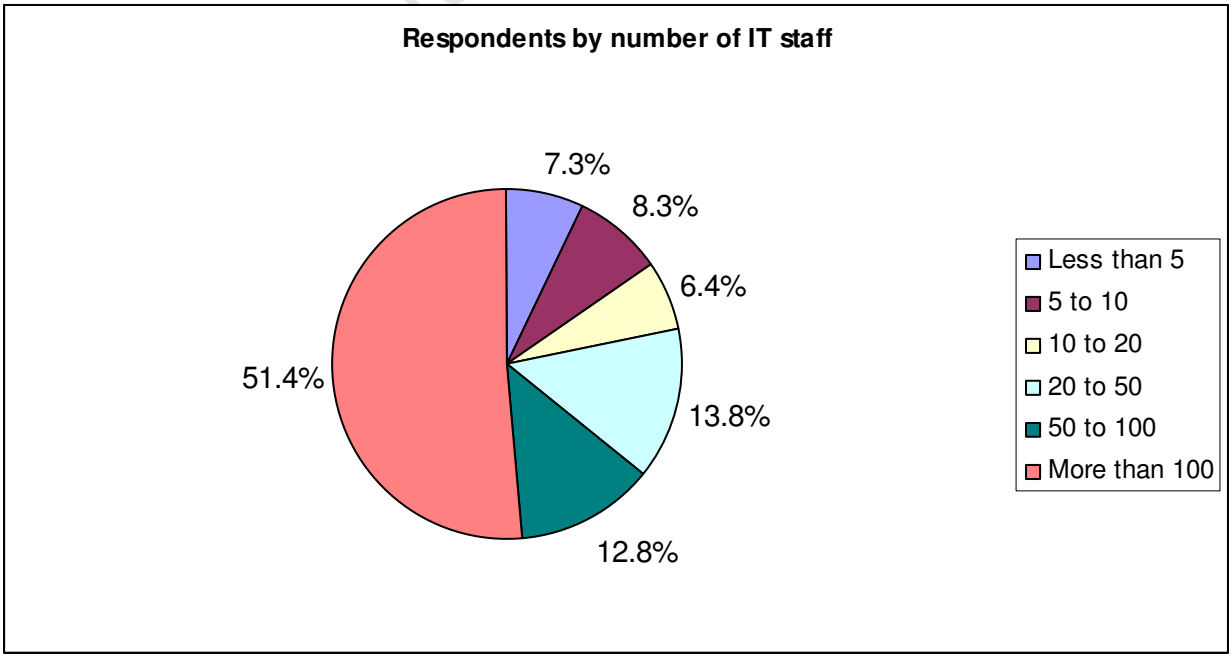

Figure 17: Respondents by number of IT staff (N=109)

To illustrate the relation between the two items, *total number of employees* and *number of IT staff*, a cross tabulation table was created (see Table 9). The table shows that when the number of employees grows, the number of IT staff grows too. A few cases, when the number of IT staff almost matches the total number of employees, can be attributed to companies representing IT vendors.

	Number of IT staff						
Total number of employees	Less than 5	5 to 10	10 to 20	20 to 50	50 to 100	More than 100	**TOTALS**
Less than 50	7	6	3	3			**19**
50 - 99	1	3		3	5		**12**
100 - 499			3	3	1	6	**13**
500 - 999				5	1	4	**10**
1,000 - 4,999			1		4	15	**20**
5,000 - 9,999				1	1	14	**16**
10,000 or more					2	17	**19**
TOTALS	**8**	**9**	**7**	**15**	**14**	**56**	**109**

Table 9: Cross tabulation table: total number of employees vs. number of IT staff

6.1.4. Total revenue

While 28.8% of the respondents either did not know total revenue of their organization or opted not to answer the question, 36.0% of the respondents stated that they work for companies with total revenue exceeding R500 million: 3.6% - in companies with revenue of R500 million to under 1 billion, 11.7% - in companies with revenue of R1 billion to under R5 billion, and 20.7% - in companies with revenue of R5 billion and higher. Respondents that work for companies with revenue from R100 million to under R500 million constitute 8.1% of the responses. The remaining 27.0% of responses came from small and medium size organizations: 7.2% - under R5 million, 14.4% - R5 million to under R50 million, and 5.4% - R50 million to under R100 million.

To explore the relation between *total revenue* and *total number of employees'* items, another cross tabulation table was created (see Table 10). The table confirms the existence of a relationship between *total revenue of an organization* and *number of employees*: organizations with higher revenue tend to have more employees.

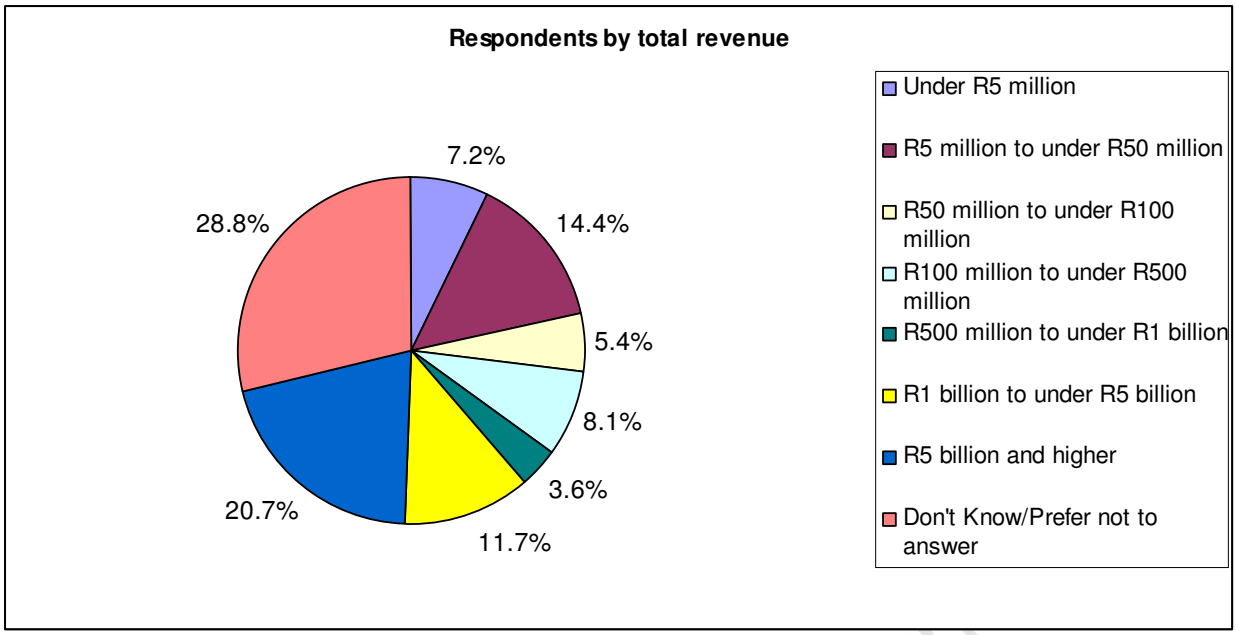

Figure 18: Respondents by total revenue (N=111)

Total revenue	Total number of employees							
	Less than 50	50 - 99	100 - 499	500 - 999	1,000 - 4,999	5,000 - 9,999	10,000 or more	**TOTALS**
Don't Know/Prefer not to answer	8	1	4	2	5	4	6	**30**
Under R5 million	7	1						**8**
R5 million to under R50 million	4	7	3		1	1		**16**
R50 million to under R100 million		1	2	2	1			**6**
R100 million to under R500 million		2	3	2		1	1	**9**
R500 million to under R1 billion			1	1	2			**4**
R1 billion to under R5 billion				2	4	4	3	**13**
R5 billion and higher				1	7	6	9	**23**
TOTALS	**19**	**12**	**13**	**10**	**20**	**16**	**19**	**109**

Table 10: Cross-tabulation table - total revenue vs. total number of employees

6.1.5. Industries

The largest number of responses (27.0%) came from financial services/banking industry. IT vendors represented 18.0% of the responses, consulting and business services - 14.4%, telecommunications/ISP - 9.9%, and government organizations - 8.1%. The remaining 22.6% of the responses are from various industries with less than 5% representation each.

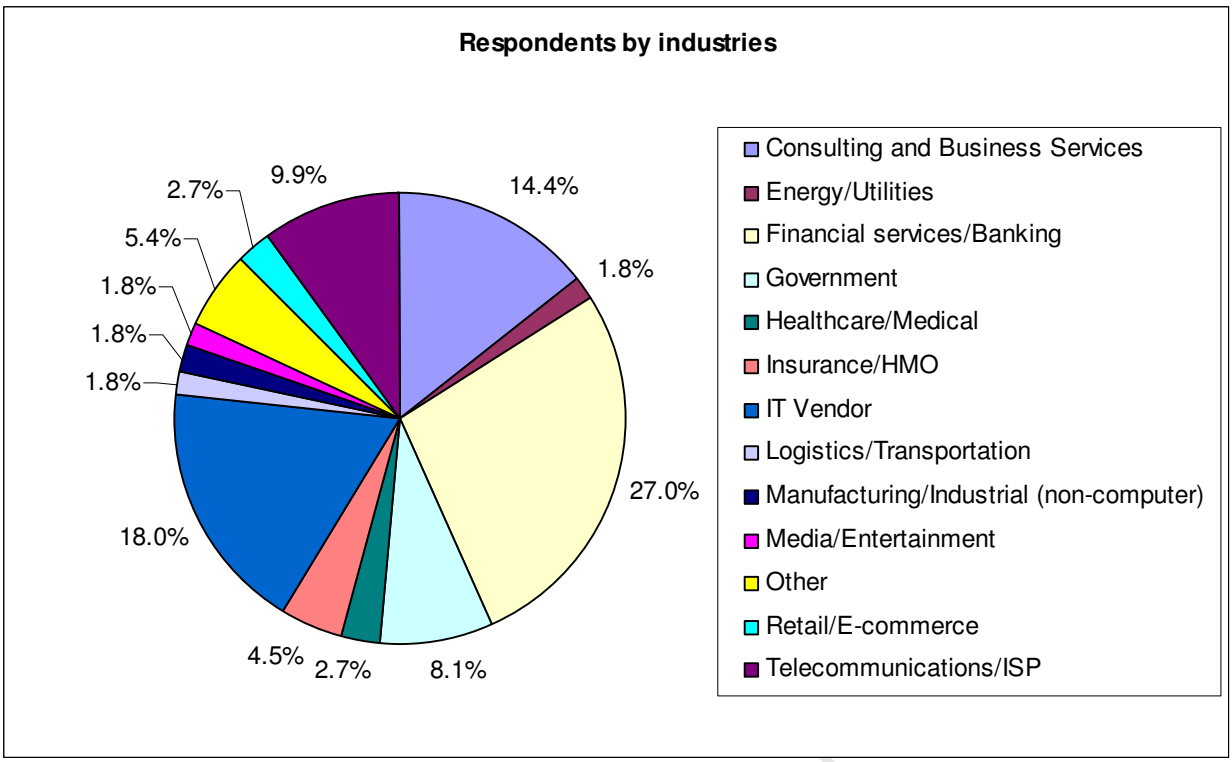

Figure 19: Respondents by industries (N=111)

6.2. Overview of survey results

This section analyses a number of nominal variables, such as stage of SOA adoption, approach to starting SOA initiative, use of external services, SOA project ownership, and SOA project success. It also provides a brief overview of SOA specifications and standards, and SOA platforms used by the respondents. The statistical analysis of significance of the relevant variables will be discussed in the hypothesis testing section.

6.2.1. Stage of SOA adoption

A small majority of the respondents (60, 54%) indicated that their SOA implementations are in production. Seven respondents (6.3%) have their SOA projects in single department use, 17 respondents (15.3%) in multiple department use, and 36 respondents (32.4%) in enterprise-wide use. Nineteen respondents (17.1%) said that their SOA implementations are in development, while 10 respondents (9%) have their SOA projects in pilot stage. Nine respondents (8.1%) stated that they will pursue SOA within the next 6 months, and 13 respondents (11.7%) indicated that they have no SOA plans.

The chart supports the presence of the adopter's bias in the results. It suggests that organizations that did not implement SOA were less likely to participate in the survey.

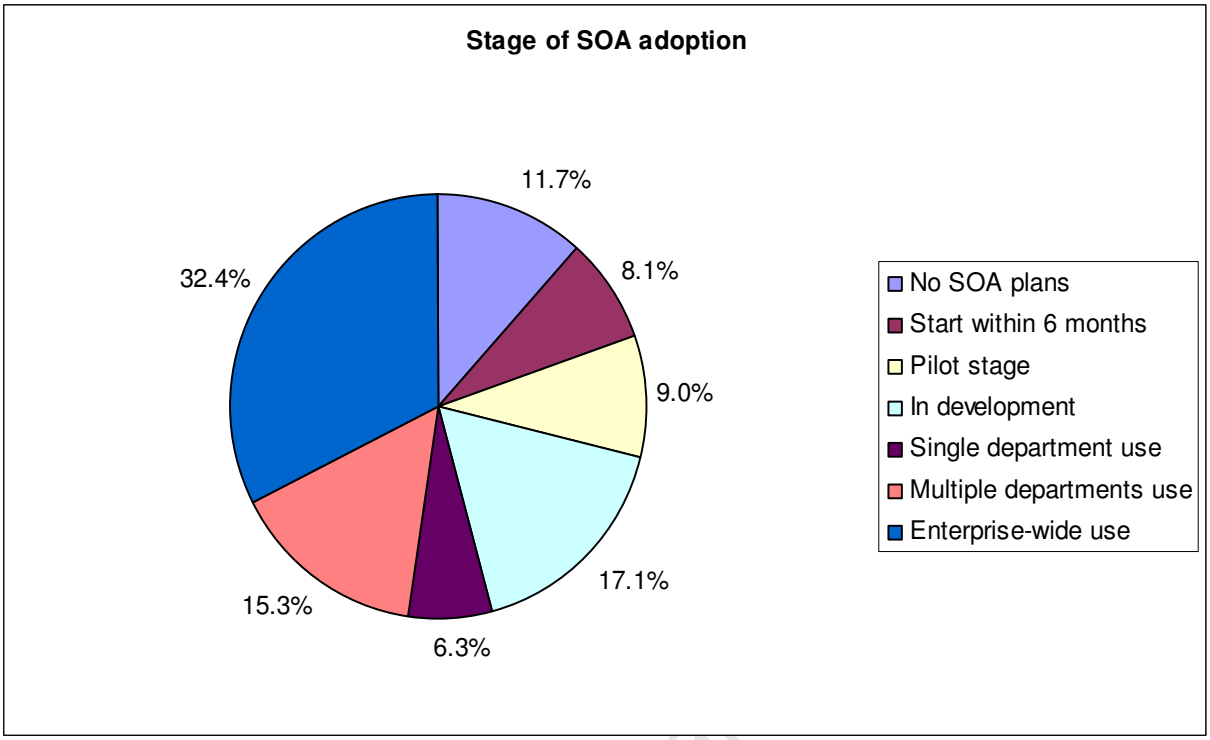

Figure 20: Stage of SOA adoption (N=111)

6.2.2. Approach to SOA initiative

Half of all the respondents (56, 50.5%) started their SOA initiatives from IT (architecture) strategy. Top-down from business strategy approach followed 21 respondents (18.9%), while bottom-up from IT projects approach adopted 13 respondents (12.6%). Consultant/vendor driven approach was used by 11 respondents (9.9%). Nine respondents (8.1%) indicated they used other approaches (e.g. combinations of options, no SOA roadmap, etc.).

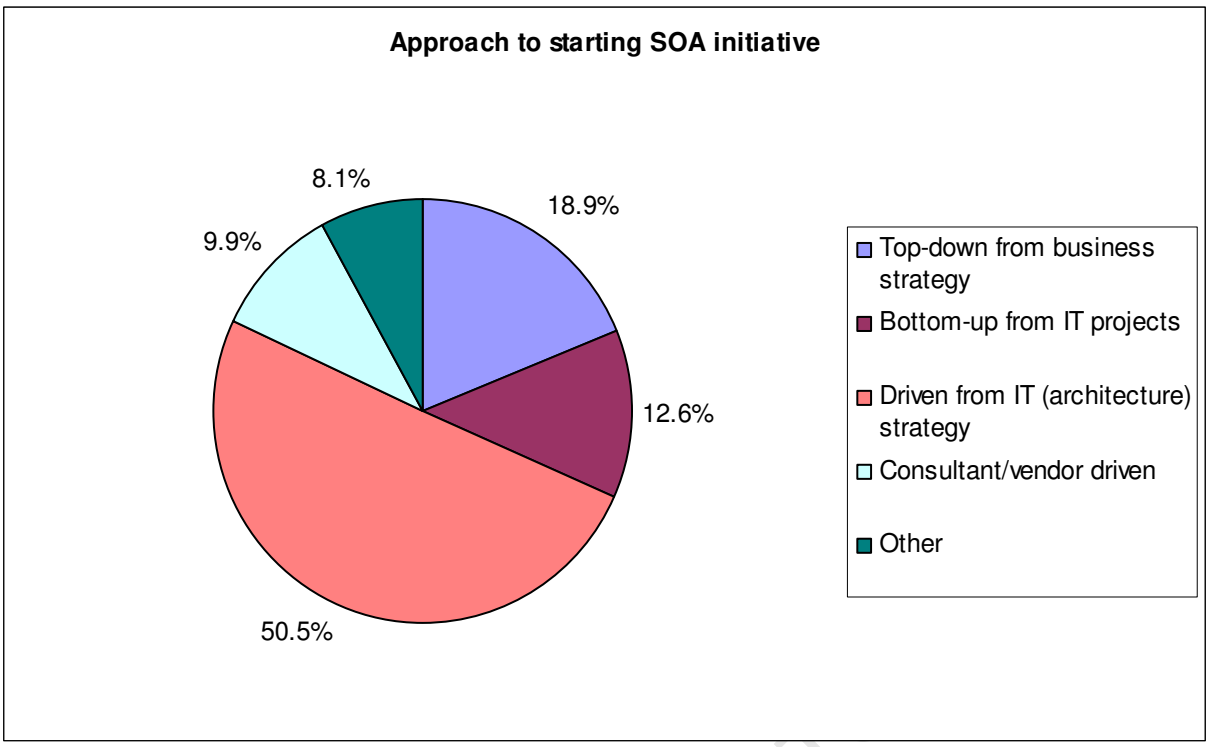

Figure 21: Approach to starting SOA initiative (N=111)

6.2.3. Use of external services

Two-thirds of the respondents (66.7%) use external services. A large number of respondents reported being providers of external services themselves (63.1%).

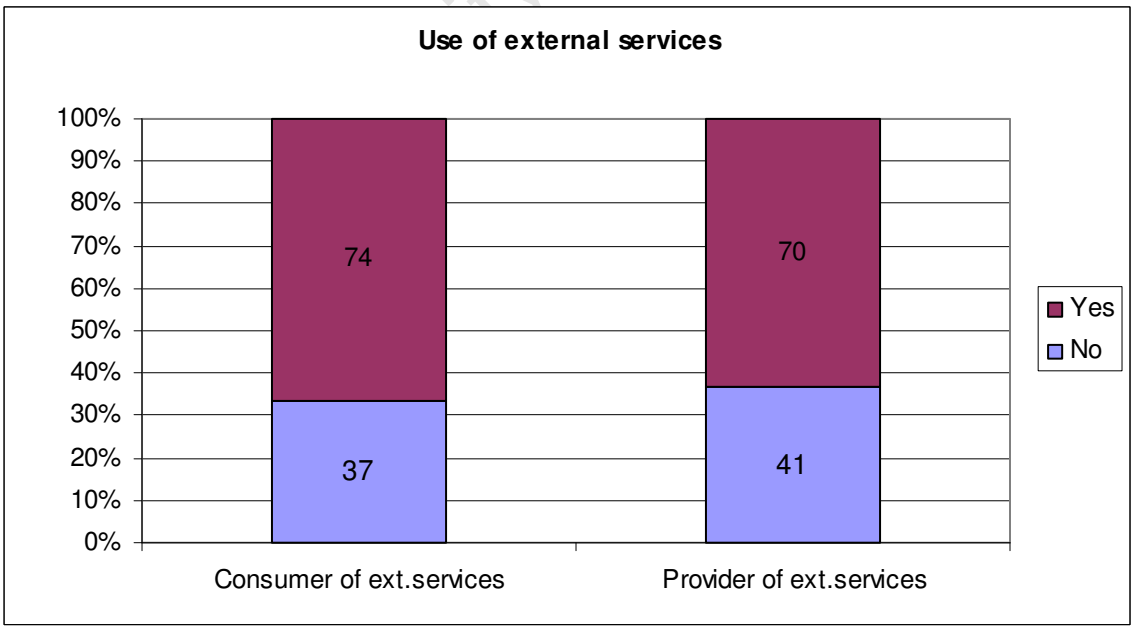

Figure 22: Use of external services (N=111)

6.2.4. SOA project ownership

Thirty six of the respondents indicated that SOA projects are owned by central IT departments of business units, while 29 respondents (26.1%) said that SOA projects are owned by business units. IT architects at a project level own SOA projects in 28 organizations (25.2%). Eighteen respondents (16.2%) stated that their organizations do not have SOA services yet.

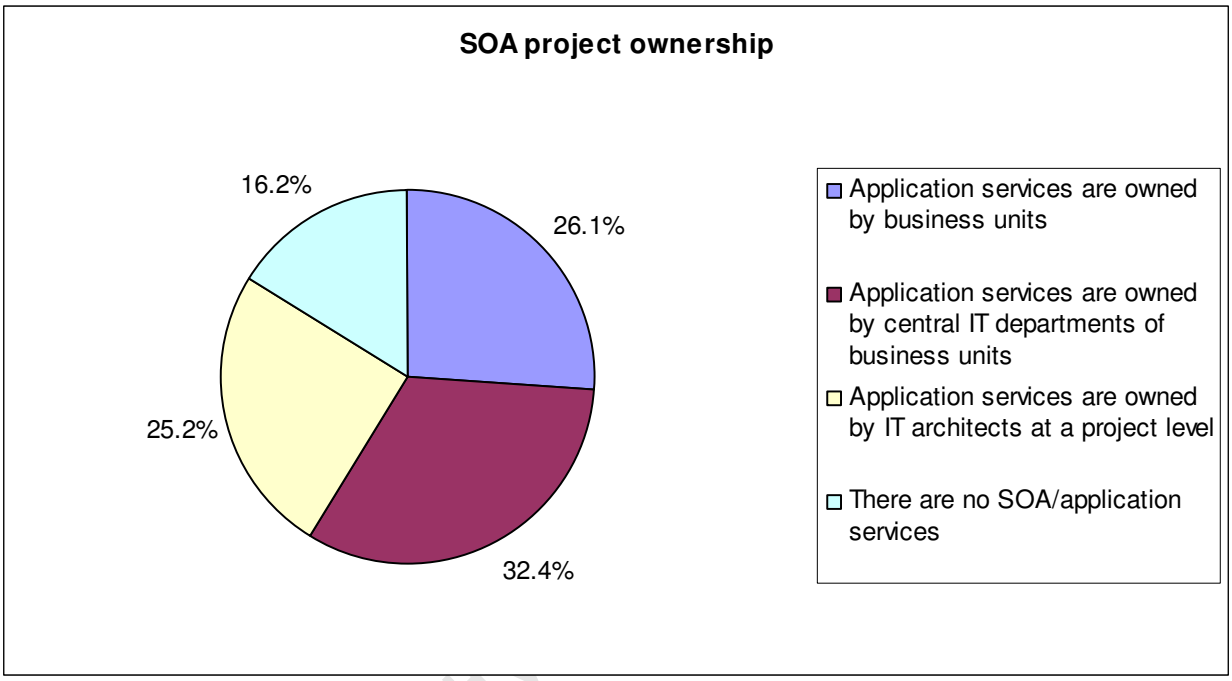

Figure 23: SOA project ownership (N=111)

6.2.5. SOA project success

Majority of the respondents (68.4%) indicated that their SOA projects are either successful (37.8%) or partially successful (30.6%). Only 2.7% of respondents described their SOA projects as unsuccessful, while 28.8% of respondents said it is too early to tell.

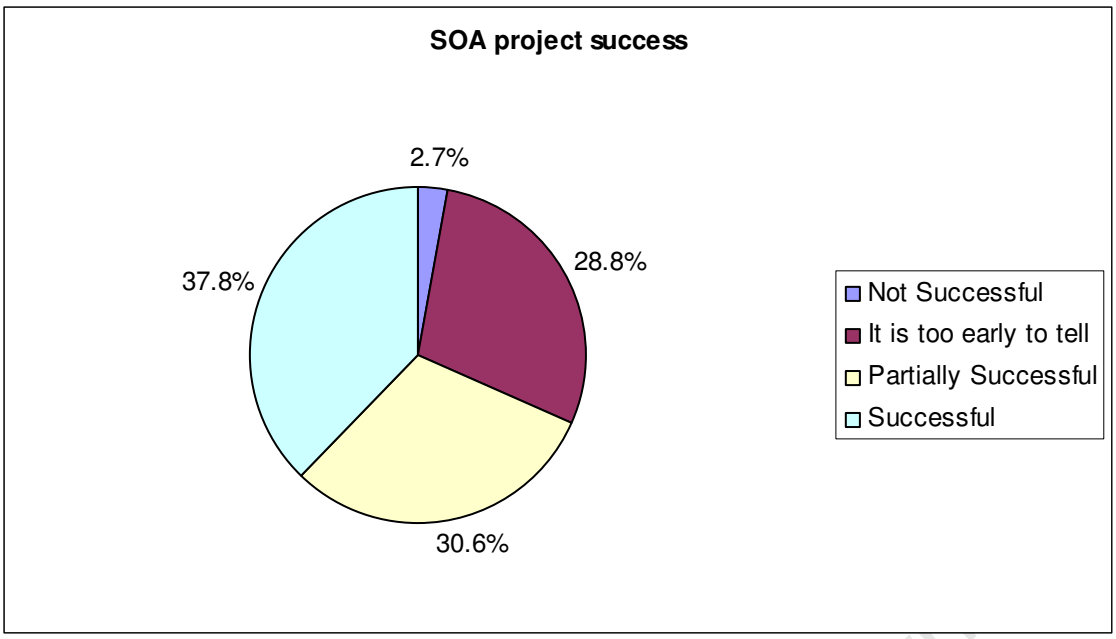

Figure 24: SOA project success (N=111)

6.2.6. SOA specifications and standards

Among the SOA specifications and standards the most used are XML, XQuery, XPath, XSLT – 87 respondents (78.4%), WSDL and SOAP – 79 respondents (71.2%) each, WS-*standards – 45 respondents (40.5%), UDDI – 31 respondents (27.9%), REST – 20 respondents (18.0%), JSON – 18 respondents (16.2%), RSS – 14 respondents (12.6%). WADL, ATOM, and other scored 2.7%, 3.6%, and 5.45% respectively.

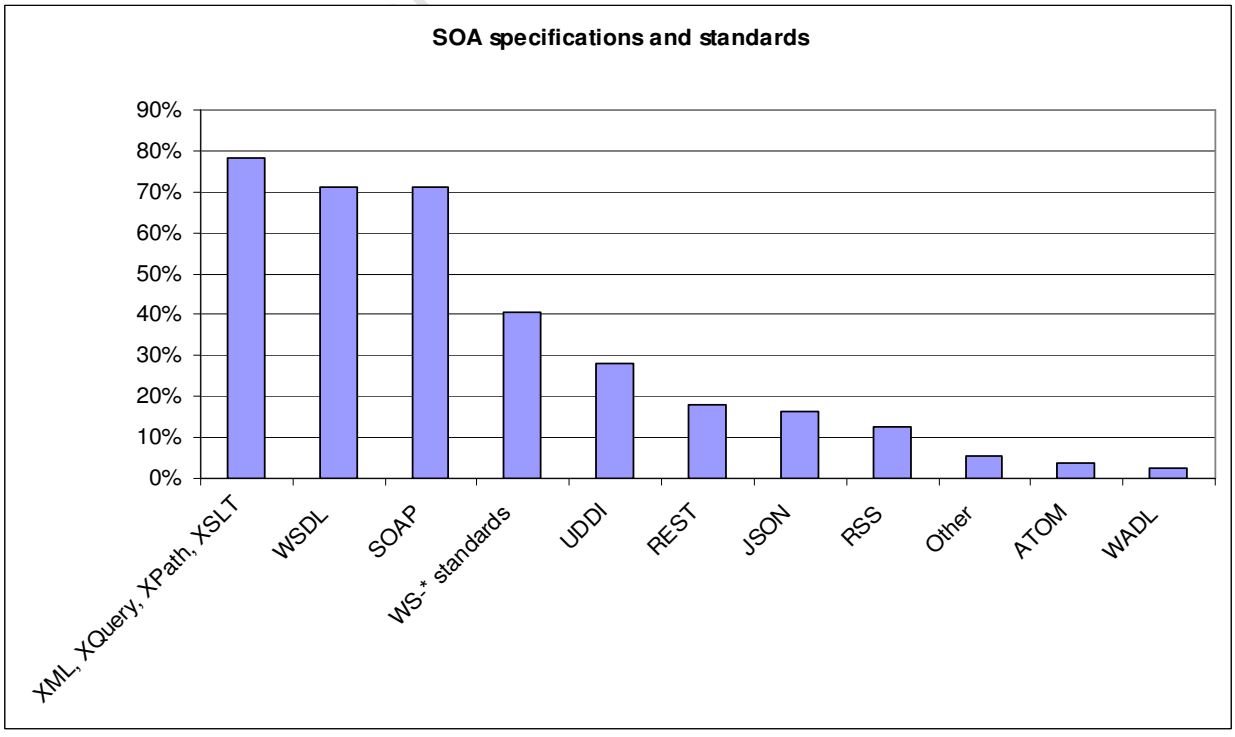

Figure 25: SOA specifications and standards (N=111)

6.2.7. SOA platforms

Among the SOA platforms the most widely used are Microsoft .Net Framework (64 respondents, 57.7%), Sun - Java Web services developer pack (36, 32.4%), IBM Websphere (35, 31.5%), Eclipse - Web tools Platform/ SOA Tools Platform (27, 24.3%), Apache- Axis (21, 18.8%), JBoss – Seam (19, 17.1%), Oracle SOA Suite/BEA WebLogic (18, 16.2%), Spring Framework (17, 15.3%), SAP NetWeaver and SOA Software (9, 8.1%) each. Other platforms were used by 10% of the respondents.

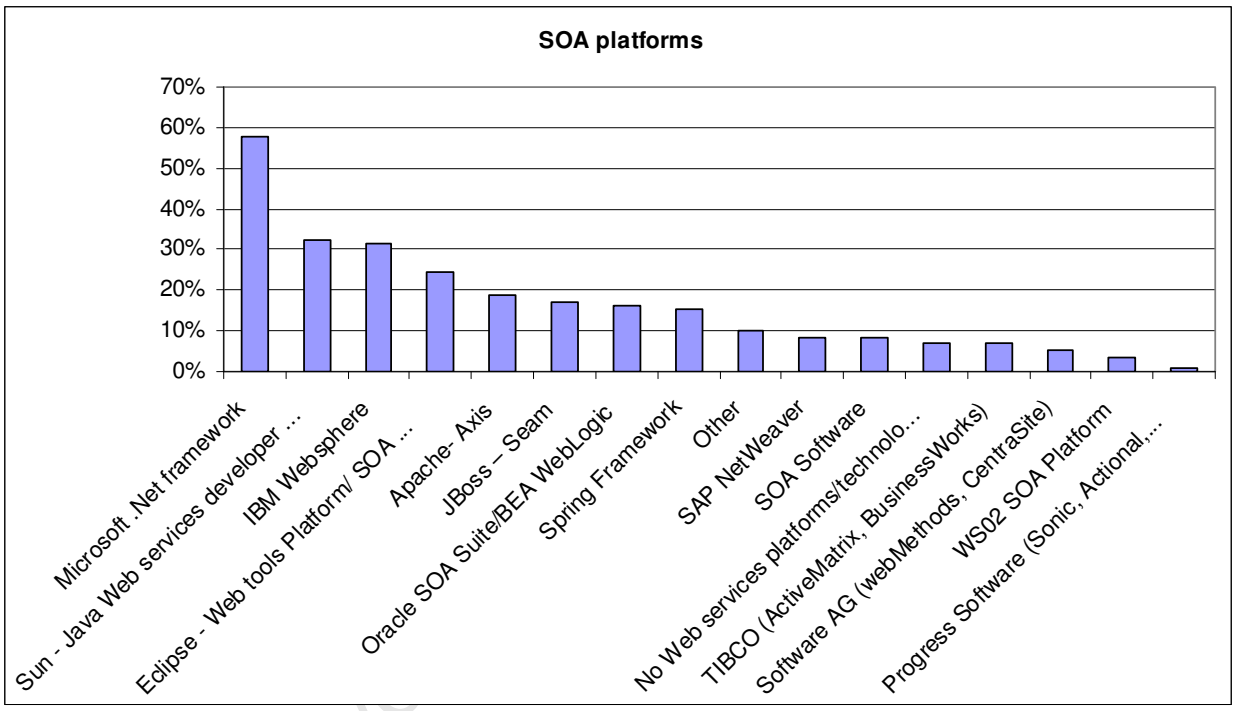

Figure 26: SOA platforms (N=111)

6.2.8. Approach to cloud computing options

Just over half of all the respondents (51.4%) do not use cloud computing options, while 27.4% of the respondents indicated that they are in the early stages of learning / testing cloud computing options. One-third of the respondents said that they use SaaS either for non-critical (13.5%) or for mission-critical (19.8%) applications. PaaS is used by 7.2% of the respondents (2.7% for non-critical and 4.5% for mission-critical applications), while IaaS is used by 10.8% of the respondents (3.6% for non-critical and 7.2% for mission-critical applications).

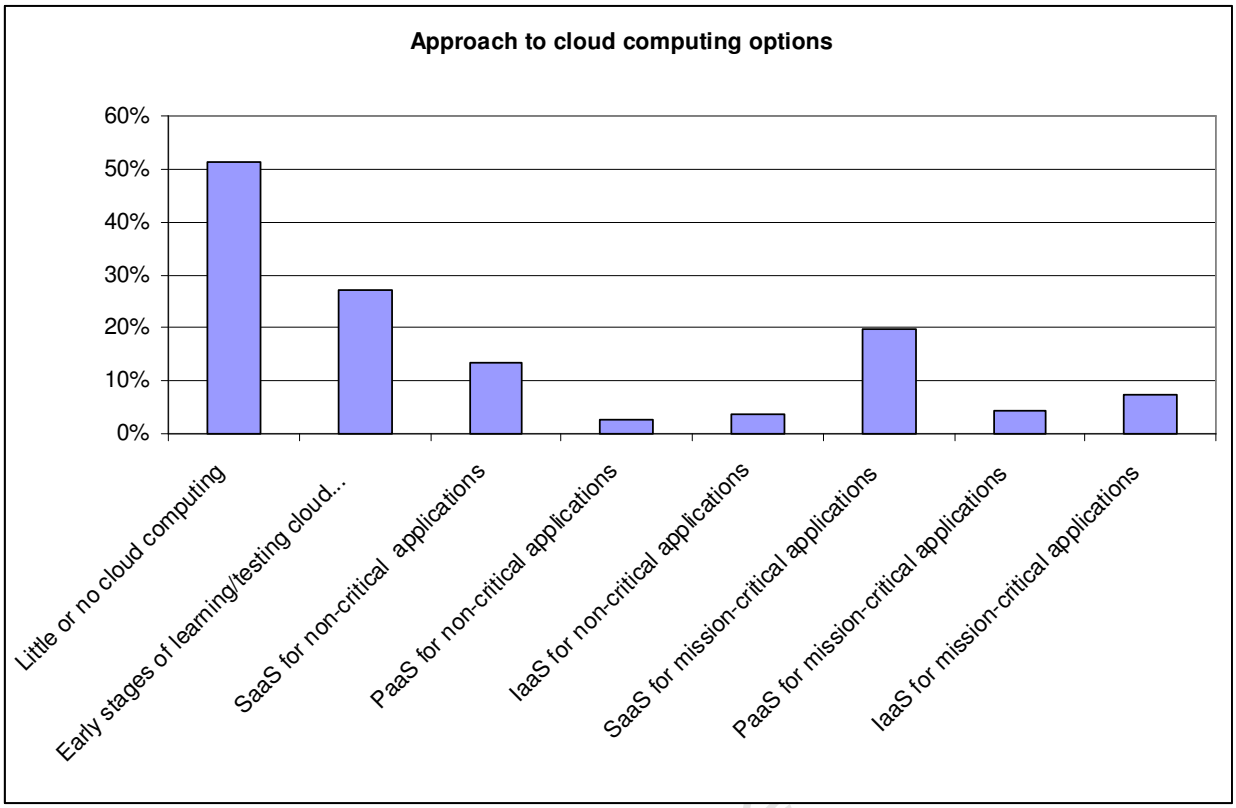

Figure 27: Approach to cloud computing options (N=111)

The relatively high percentage of respondents already using cloud to run mission-critical applications was somewhat unexpected. The mission-critical SaaS applications run by respondents fall into various categories: ERP systems, CRM systems, HRM systems, PLM systems, etc. When asked to provide examples of mission-critical SaaS applications used by the organizations, the most frequently mentioned applications were Google Apps Premier, Google Docs, Salesforce CRM, and JIRA Confluence.

6.2.9. SOA project risks

The following SOA project risks, security, performance, interoperability, reliability, and testing, were examined in the questionnaire (see Figure 28). The most important project risks identified were reliability (78.4%), security (73.9%), and performance (72.9%). Reliability is extremely important for 47.7% and very important for 30.6% of respondents, security is extremely important for 48.7% and very important for 25.2%, while performance is extremely important for 37.7% and very important for 35.1% of respondents. Testing and interoperability are extremely important or very important for 58.6% and 54.1% of respondents respectively.

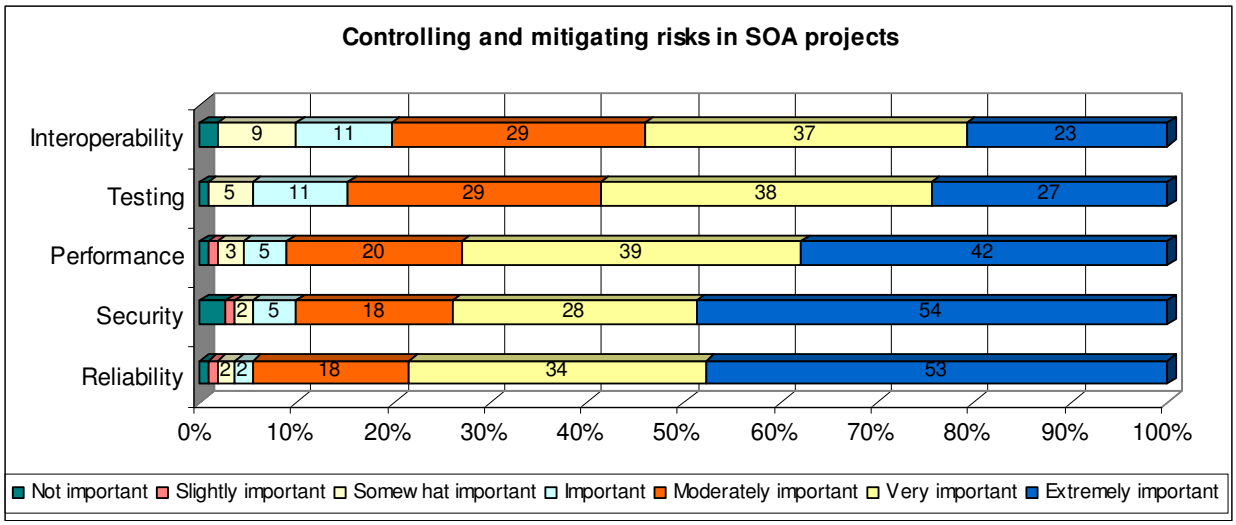

Figure 28: Risks in SOA projects (N=111)

6.2.10. SOA implementation challenges

Ten SOA implementation challenges were offered to the respondents in the questionnaire. A summary of the results is provided in Figure 29. The top five challenges, with more than 50% of the respondents identifying them as being extremely important and very important, are listed in Table 11.

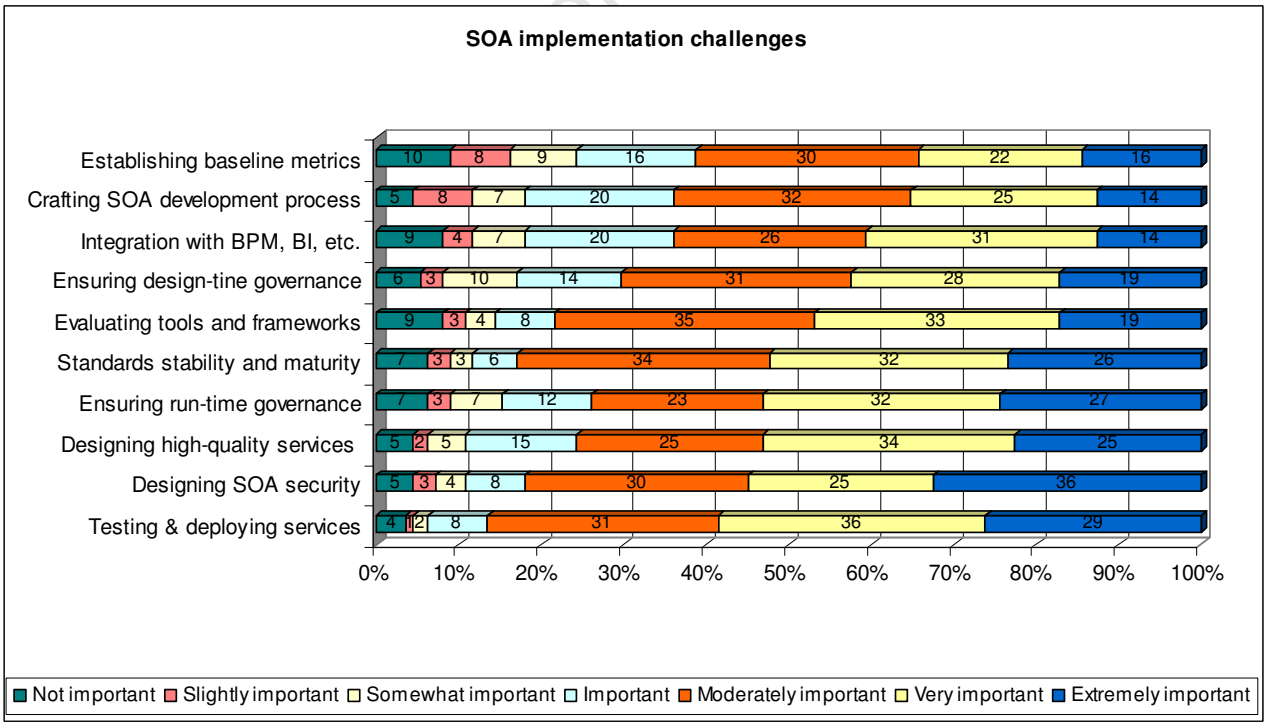

Figure 29: SOA implementation challenges (N=111)

SOA implementation challenges	Extremely important	Very important	Extremely and very important
Testing and deploying services	26.1%	32.4%	58.6%
Designing SOA security	32.4%	22.5%	55.0%
Ensuring run-time governance	24.3%	28.8%	53.2%
Designing high quality services	22.5%	30.6%	53.2%
Standards stability and maturity	23.4%	28.8%	52.3%

Table 11: Top five implementation challenges (N=111)

The results revealed that SOA security is not only viewed as a major SOA implementation risk, but is also considered by the respondents to be a SOA implementation challenge.

6.2.11. SOA as solution to IT issues

One of aspects of the questionnaire was to examine whether SOA is viewed as a solution to existing IT issues, such as lengthy application development cycles, high cost of application development, inflexible, hard to integrate systems and restricted information flow. A summary of the responses is provided in Figure 30. More than half of all the respondents (56.7%) rated addressing of inflexible and hard to integrate systems as extremely important and very important in terms of influencing their organization's decision to pursue SOA. High cost of application development and restricted information flow was rated as extremely and very important by 45.9% of respondents.

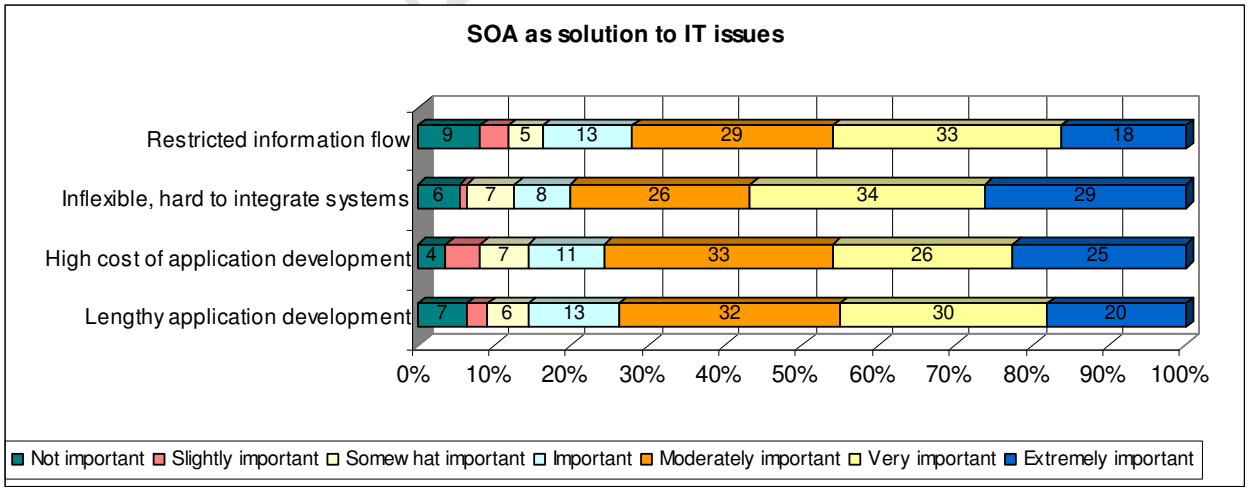

Figure 30: SOA as solution to IT issues (N=111)

6.2.12. SOA perceived benefits

A number of SOA benefits were examined in the questionnaire. A summary of the responses is provided in Figure 31. The top five benefits, with more than 50% of the respondents identifying them as being extremely important and very important, are listed in Table 12.

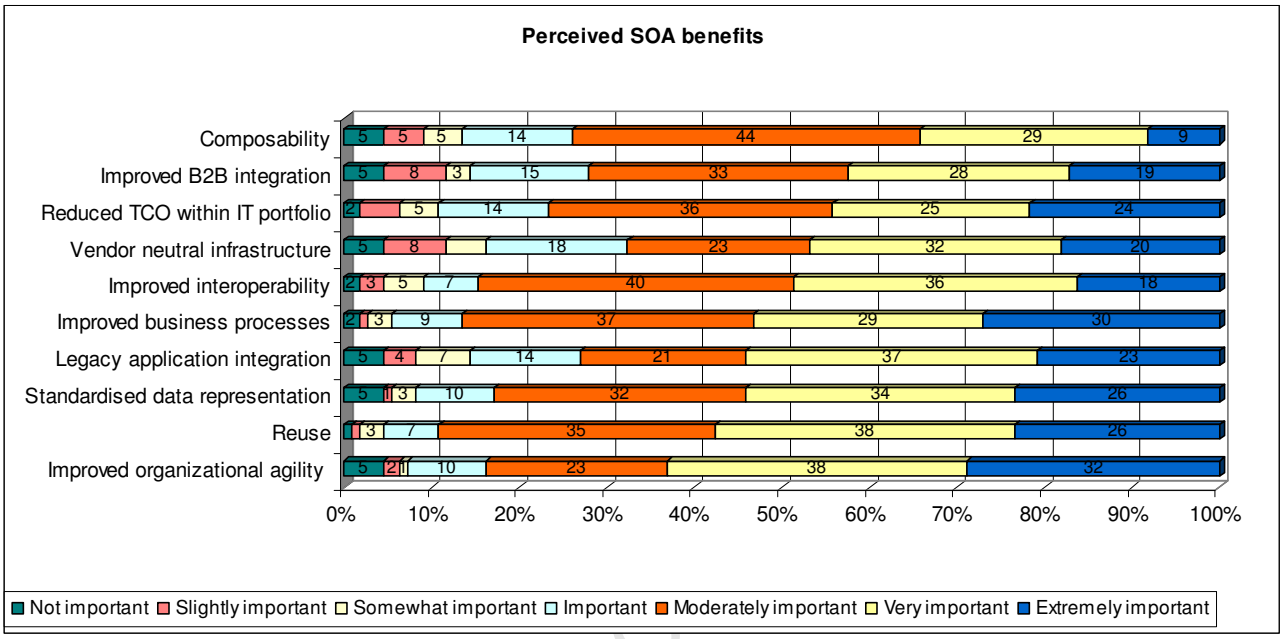

Figure 31: Perceived SOA benefits (N=111)

SOA perceived benefits	Extremely important	Very important	Extremely and very important
Improved organizational agility	28.8%	34.2%	63.1%
Reuse	23.4%	34.2%	57.7%
Legacy application integration	20.7%	33.3%	54.1%
Standardised data representation	23.4%	30.6%	54.1%
Improved business processes	27.0%	26.1%	53.2%

Table 12: Top five SOA perceived benefits (N=111)

It has to be noted, that the relatively low rating of the SOA benefit, reduced TCO within IT portfolio, does not correspond with the high rating given in section 6.2.11 to SOA as a solution to high cost of application development. One possible explanation is that TCO may encompass other factors, such as hardware and network infrastructure costs, deployment costs (including application migration, integration, and database conversions), support and maintenance costs (Ghazizadeh, 2009).

6.3. Descriptive statistics

An exploratory data analysis was conducted on the set of test items. Numerical summaries and graphs were created as part of the analysis. A summary of descriptive statistics of the test items is provided in Appendix E. The test items STAND1 (number of SOA specifications and standards used) and STAND2 (number of SOA platforms used) represent interval data. The rest of the test items listed in the table are ordinal and measured by seven-point Likert scale.

When the central tendency of test items was analysed, it became apparent that four items displayed a mode of 7 (rating as extremely important). These items are: designing of SOA security as SOA implementation challenge (IMPLC5), security risk (RISK1), performance risk (RISK2), and reliability risk (RISK4). Graphic representations of the frequency of the responses for these items are provided in sections 6.2.9 and 6.2.10.

In order to explore the distribution of the test items and variables, distribution graphs for all the test items and variables were created and analysed. The test item distribution histograms are provided in Appendix F. Variable distribution diagrams are supplied in Appendix G.

The analysis of the distribution data revealed that certain items display left-skewed distribution. For example, respondents seemed to have strong opinion (rating as very import and extremely important), when asked about such items as choosing the right standard for SOA implementations (COMPL2) and items related to compatibility (COMPA1 - COMPA3), implementation concerns (IMPLC1 - IMPLC10), risk (RISK1 - RISK5), relative advantage (RELADV1 - RELADV4), and benefits of SOA (BENEF1 - BENEF10). Similarly, variable histograms show left-skewed distribution for a number of variables: *complexity* (COMPL), *compatibility* (COMPA), *technology implementation concerns* (ITIMPLC), *organizational change implementation concerns* (ORIMPLC), *risk* (RISK), *relative advantage* of the SOA technology, *intra-organizational* and *inter-organizational benefits* (INTRABENEF and INTERBENEF).

Normal probability plots for the test items and variables were created and analysed. Although the plots show linear pattern, deviations from the line fit to the data points on the probability plots were identified.

To examine the distribution of data further, Kolmogorov-Smirnov & Lilliefors and Shapiro-Wilk tests for normality were conducted on each of the test items and variables. The results of the normality tests for the test items are provided in Appendix F. A summary of the normality test results for the test items is presented in Table 13. The results show significant p- values ($p < .05$), which means that the null hypothesis H_o about normality of data distribution is rejected, and the distribution is not normal. When the normality assumption was tested on the instrument variables, two variables, STAND (use of standards) and COMPL (complexity), passed Kolmogorov-Smirnov & Lilliefors test, but failed Shapiro-Wilk normality test. The other variables show significant p-values (<.05) in both Kolmogorov-Smirnov & Lilliefors and Shapiro-Wilk tests. The results of normality test for the variables are provided in Appendix G. A summary of the results is presented in Table 14.

Although, the distribution in the data set is skewed and not normal, it has to be noted that Likert scales can generate skewed or polarised distribution (Jamieson, 2004). This normally happens when respondents have strong opinions about a particular aspect in the model.

Item	K-S & Lilliefors (Lilliefors p<.01 for all test items)	Shapiro-Wilk	Item	K-S & Lilliefors (Lilliefors p<.01 for all test items)	Shapiro-Wilk
STAND1	d=.13560, p<.05	W=.94932, p=.00035	STRAT1	d=.18771, p<.01	W=.88956, p=.00000
STAND2	d=.17059, p<.01	W=.91505, p=.00000	STRAT2	d=.24005, p<.01	W=.87109, p=.00000
COMPL1	d=.15147, p<.05	W=.92989, p=.00002	STRAT3	d=.20172, p<.01	W=.90266, p=.00000
COMPL2	d=.18288, p<.01	W=.91818, p=.00000	GVRN1	d=.16646, p<.01	W=.92641, p=.00001
COMPA1	d=.21537, p<.01	W=.90463, p=.00000	GVRN2	d=.17568, p<.01	W=.93502, p=.00004
COMPA2	d=.24639, p<.01	W=.88020, p=.00000	GVRN3	d=.15781, p<.01	W=.94428, p=.00016
COMPA3	d=.26487, p<.01	W=.88228, p=.00000	GVRN4	d=.15326, p<.05	W=.93585, p=.00005
COST1	d=.15623, p<.01	W=.92660, p=.00001	RSRC1	d=.19110, p<.01	W=.91242, p=.00000
COST2	d=.15088, p<.05	W=.93865, p=.00007	RSRC2	d=.20252, p<.01	W=.90976, p=.00000
COST3	d=.16110, p<.01	W=.93221, p=.00003	RSRC3	d=.16901, p<.01	W=.92152, p=.00001
IMPLC1	d=.26214, p<.01	W=.83254, p=.00000	RELADV1	d=.22090, p<.01	W=.87142, p=.00000
IMPLC2	d=.25076, p<.01	W=.81880, p=.00000	RELADV2	d=.21101, p<.01	W=.88294, p=.00000
IMPLC3	d=.20023, p<.01	W=.90794, p=.00000	RELADV3	d=.21853, p<.01	W=.83622, p=.00000
IMPLC4	d=.18874, p<.01	W=.89127, p=.00000	RELADV4	d=.22495, p<.01	W=.86117, p=.00000
IMPLC5	d=.20346, p<.01	W=.83047, p=.00000	BENEF1	d=.24162, p<.01	W=.85821, p=.00000
IMPLC6	d=.19624, p<.01	W=.91469, p=.00000	BENEF2	d=.20409, p<.01	W=.86066, p=.00000
IMPLC7	d=.20862, p<.01	W=.86476, p=.00000	BENEF3	d=.26902, p<.01	W=.86522, p=.00000
IMPLC8	d=.20980, p<.01	W=.81891, p=.00000	BENEF4	d=.23022, p<.01	W=.86816, p=.00000
IMPLC9	d=.20495, p<.01	W=.89603, p=.00000	BENEF5	d=.21344, p<.01	W=.83509, p=.00000
IMPLC10	d=.21202, p<.01	W=.85821, p=.00000	BENEF6	d=.19539, p<.01	W=.89080, p=.00000
RISK1	d=.25475, p<.01	W=.73070, p=.00000	BENEF7	d=.24319, p<.01	W=.80274, p=.00000
RISK2	d=.24821, p<.01	W=.79958, p=.00000	BENEF8	d=.19134, p<.01	W=.85698, p=.00000
RISK3	d=.21304, p<.01	W=.88185, p=.00000	BENEF9	d=.21848, p<.01	W=.88306, p=.00000
RISK4	d=.25700, p<.01	W=.73895, p=.00000	BENEF10	d=.20085, p<.01	W=.89400, p=.00000
RISK5	d=.21737, p<.01	W=.87847, p=.00000	VENDS1	d=.18944, p<.01	W=.92406, p=.00001
EXPR1	d=.15116, p<.05	W=.92554, p=.00001	VENDS2	d=.15758, p<.01	W=.91455, p=.00000
EXPR2	d=.16843, p<.01	W=.91751, p=.00000	VENDS3	d=.19719, p<.01	W=.91586, p=.00000
EXPR3	d=.15177, p<.05	W=.93119, p=.00002	INDSP1	d=.16908, p<.01	W=.91212, p=.00000
TMSP1	d=.17916, p<.01	W=.91726, p=.00000	INDSP2	d=.20224, p<.01	W=.92267, p=.00001
TMSP2	d=.18545, p<.01	W=.90829, p=.00000	ITMED1	d=.20786, p<.01	W=.92605, p=.00001
TMSP3	d=.20203, p<.01	W=.88575, p=.00000	ITMED2	d=.18031, p<.01	W=.91670, p=.00000

Table 13: Summary tests for normality (test items)

Item	K-S & Lilliefors (Lilliefors p<.01 for all variables)	Shapiro-Wilk	Item	K-S & Lilliefors (Lilliefors p<.01 for all variables)	Shapiro-Wilk
STAND	d=.10233, p<.20	W=.96811, p=.00926	GVRNSTR	d=.19166, p<.01	W=.91586, p=.00000
COMPL	d=.12037, p<.10	W=.96209, p=.00306	HFRSRC	d=.14248, p<.05	W=.96067, p=.00238
COMPA	d=.27365, p<.01	W=.88111, p=.00000	RELADV	d=.16925, p<.01	W=.90723, p=.00000
COST	d=.14216, p<.05	W=.94147, p=.00010	INTRABEN	d=.22117, p<.01	W=.88549, p=.00000
ITIMPLC	d=.18988, p<.01	W=.86588, p=.00000	INTERBEN	d=.16935, p<.01	W=.88554, p=.00000
ORIMPLC	d=.18307, p<.01	W=.90885, p=.00000	VENDI	d=.18922, p<.01	W=.93033, p=.00002
RISK	d=.27132, p<.01	W=.77211, p=.00000	VENDS	d=.14616, p<.05	W=.94726, p=.00027
TMSP	d=.18782, p<.01	W=.90233, p=.00000	INDSP	d=.13551, p<.05	W=.95524, p=.00099

Table 14: Summary of tests for normality (variables)

6.4. Reliability and item analysis (initial model)

In order to evaluate inter-item reliability, Cronbach alpha test was performed for each test construct. For each construct, the correlations between the respective item and the total sum score and the internal consistency of the scale (alpha) were examined. The results of Cronbach

alpha reliability analysis are presented in Appendix I. A summary of the results is listed in Table 15.

Analysis showed that some items correlate with the sum scale at a lower level than other items. For example, the IMPLC1 (Evaluating and selecting tools & frameworks) item correlates with the sum scale at .472, while all other items correlate at .618 or better. Removing the IMPLC1 item from the *implementation challenges* (IMPLC) construct will slightly increase the scale alpha from .908 to .911. Similar situation can be observed with VENDS1 (vendor influence to adopt SOA), which correlates with the sum scale at .410, while all other items correlate at .540 or better. If the item is removed, the *vendor suppor*t (VENDS) construct alpha would be increased from .689 to .719. Two items from the *perceived benefits* (BENEF) construct, improved interoperability (BENEF1) and legacy application integration (BENEF4), also show marginally lower correlation of .596 and .541 respectively, while all other items correlate at .618 and better. However, removing the items from the construct would not improve the construct alpha of .898.

Variable	# of items	Cronbach alpha	Standardized alpha	Average inter-item corr.	Implied reliability
STAND	2	0.609536	0.610380	0.439242	Undesirable (but acceptable)
COMPL	2	0.691133	0.692860	0.530058	Minimally acceptable
COMPA	3	0.821384	0.821592	0.605712	Very good
COST	3	0.770655	0.771492	0.529990	Respectable
IMPLC	10	0.908236	0.910148	0.516777	Very good
RISK	5	0.857350	0.862445	0.563690	Very good
EXPR	3	0.868005	0.868887	0.697201	Very good
TMSP	3	0.887962	0.887847	0.727267	Very good
STRAT	3	0.778491	0.782957	0.546107	Respectable
GVRN	4	0.918764	0.919690	0.745115	Very good
RSRC	3	0.887714	0.887996	0.741310	Very good
RELADV	4	0.827123	0.828273	0.570031	Very good
BENEF	10	0.897831	0.899976	0.478148	Very good
VENDS	3	0.689461	0.692722	0.434321	Minimally acceptable
INDSP	2	0.803918	0.804465	0.672892	Very good
ITMED	2	0.615840	0.626104	0.455714	Undesirable (but acceptable)

Table 15: Cronbach alpha reliability analysis results

Implied reliability of the Cronbach alpha scores was evaluated according to DeVellis (1991, p.85), who suggested the following criteria: below .06 – unacceptable, between .60 and .65 – undesirable, between .65 and .70 – minimally acceptable, between .70 and .80 – respectable, between .80 and .90 – very good, much above .90 – consider shortening the scale. Most of the

constructs have reliability that is “respectable” or “very good”. Two of the constructs (COMPL and VENDS) have “minimally acceptable” reliability, while other two (STAND and ITMED) have “undesirable” reliability. According to Nunnally study (as cited in Ngai, Cheng, & Ho, 2004), minimally acceptable level of Cronbach alpha for exploratory studies is 0.60. For that reason the two constructs, STAND and ITMED, were kept in the instrument.

6.5. Construct validity

To analyse the structure of the relationships between the variables and to test for a possibility of data reduction, factor analysis was conducted on the set of 62 items. Factor rotation Varimax normalised was used. Maximum number of factors was set to the number of variables (16), while minimum eigenvalue was set to 1. The results of the factor analysis are presented in Appendix J. A summary of Eigenvalues is given in Table 16, while a graph plotting factors versus cumulative explained variance is presented in Figure 32.

Value	Eigen-value	% Total variance	Cumulative Eigenvalue	Cumulative %
1	14.93670	24.09145	14.93670	24.09145
2	8.57382	13.82873	23.51051	37.92018
3	4.31222	6.95519	27.82273	44.87537
4	2.98896	4.82091	30.81169	49.69628
5	2.25920	3.64388	33.07089	53.34015
6	2.09174	3.37378	35.16264	56.71393
7	1.85387	2.99011	37.01650	59.70404
8	1.66943	2.69263	38.68593	62.39667
9	1.54037	2.48446	40.22630	64.88113
10	1.46334	2.36023	41.68964	67.24135
11	1.38625	2.23588	43.07589	69.47724
12	1.22682	1.97874	44.30271	71.45598
13	1.11033	1.79085	45.41303	73.24682
14	1.07284	1.73039	46.48587	74.97721

Table 16: Eigenvalues

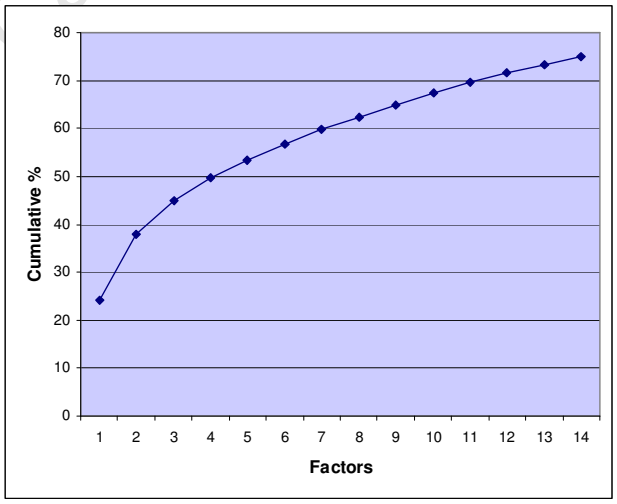

Figure 32: Cumulative explained variance

Fourteen (14) factors, which explain 74.98% of the variance in the data, were identified during the analysis. According to the Kaiser criterion, all the factors were retained as their eigenvalues were greater than 1.

Nunnally (as cited in Ngai et al., 2004), suggested that an item is considered to load on a factor when the factor loading is 0.4 or greater. Using this criterion, factor loadings were analysed, and the instrument variables were adjusted to match newly discovered factors. The results of the factor analysis are summarised in Table 17. A full list of the reviewed instrument variables with all its items provided in Appendix B.

Factor #	Construct label	Interpretation
1	ORIMPLC	Items IMPLC3 - IMPLC10 load on to one factor representing "Organizational change implementation challenges"
2	GVRNSTRAT	Items STRAT1, STRAT2, GVRN1-GVRN4, TMSP2 load on to a factor representing "Governance & Strategy"
2'	HFRSRC	Items RSRC1-RSRC3, EXPR1-EXPR3 load on to the same factor, however, this construct is conceptually distinct and represents "Human & Financial Resources"
3	INDSP	Items INDSP1, INDSP2, ITMED1, ITMED2 load on to one factor representing "Industry pressure & IT Media influence"
4	INTERBENEF	Items RELADV3, RELADV4, BENEF7, BENEF9 load on to one factor representing "Inter-organizational benefits"
5	VENDI	Only one item VENDS1 loads on to a factor representing "Vendor influence". Negative loading value indicates an inverse impact on the factor.
6	ITIMPLC	Items IMPLC1, IMPLC2, BENEF1, BENEF4 load on to one factor "Technology implementation challenges"
7	INTRABENEF	Items BENEF2, BENEF3, BENEF5, BENEF6, BENEF8, BENEF10 load on to one factor respresenting "Intra-organizational benefits"
8	COMPL	Items COMPL1, COMPL2 load on to a factor respresenting "Complexity"
8'	COST	Items COST1-COST3 load on to the same factor, however, the construct is conceptually distinct and represents "Cost"
9	TMSP	Items TMSP1, TMSP3, STRAT3 load on to a factor, representing "Top management support"
10	COMPA	Items COMPA1-COMPA3 load on to a factor representing "Compatibility"
11	RELADV	Items RELADV1, RELADV2 load on to a factor representing "Relative advantage"
12	VENDS	Items VENDS2, VENDS3 load on to a factor representing "Vendor support for integration & dev tools"
13	RISK	Items RISK1-RISK5 load on to factor representing "Risks"
14	STAND	Items STAND1, STAND2 load on to a factor representing "Use of standards and platforms"

Table 17: Summary of Factor Analysis loadings

6.6. Reliability and item analysis (reviewed model)

To test reliability of the updated instrument variables, Cronbach alpha tests were re-run for each of the affected test constructs. The results of Cronbach alpha reliability analysis are presented in Appendix K. A summary of these results is listed in Table 18. The reviewed instrument constructs are highlighted.

Variable	# of items	Cronbach alpha	Standardized alpha	Average inter-item corr.	Implied reliability
STAND	2	0.609536	0.610380	0.439242	Undesirable (but acceptable)
COMPL	2	0.691133	0.692860	0.530058	Minimally acceptable
COMPA	3	0.821384	0.821592	0.605712	Very good
COST	3	0.770655	0.771492	0.529990	Respectable
ITIMPLC	4	0.765334	0.772758	0.463557	Respectable
ORIMPLC	8	0.908759	0.910913	0.573925	Very good
RISK	5	0.857350	0.862445	0.563690	Very good
TMSP	3	0.875786	0.876148	0.705166	Very good
GVRNSTRAT	7	0.904971	0.905707	0.592972	Very good
HFRSRC	6	0.880651	0.881383	0.576171	Very good
RELADV	2	0.880453	0.880633	0.786724	Very good
INTRABENEF	6	0.862943	0.866499	0.524634	Very good
INTERBENEF	4	0.841221	0.841067	0.575669	Very good
VENDI	1	---	---	---	---
VENDS	2	0.719069	0.719205	0.561530	Respectable
INDSP	4	0.787446	0.791329	0.493573	Respectable

Table 18: Cronbach alpha reliability test results for reviewed instrument variables

6.7. Regression and correlation analysis

In order to identify existing relationships between dependent and independent variables, a number of statistical techniques were applied to the model. These included creating correlation matrices, partial correlation analysis, multiple regression analysis, and step-wise regression. This section discusses the results of the analyses.

6.7.1. Correlation matrix

A correlation table for all the test items was created to test existing relationships between the various test items. The correlation table is provided in Appendix H. Correlation coefficients were examined and colour-coded to reflect strength of the correlation coefficients: light green colour was used for “weak” correlations (0.2-0.4), light yellow - for “moderate” correlations (0.4-0.7),

and light red – for "strong" correlations (>0.7). Correlations that can be classified as "very weak" (<0.2) were not colour-coded.

A number of items displayed moderate and strong correlation between them:

- *cost* items showed moderate correlation with *complexity* items (COST ←→COMPL),
- items representing *technology implementation challenges* showed moderate and strong correlation with *risk* items (IMPLC←→RISK),
- items representing *top management support*, *strategy*, *governance*, and *resources* showed moderate correlation with *compatibility* items (TMSP, STRAT, GVRN, RSRC ←→ COMPA),
- *benefits* items showed moderate correlation with *technology implementation challenges*, *risk*, and *relative advantage* items (BENEF ←→IMPLC, RISK, RELADV),
- *industry pressure* showed moderate correlation with *IT media influence* items (INDSP←→ITMED).

To examine the correlation between the model variables, Spearman rank-order correlation table was created. The correlation table is provided in Appendix L. A summary of correlation coefficients between *use of SOA* construct and independent variables is provided in Table 19. Negative correlations are highlighted.

Variable	Use of SOA-	STAND	COMPL	COMPA	COST	ITIMPLC	ORIMPLC	RISK	TMSP
Use of SOA-	1.000000	0.423463	-0.062604	0.301880	-0.293758	0.109866	0.187903	0.162032	0.364855
p-value	p= ---	0.000004	0.513921	0.001282	0.001753	0.251017	0.048280	0.089313	0.000082
Variable	Use of SOA-	GVRN STRAT	HFRSRC	RELADV	INTRA BENEF	INTER BENEF	VENDI	VENDS	INDSP
Use of SOA-	1.000000	0.451826	0.426763	-0.031003	0.189721	0.065203	0.109962	0.305585	0.067475
p-value	p= ---	0.000001	0.000003	0.746683	0.046112	0.496567	0.252796	0.001169	0.483678

Table 19: Summary of Spearman rank order correlation for use of SOA construct and independent variables

The results presented in the table show highly significant (p<.001), moderate correlation between *use of SOA* and a number of constructs, such as *use of standards & platforms, governance & strategy*, and *human & financial resources*. Highly significant correlation (p<.001) between *use of SOA* and *top management support* can be classed as weak. Constructs displayed significant (p<.01), but weak correlations with *use of SOA* are *compatibility*, *cost*, and

vendor support for integration & development tools. *Use of SOA* correlation to *organizational implementation concerns* and *intra-organizational benefits* is very weak and significant at p<.05.

Correlation coefficients only describe the strength of some relationships between variables and do not imply causality. Furthermore, correlation measures the linear relation only. When a relation is not purely linear, it may be an indication that the sample does not represent the whole population (Clarke & Cooke, 1992, p. 344). For that reason scatter diagrams are important when interpretations of correlation coefficients are made. The scatter diagrams of all the model variables are discussed in the next section.

6.7.2. Simple regression analysis

To examine the relationships between the independent variables and the dependent variable *use of SOA*, simple regression analysis was conducted for each independent and dependent variables' pair. To illustrate a two dimensional regression equation, correlation scatter plot diagrams were created for each independent variable. Since the sample has been taken from only part of the population, it is expected that the relations between the independent and dependent variables will not be purely linear, although they will have a linear component. The scatter plot diagrams are provided in Appendix M.

To summarise the findings, the results of the analyses, sorted by p-value, are provided in Table 20. Three variables STAND, HFRSRC, and GVRNSTRAT show moderate positive correlation (.4 and higher). These variables account for more 19.7%, 19.2% and 16.1% of original variability respectively and are highly significant (p<.001).

Seven variables, COMPA, TMSP, VENDS, COST, ORIMPLC, RISK, and ITIMPLC, show weak positive correlation with correlation coefficient R between .2 and 0.4. Correlation of COMPA, and TMSP are highly significant at p<.001, correlation of VENDS, COST, ORIMPLC are significant at p<.01, while correlation of RISK and ITIMPLC are significant at p<.05.

Variable	Correlation coefficient R	Residual Variance R^2	F value	Intercept	B coefficient	p value
STAND	0.44365831	0.19683270	26.713000	3.012345	0.578942	0.000001
HFRSRC	0.43762201	0.19151302	25.820000	2.006089	0.621566	0.000002
GVRNSTRAT	0.40092114	0.16073776	20.876000	2.341782	0.554296	0.000013
COMPA	0.33705906	0.11360881	13.971000	2.218931	0.488130	0.000298
TMSP	0.31884856	0.10166441	12.336000	2.967435	0.390884	0.000648
VENDS	0.29803916	0.08882734	10.529000	2.643917	0.459555	0.001565
COST	0.29022692	0.08423167	10.026000	6.430766	-0.400458	0.002002
ORIMPLC	0.25349071	0.06425754	7.485000	2.663347	0.402390	0.007265
RISK	0.24261159	0.05886038	6.817000	1.746063	0.498031	0.010300
ITIMPLC	0.20788417	0.04321583	4.923300	2.862234	0.352142	0.028569
INTRABENEF	0.15736244	0.02476294	2.767700	3.238233	0.280162	0.099057
VENDI	0.11384826	0.01296143	1.418200	4.093829	0.145198	0.236308
INTERBENEF	0.09447786	0.00892607	0.981700	3.959746	0.146681	0.323973
COMPL	0.06841882	0.00468113	0.512640	5.260617	-0.108582	0.475528
INDSP	0.06836198	0.00467336	0.507090	4.345483	0.101477	0.477936
RELADV	0.00663922	0.00004408	0.004800	4.787109	-0.009436	0.944864

Table 20: Summary of partial correlations of independent variables

6.7.3. Multiple regression analysis

To test simultaneous effects of the independent variables on the dependent variable, multiple regression analysis with the 16 independent variables was conducted. The results of the analysis are presented in Appendix N. The results show strong correlation (r=.654) and explain 32.96% of original variability. The results of the multiple regression analysis of initial data model show correlation r=.644 and account for 31.38% of original variability.

A summary of the analysis run with three statistically significant variables is provided in Table 21. Variables STAND, COST, and ORIMPLC show moderate positive association (r=.582) and account for 31.96% of original variability. The relationship between the dependent variable and the independent variables STAND and ORIMPLC is positive, while the relationship between the dependent variable and the COST variable is negative.

	Regression Summary for Dependent Variable: Use of SOA-Ordinal					
	R= .58150569 R^2= .33814887 Adjusted R^2= .31959230					
	F(3,107)=18.223 p<.00000 Std.Error of estimate: 1.7611					
N=111	b*	Std.Err. of b*	b	Std.Err. of b	t(107)	p-value
Intercept			3.121781	0.785315	3.9752	0.000128
STAND	0.407545	0.079719	0.531816	0.104027	5.11228	0.000001
COST	-0.332195	0.079683	-0.458367	0.109947	-4.16897	0.000062
ORIMPLC	0.240349	0.080752	0.381529	0.128186	2.97638	0.003607

Table 21: Summary of multiple regression analysis

6.7.4. Stepwise regression

In order to find the 'best' regression model, forward and backward stepwise regression analyses were conducted. The results of the analyses are presented in Appendix O.

Forward stepwise analysis showed that four variables, STAND, COST, ORIMPLC, and HFRSRC, represent the "best" model with moderate positive association (r=.607) and 34.32% of the explained variance. Backward stepwise analysis identified a different model, consisting of STAND, COMPA, COST, and ORIMPLC, with correlation coefficient of .603 and 33.95% of the explained variance.

6.8. Review of the model

As explained at the beginning of this chapter, the initial model was reviewed during the construct validity analysis. A number of introduced changes are explained below.

When SOA *implementation challenges* construct was analysed, a clear separation between pure technological implementation challenges and implementation challenges requiring organizational change was identified. *Technology implementation challenges* construct forms part of the technological context of the model, while *organizational change implementation challenges* construct was included in the organizational context of the model.

When SOA *perceived benefits* construct was analysed, it also became clear that some benefits can be realised inside an organization (intra-organizational benefits), while the other benefits, such as increased B2B integration and organizational agility (time to market) can only be realised at inter-organizational level. Thus, perceived benefits construct was split into two new constructs: *intra-organizational benefits* and *inter-organizational benefits*.

Vendors can support SOA in different ways. Vendor's direct influence to adopt SOA is seen as an active way of promoting SOA, while vendor's support for SOA integration and development tools is seen as indirect support. These two factors were separated into two new constructs: *vendor direct influence* and *vendor support for integration & development tools*.

A number of constructs were merged, as it appeared that they measure similar concepts. *Resources* and *IT skills & expertise* were seen as two constructs that were part of the whole, which are human, financial, and technological resources. The reasoning is that if an organization has adequate budget for SOA projects, then it can afford to hire skilled staff or provide training to existing staff. Thus, the two constructs, *resources* and *IT skills/expertise*, were merged into one construct.

Additionally, *governance* and *strategy & plan* constructs were considered to be measuring similar concepts, and, therefore, were merged into *governance & strategy* construct. Similarly, two separate constructs, *industry pressure* and *IT media influence,* were considered to represent industry pressure, whether it is coming from competitors, business partners or IT media. Hence, the two constructs were merged into *industry pressure & IT media influence* construct.

The revised research model can be found in Figure 33. Due to the review of the research model, altered research hypotheses are provided here to reflect the changes.

Hypothesis 1: The greater the degree of utilization of multiple standards and platforms, the greater the potential for SOA adoption.

Hypothesis 2: The higher the perceived complexity of SOA, the less likely SOA will be adopted.

Hypothesis 3: The higher compatibility between SOA and existing enterprise architecture (EA) and infrastructure, the greater the potential for SOA adoption.

Hypothesis 4: The higher the cost of SOA implementation, the less likely SOA will be adopted.

Hypothesis 5: The higher the perceived technology implementation challenges, the less likely SOA will be adopted.

Hypothesis 6: The greater the relative advantage of SOA as a technology, the greater the potential for SOA adoption.

Hypothesis 7: The larger the size of the firm, the greater the potential for SOA adoption.

Hypothesis 8: Organizations that adopt SOA are more likely to come from certain industries/sectors.

Hypothesis 9: The higher the perceived risks of SOA implementation, the less likely SOA will be adopted.

Hypothesis 10: The higher the perceived organizational change implementation challenges in the organization, the less likely the organization will adopt SOA.

Hypothesis 11: The higher the level of top management support for SOA initiatives, the more likely the organization will adopt SOA.

Hypothesis 12: The more effective SOA governance & strategy in the organization, the greater potential for SOA adoption.

Hypothesis 13: The greater the level of human and financial resources available to the SOA initiatives, the greater the potential for SOA adoption.

Hypothesis 14: The greater the perceived SOA benefits at intra-organizational level, the greater the potential for SOA adoption.

Hypothesis 15: The greater the perceived SOA benefits at inter-organizational level, the greater the potential for SOA adoption.

Hypothesis 16: Organizations that adopt SOA are more likely to have higher levels of influence from vendors.

Hypothesis 17: Organizations that adopt SOA are more likely to have higher levels of vendor support for integration and development tools.

Hypothesis 18: Organizations that adopt SOA are more likely to perceive higher levels of industry pressure and IT media influence.

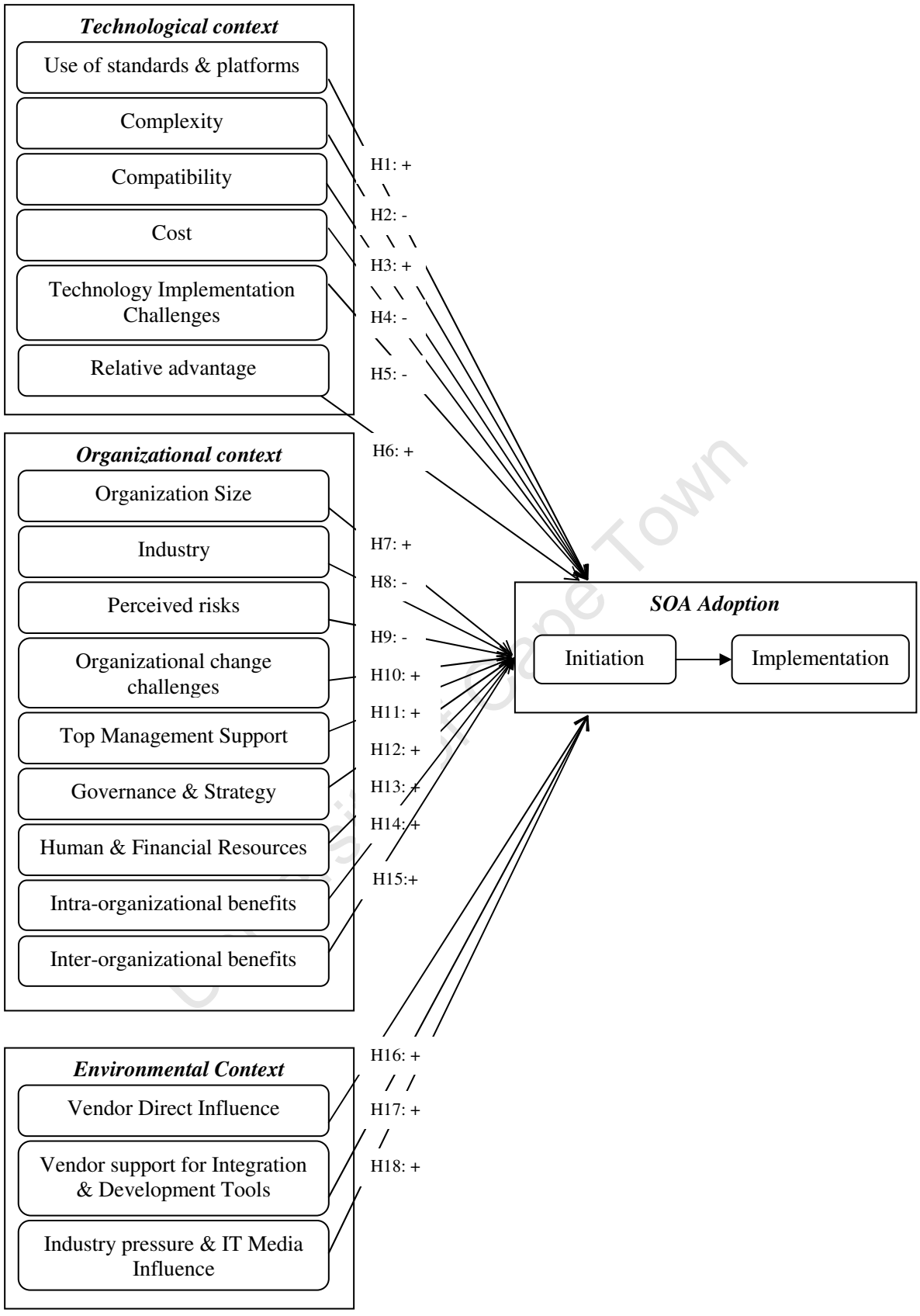

Figure 33: Revised research model for SOA adoption based on the TOE framework

6.9. Analysis of variance

Adoption of SOA is measured by two variables *use of SOA*, which identifies stages of SOA adoption, and *SOA project success*. *Use of SOA*, originally a nominal variable, was transformed to the ordinal variable with stages ranging from 1 (no SOA plans) to 7 (deployed in production for enterprise-wide use). As a result, both variables describing SOA adoption, *Use of SOA - Nominal* and *Use of SOA - Ordinal*, were used in the statistical analysis. *SOA project success* is a nominal variable with five categories: successful, partially successful, too early to tell, unsuccessful, and fiasco. The variable was also transformed to the ordinal variable with the following ranks: 1 (fiasco), 2 (not successful), 3 (it is too early to tell), 4 (partially successful), 5 (successful).

Due to the nature of the test data (ordinal variables with non-normal distribution), Spearman rank order correlation test was used for hypotheses testing between independent ordinal and dependent ordinal variables (H1-H6, H9-H18). Kruskal-Wallis one-way analysis of variance test was used for hypotheses testing between independent nominal and dependent ordinal variables (H7 and H8). Kruskal-Wallis ANOVA, being a non-parametric test, does not allow testing for the direction of the hypotheses effects, but only testing for differences or lack thereof. For H7 and H8 hypotheses testing, Pearson Chi-square test was also used to test relationships between independent and dependent nominal variables and to test differences in groups. When a statistically significant relationship is found, then differences in groups are confirmed.

6.9.1. Technological context

Six ordinal variables, use of standards and platforms, complexity, compatibility, cost, technology implementation concerns, and relative advantage, form part of the technological context of the model. This section discusses the results of the hypotheses testing of the variables.

6.9.1.1. Use of standards and platforms

Use of standards & platforms (STAND construct) is expected to positively affect SOA adoption (hypothesis H1). In order to test the research variable, the following hypotheses were identified:

- H_01_a – there is no association in the population between *use of standards & platforms* and *use of SOA*,
- H_11_a – there is an association significantly different from zero between *use of standards & platforms* and *use of SOA*,
- H_01_b – there is no association in the population between *use of standards & platforms* and *SOA project success*,
- H_11_b - there is an association significantly different from zero between *use of standards & platforms* and *SOA project success*.

The results of the tests are provided in Table 22. They show statistically significant rank correlation for stage of SOA adoption (p<.001) and for *SOA project success* (p<.01). The results reject both H_01_a and H_01_b null hypotheses in favour of the alternative hypotheses; therefore the H1 hypothesis ***Use of standards & platforms*** **positively affects adoption** is supported.

Variables	Use of SOA-Ordinal	SOA project success-Ordinal
STAND	Rs (109) =.424 p <.001	Rs (109) =.286 p =.002

Table 22: Spearman rank order correlation - ***use of standards & platforms***

6.9.1.2. Complexity

Complexity (COMPL construct) is expected to have a negative affect on SOA adoption (H2). To test the effect of this variable, the following hypotheses were formulated:

- H_02_a – there is no association in the population between *complexity* and *use of SOA*,
- H_12_a – there is an association significantly different from zero between *complexity* and *use of SOA*,
- H_02_b – there is no association in the population between *complexity* and *SOA project success*,
- H_12_b – there is an association significantly different from zero between *complexity* and *SOA project success*.

The results of the hypotheses testing are provided in Table 23. Though the results supported H_02_a null hypothesis (p=.514), they show significant rank correlation for *SOA project success*

($p<.05$), which allows us to reject H_02_b null hypothesis. While no evidence was found that complexity affects stage of SOA adoption, the tests suggest that it, nonetheless, affects *SOA project success*.

Variables	Use of SOA-Ordinal	SOA project success-Ordinal
COMPL	Rs (109) =-.063 p =.514	Rs (109) =-.216 p =.023

Table 23: Spearman rank order correlation - *complexity*

6.9.1.3. Compatibility

Compatibility (COMPA construct) is considered to positively affect SOA adoption (H3). To explore the effect of this variable, the following hypotheses were examined:

- H_03_a – there is no association in the population between *compatibility* and *use of SOA*,
- H_13_a - there is an association significantly different from zero between *compatibility* and *use of SOA*,
- H_03_b – there is no association in the population between *compatibility* and *SOA project success*,
- H_13_b - there is an association significantly different from zero between *compatibility* and *SOA project success*.

The outcomes of the hypotheses testing are provided in Table 24. They show significant rank correlation for *use of SOA* ($p<.01$) and by *SOA project success* ($p<.001$). As a result, both H_03_a and H_03_b null hypothesis are rejected. The H3 hypothesis, describing effects of compatibility on SOA adoption, is therefore supported.

Variables	Use of SOA-Ordinal	SOA project success-Ordinal
COMPA	Rs (109) =.302 p =0.001	Rs (109) =.338 p <0.001

Table 24: Spearman rank order correlation – *compatibility*

6.9.1.4. Cost

Cost (COST construct) is reported to have a negative effect on SOA adoption (H4). To test this variable, the following hypotheses were identified:

- H_04_a – there is no association in the population between *cost* and *use of SOA*,
- H_14_a - there is an association significantly different from zero between *cost* and *use of SOA*,
- H_04_b – there is no association in the population between *cost* and *SOA project success*,
- H_14_b - there is an association significantly different from zero between *cost* and *SOA project success*.

The results of the hypotheses testing are provided in Table 25. They show significant rank correlation for *use of SOA* (p<.01) and *SOA project success* (p<.001), which allows as to reject both H_04_a and H_04_b null hypotheses. Cost seems to affect both the stage of SOA adoption and SOA *project success*.

Variables	Use of SOA-Ordinal	SOA project success-Ordinal
COST	Rs (109) =-.294 p =0.002	Rs (109) =-.353 p <0.001

Table 25: Spearman rank order correlation - *cost*

6.9.1.5. Technology implementation challenges

Technology implementation challenges (ITIMPLC construct) can have both positive and negative effect on SOA adoption (H5). While *technology implementation challenges* can hinder the adoption, the awareness of possible implementation issues may positively affect SOA adoption. The variable was tested with the following hypotheses:

- H_05_a – there is no association in the population between *technology implementation challenges* and *use of SOA*,
- H_15_a - there is an association significantly different from zero between *technology implementation challenges* and *use of SOA*,
- H_05_b – there is no association in the population between *technology implementation challenges* and *SOA project success*,
- H_15_b - there is an association significantly different from zero between *technology implementation challenges* and *SOA project success*.

The results of the hypotheses testing are provided in Table 26. The results support both H_05_a and H_05_b null hypotheses, and there is no evidence to suggest that *technology implementation challenges* construct has any effect on SOA adoption.

Variables	Use of SOA-Ordinal	SOA project success-Ordinal
ITIMPLC	Rs (109) =.110 p =.251	Rs (109) =0.035 p =.715

Table 26: Spearman rank order correlation - *technology implementation challenges*

6.9.1.6. Relative advantage

Relative advantage (RELADV construct) is expected to positively affect SOA adoption (H6). To explore the effect of the variable, the following hypotheses were identified:

- H_06_a - there is no association in the population between *relative advantage* and *use of SOA*,
- H_16_a - there is an association significantly different from zero between *relative advantage* and *use of SOA*,
- H_06_b – there is no association in the population between *relative advantage* and *SOA project success*,
- H_16_b - there is an association significantly different from zero between *relative advantage* and *SOA project success*.

The results of the tests are presented in Table 27. The results show no statistically significant rank correlation for the variable, and both H_06_a and H_06_b null hypotheses are supported. There is no evidence to suggest that *relative advantage* construct has any effect on SOA adoption.

Variables	Use of SOA-Ordinal	SOA project success-Ordinal
RELADV	Rs (109) =-.031 p =.747	Rs (109) =-.080 p =.402

Table 27: Spearman rank order correlation - *relative advantage*

6.9.1.7. Summary of hypothesis testing for technological context

A summary of the hypotheses testing for the technological context is provided in Table 28. The results suggest significant relationships between *use of SOA* and three independent variables, *use of standards & platforms*, *compatibility*, and *cost*. The results of the simple regression

analysis also confirm the existence of these relationships (with p<.001 for *use of standards & platforms* and *compatibility* and p<.01 for *cost*).

The results show that a number of factors are significant for SOA project success. They include *use of standards & platforms*, *complexity*, *compatibility*, and *cost*.

Variables	Summary of hypotheses testing: technological context	
	Use of SOA	SOA project success
STAND	Rs (109) =.424 p <.001	Rs (109) =.286 p =.002
COMPL	Rs (109) =-.063 p =.514	Rs (109) =-.216 p =.023
COMPA	Rs (109) =.302 p =0.001	Rs (109) =.338 p <0.001
COST	Rs (109) =-.294 p =0.002	Rs (109) =-.353 p <0.001
ITIMPLC	Rs (109) =.110 p =.251	Rs (109) =0.035 p =.715
RELADV	Rs (109) =-.031 p =.747	Rs (109) =-.080 p =.402

Table 28: Summary of hypotheses testing: technological context

6.9.2. Organizational context

Seven ordinal variables and two nominal variables form part of the technological context of the model. Among them are *organization size*, *industry*, *perceived risks*, *human & financial resources*, *top management support*, *governance & strategy*, *organizational change implementation challenges*, *intra-organizational benefits*, and *inter-organizational benefits*. This section discusses the results of the hypotheses testing of these variables.

6.9.2.1. Organization size

Size of an organization is believed to positively affect adoption. In the study, the size of an organization was measured by 3 categorical sub-variables: *total number of employees*, *number of IT staff*, and *total revenue*. To test the relationships between the sub-variables and the nominal variable *use of SOA*, Chi-square test were used. Due to the Chi-square test minimum cell requirements, categories of *total number of employees'* variable were grouped according to the arbitrary classification provided in Table 29.

Less than 50	50 - 99	100 - 499	500 - 999	1000 - 4999	5000 - 9999	10000 or more
small	medium	medium	large	large	very large	very large

Table 29: Grouping of categorical variable *total number of employees* for Chi-square test

Similar grouping was not applied to *number of IT staff*, as the variable alone does not adequately describe *organization size*, i.e. 'small' IT vendor might have a 'large' IT team, while a 'large' organization might have a relatively 'small' IT team. The results of the Chi-square tests for *total number of employees* and *total revenue* variables are provided in Table 30. Both variables were tested against *Use of SOA* and *SOA project success* nominal variables. The Chi-square test results show no evidence of significant relationship between *organization size* and stage of SOA adoption or *SOA project success*.

Categorical variable	Use of SOA - Nominal	SOA project success-Nominal
Total number of employees	Chi-square: 5.85971, df=6, p=.439094	Chi-square: 13.7216, df=9, p=.132595
Total revenue	Chi-square: 12.7668, df=14, p=.544968	Chi-square: 27.1582, df=21, p=.165715

Table 30: Pearson Chi-square test results for *total number of employees* and *total revenue* variables

To test hypothesis H7 **Organization size positively affects adoption**, Kruskal-Wallis ANOVA by Ranks tests were run for the *organization size* sub-variables. The hypotheses are:

- $H_0 7_a$ – population medians of *use of SOA* do not differ by *organization size*,
- $H_1 7_a$ - population medians of *use of SOA* differ by *organization size*,
- $H_0 7_b$ – population medians of *SOA project success* do not differ by *organization size*,
- $H_1 7_b$ - population medians of *SOA project success* differ by *organization size*.

The results of the tests are presented in Table 31. The tests show no statistically significant differences in medians for the sub-variables describing organization size. As a result, the null hypothesis $H_0 7$ is supported, and the H7 hypothesis **Organization size positively affects SOA adoption** is rejected.

Independent variable	Use of SOA-Ordinal	SOA project success - Ordinal
Total number of employees	H (6, N= 109) =8.481898 p =.2049	H (6, N= 109) =10.97362 p =.0892
Number of IT staff	H (5, N= 109) =1.994885 p =.8499	H (5, N= 109) =2.623704 p =.7578
Total revenue	H (7, N= 111) =7.739322 p =.3561	H (7, N= 111) =15.04588 p =.0354

Table 31: Kruskal-Wallis ANOVA by ranks – *organization size*

6.9.2.2. Industry

SOA adoption is expected to be higher in certain industries/sectors (H8). To investigate the effect of the variable on SOA adoption, the following hypotheses were identified:

- $H_0 8_a$ – population medians of *use of SOA* do not differ by *industry*,
- $H_1 8_a$ - population medians of *use of SOA* differ by *industry*,
- $H_0 8_b$ – population medians of *SOA project success* do not differ by *industry*,
- $H_1 8_b$ - population medians of *SOA project success* differ by *industry*.

Industry variable was initially tested with Chi-square test against *Use of SOA* and *SOA project success* nominal variables. The results of the tests are provided in Table 32. The Chi-square test results show no evidence of significant relationship between industry and *use of SOA* or *SOA project success*. The variable was also tested with Kruskal-Wallis test (see Table 33). Although, the significance level (p = .0504) is almost borderline with statistically significant .05 level, there is not enough evidence to reject the null hypothesis $H_0 8_a$. Based on the results of the tests, the H8 hypothesis **SOA adoption differs by industries** is rejected.

Categorical variable	Use of SOA - Nominal	SOA project success-Nominal
Industry	Chi-square: 11.2745, df=6, p=.080267	Chi-square: 10.7386, df=9, p=.294067

Table 32: Pearson Chi-square test results for *industry* variable

Independent variable	Use of SOA-Ordinal	SOA project success - Ordinal
Industry	H (12, N= 111) =20.99620 p =.0504	H (12, N= 111) =13.00329 p =.3688

Table 33: Kruskal-Wallis ANOVA by ranks – *industry*

6.9.2.3. Perceived risks

Perceived risks (RISK construct) negatively affect SOA adoption (H9). To test this variable, the following hypotheses were identified:

- $H_0 9_a$ – there is no association in the population between *perceived risks* and u*se of SOA*,
- $H_1 9_a$ - there is an association significantly different from zero between *perceived risks* and *use of SOA*,
- $H_0 9_b$ – there is no association in the population between *perceived risks* and *SOA project success*,
- $H_1 9_b$ - there is an association significantly different from zero between *perceived risks* and *SOA project success*.

The results of the hypotheses testing are provided in Table 34. The results show no statistically significant rank correlation for the variable, and both $H_0 9_a$ and $H_0 9_b$ null hypotheses are supported. There is no evidence to suggest that *perceived risks* construct has any effect on SOA adoption.

Variables	Use of SOA-Ordinal	SOA project success-Ordinal
RISK	Rs (109) =.162 p =.089	Rs (109) =.060 p =.532

Table 34: Spearman rank order correlation – *perceived risks*

6.9.2.4. Organizational change implementation challenges

Organizational change implementation challenges (ORIMPLC construct), similar to *technology implementation challenges*, can have both positive and negative effect on SOA adoption (H10). While *organizational change implementation challenges* can slow down the adoption, awareness of the need for organizational change may positively affect SOA adoption. That awareness is most likely to change when an organization moves from one stage of SOA adoption to another. The following hypotheses were identified before the testing:

- $H_0 10_a$ – there is no association in the population between *organizational change implementation challenges* and u*se of SOA*,
- $H_1 10_a$ - there is an association significantly different from zero between *organizational change implementation challenges* and u*se of SOA*,
- $H_0 10_b$ – there is no association in the population between *organizational change implementation challenges* and *SOA project success*,
- $H_1 10_b$ - there is an association significantly different from zero between *organizational change implementation challenges* and *SOA project success*.

The results of the tests are provided in Table 35. Although the results supported $H_0 10_b$ null hypothesis (p=.108), they show significant rank correlation for *use of SOA* (p<.05), which allows us to reject $H_0 10_a$ null hypothesis. While there is no evidence to suggest that *organizational change implementation challenges* construct affects *SOA project success*, the tests suggest that it affects *use of SOA*.

Variables	Use of SOA-Ordinal	SOA project success-Ordinal
ORIMPLC	Rs (109) =.188 p =.048	Rs (109) =.153 p =.108

Table 35: Spearman rank order correlation – *organizational change implementation challenges*

6.9.2.5. Top management support

Top management support (TMSP construct) is expected to positively affect SOA adoption (H11). In order to test the variable, the following hypotheses were examined:

- $H_0 11_a$ – there is no association in the population between *top management support* and u*se of SOA*,
- $H_1 11_a$ - there is an association significantly different from zero between *top management support* and u*se of SOA*,
- $H_0 11_b$ – there is no association in the population between *top management support* and *SOA project success*,
- $H_1 11_b$ - there is an association significantly different from zero between *top management support* and *SOA project success*.

The results of the hypotheses testing are provided in Table 36. They show highly significant rank correlation for stage of SOA adoption and *SOA project success* (both at p<.001). This allows us to reject both $H_0 11_a$ and $H_0 11_b$ null hypothesis. The H11 hypothesis, stating that top management support affects SOA adoption, is therefore supported.

Variables	Use of SOA-Ordinal	SOA project success-Ordinal
TMSP	Rs (109) =.365 p <.001	Rs (109) =.389 p <.001

Table 36: Spearman rank order correlation – *top management support*

6.9.2.6. Governance and strategy

Governance & strategy (GVRNSTRAT construct) is expected to have to a positive effect on SOA adoption (H12). The effect of this variable was examined with the following hypotheses:

- $H_0 12_a$ – there is no association in the population between *governance & strategy* and *use of SOA*,

- $H_1 12_a$ - there is an association significantly different from zero between *governance & strategy* and *use of SOA*,
- $H_0 12_b$ – there is no association in the population between *governance & strategy* and *SOA project success*,
- $H_1 12_b$ - there is an association significantly different from zero between *governance & strategy* and *SOA project success*.

The outcomes of the hypotheses testing are provided in Table 37. The results are highly significant at p<.001 for both stage of SOA adoption and SOA project success. This allows us to reject both $H_0 12_a$ and $H_0 12_b$ null hypothesis. The H12 hypothesis, describing effects of governance and strategy on SOA adoption, is therefore supported.

Variables	Use of SOA-Ordinal	SOA project success-Ordinal
GVRNSTRAT	Rs (109) =.452 p <.001	Rs (109) =.475 p <.001

Table 37: Spearman rank order correlation – *governance & strategy*

6.9.2.7. Human and financial resources

Human & financial resources (HFRSRC construct) are expected to have a positive effect on SOA adoption (H13). The following hypotheses were tested against the variable:

- $H_0 13_a$ – there is no association in the population between *human & financial resources* and *use of SOA*,
- $H_1 13_a$ - there is an association significantly different from zero between *human & financial resources* and *use of SOA*,
- $H_0 13_b$ – there is no association in the population between *human & financial resources* and *SOA project success*,
- $H_1 13_b$ - there is an association significantly different from zero between *human & financial resources* and *SOA project success*.

The results of the hypotheses testing are presented in Table 38. They show highly significant rank correlation for stage of SOA adoption (p<.001) and *SOA project success* (p<.001). As a

result, both $H_0 13_a$ and $H_0 13_b$ null hypothesis are rejected. The H13 hypothesis, describing effects of human and financial resources on SOA adoption, is therefore supported.

Variables	Use of SOA-Ordinal	SOA project success-Ordinal
HFRSRC	Rs (109) =.427 p <.001	Rs (109) =.502 p <.001

Table 38: Spearman rank order correlation - *human & financial resources*

6.9.2.8. Perceived benefits at business unit level

Intra-organizational benefits (INTRABENEF construct) are expected to positively affect SOA adoption (H14). To explore the effect of the variable, the following hypotheses were identified:

- $H_0 14_a$ – there is no association in the population between *intra-organizational benefits* and *use of SOA*,
- $H_1 14_a$ - there is an association significantly different from zero between *intra-organizational benefits* and *use of SOA*,
- $H_0 14_b$ – there is no association in the population between *intra-organizational benefits* and *SOA project success*,
- $H_1 14_b$ - there is an association significantly different from zero between *intra-organizational benefits* and *SOA project success*.

The results of the tests are presented in Table 39. Although the results supported $H_0 14_b$ null hypothesis (p=.150), they show significant rank correlation for *use of SOA* (p<.05), which allows us to reject $H_0 14_a$ null hypothesis. While there is no evidence to suggest that *intra-organizational benefits* construct affects *SOA project success*, the tests suggest that it has an effect on the stage of SOA adoption.

Variables	Use of SOA-Ordinal	SOA project success-Ordinal
INTRABENEF	Rs (109) =.190 p =.046	Rs (109) =.138 p =.150

Table 39: Spearman rank order correlation - *intra-organizational benefits*

6.9.2.9. Perceived benefits at organization level

Inter-organizational benefits (INTERBENEF construct) are expected to positively affect SOA adoption (H15). To explore the effect of the variable, the following hypotheses were identified:

- $H_0 15_a$ – there is no association in the population between *inter-organizational benefits* and *use of SOA*,
- $H_1 15_a$ - there is an association significantly different from zero between *inter-organizational benefits* and *use of SOA*,
- $H_0 15_b$ – there is no association in the population between *inter-organizational benefits* and *SOA project success*,
- $H_1 15_b$ - there is an association significantly different from zero between *inter-organizational benefits* and *SOA project success*.

The results of the tests are presented in Table 40.The results show no statistically significant rank correlation for the variable, and both $H_0 15_a$ and $H_0 15_b$ null hypotheses are supported. There is no evidence to suggest that *perceived benefits at organization level* construct has any effect on SOA adoption

Variables	Use of SOA-Ordinal	SOA project success-Ordinal
INTERBENEF	Rs (109) =.065 p =.497	Rs (109) = .070 p =.467

Table 40: Spearman rank order correlation - *inter-organizational benefits*

6.9.2.10. Summary of hypotheses testing for organizational context

A summary of the hypotheses testing for the organizational context variables is provided in Table 41. It shows highly significant results for *top management support*, *governance & strategy*, and *human & financial resources* constructs. The hypothesis testing results confirm the results of the simple regression analysis which also demonstrated highly significant relationships for these variables.

The results show that a number of factors are significant for SOA project success. They include *organizational change implementation challenges* and *intra-organizational SOA benefits*.

Variables	Summary of hypothesis testing: organizational context	
	Use of SOA	SOA project success
Organization size	Chi-square: 5.85971, df=6, p=.439094	Chi-square: 13.7216, df=9, p=.132595
- # of employees	H (6, N= 109) =8.481898 p =.2049	H (6, N= 109) =10.97362 p =.0892
- # of IT staff	H (5, N= 109) =1.994885 p =.8499	H (5, N= 109) =2.623704 p =.7578
- total revenue	Chi-square: 12.7668, df=14, p=.544968	Chi-square: 27.1582, df=21, p=.165715
	H (7, N= 111) =7.739322 p =.3561	H (7, N= 111) =15.04588 p =.0354
Industry	Chi-square: 11.2745, df=6, p=.080267	Chi-square: 10.7386, df=9, p=.294067
	H (12, N= 111) =20.99620 p =.0504	H (12, N= 111) =13.00329 p =.3688
RISK	Rs (109) =.162 p =.089	Rs (109) =.060 p =.532
ORIMPLC	Rs (109) =.188 p =.048	Rs (109) =.153 p =.108
TMSP	Rs (109) =.365 p <.001	Rs (109) =.389 p <.001
GVRNSTRAT	Rs (109) =.452 p <.001	Rs (109) =.475 p <.001
HFRSRC	Rs (109) =.427 p <.001	Rs (109) =.502 p <.001
INTRABENEF	Rs (109) =.190 p =.046	Rs (109) =.138 p =.150
INTERBENEF	Rs (109) =.065 p =.497	Rs (109) = .070 p =.467

Table 41: Summary of hypotheses testing: organizational context

6.9.3. Environmental context

Environmental context of the model includes the following three ordinal variables: *vendor direct influence*, *vendor support for integration and development tools*, *industry pressure and IT media influence*. This section examines results of the hypotheses testing of these variables.

6.9.3.1. Vendor direct influence

Vendor direct influence (VENDI construct) is expected to positively affect SOA adoption (H16). To explore the effect of the variable, the following hypotheses were identified:

- $H_0 16_a$ – there is no association in the population between *vendor direct influence* and *use of SOA*,
- $H_1 16_a$ - there is an association significantly different from zero between *vendor direct influence* and *use of SOA*,
- $H_0 16_b$ – there is no association in the population between *vendor direct influence* and SOA *project success*,
- $H_1 16_b$ - there is an association significantly different from zero between *vendor direct influence* and SOA *project success*.

The results of the tests are presented in Table 42. Though the results supported $H_0 16_a$ null hypothesis (p=.356), they show statistically significant rank correlation for SOA *project success*

($p<.05$), which allows us to reject $H_0 16_b$ null hypotheses. While no evidence was found to suggest that *vendor direct influence* construct affects stage of SOA adoption, the tests suggest that it has an effect on SOA *project success*.

Variables	Use of SOA-Ordinal	SOA project success-Ordinal
VENDI	Rs (109) =.088 p =.356	Rs (109) =.220 p =.021

Table 42: Spearman rank order correlation - *vendor direct influence*

6.9.3.2. Vendor support for integration and development tools

Vendor support for integration & development tools (VENDS construct) is expected to have a positive effect on SOA adoption (H17). The effect of this variable is examined with the following hypotheses:

- $H_0 17_a$ – there is no association in the population between *vendor support for integration & development tools* and *use of SOA*,
- $H_1 17_a$ - there is an association significantly different from zero between *vendor support for integration & development tools* and *use of SOA*,
- $H_0 17_b$ – there is no association in the population between *vendor support for integration & development tools* and SOA *project success*,
- $H_1 17_b$ - there is an association significantly different from zero between *vendor support for integration & development tools* and SOA *project success*.

The outcomes of the hypotheses testing are provided in Table 43. They show significant rank correlation for stage of adoption (*use of SOA*, $p<.05$) and *SOA project success* ($p<.001$). As a result, both $H_0 17_a$ and $H_0 17_b$ null hypothesis are rejected. The H17 hypothesis, describing effects of *vendor support for integration & development tools*, is therefore supported.

Variables	Use of SOA-Ordinal	SOA project success-Ordinal
VENDS	Rs (108) =.306 p =.001	Rs (108) =.325 p <.001

Table 43: Spearman rank order correlation - *vendor support for integration & development tools*

6.9.3.3. Industry pressure and IT media influence

Industry pressure & IT media influence (INSDP construct) is expected to positively affect SOA adoption (H18). To explore the effect of the variable, the following hypotheses were identified:

- $H_0 18_a$ – there is no association in the population between *industry pressure & IT media influence* and *use of SOA*,
- $H_1 18_a$ - there is an association significantly different from zero between *industry pressure & IT media influence* and *use of SOA*,
- $H_0 18_b$ – there is no association in the population between *industry pressure & IT media influence* and SOA *project success*,
- $H_1 18_b$ - there is an association significantly different from zero between *industry pressure & IT media influence* and SOA *project success*.

The results of the tests are presented in Table 44. The results show no statistically significant rank correlation for the variable, and both $H_0 18_a$ and $H_0 18_b$ null hypotheses are supported. There is no evidence to suggest that *industry pressure & IT media influence* construct affect SOA adoption.

Variables	Use of SOA-Ordinal	SOA project success-Ordinal
INDSP	Rs (108) =.067 p =.484	Rs (108) =.158 p =.099

Table 44: Spearman rank order correlation - *pressure & IT media influence*

6.9.3.4. Summary of hypothesis testing for environmental context

A summary of the hypotheses testing for the environmental context is provided in Table 45. The results suggest the existence of a significant relationship (p<.05) between *use of SOA* and *vendor support for integration and development tools* variable. The results of the multiple regression analysis also showed highly significant relationship (p<.01) for this variable.

The results show that a number of factors are significant for SOA project success. They include *vendor direct influence* and *vendor support for integration and development tools*.

Variables	Summary of hypothesis testing for environmental context	
	Use of SOA	SOA project success
VENDI	Rs (109) =.088 p =.356	Rs (109) =.220 p =.021
VENDS	Rs (108) =.306 p =.001	Rs (108) =.325 p <.001
INDSP	Rs (108) =.067 p =.484	Rs (108) =.158 p =.099

Table 45: Summary of hypothesis testing for environmental context

6.9.4. Additional analysis

Some test items that do not form part of the model were included in the questionnaire. The purpose of their inclusion was to gather more information about the way organizations go about their SOA implementations. Such items were approach to starting SOA, SOA project ownership and use of external services. This section discusses the results of the statistical analyses of the differences in groups for the test items that are mentioned.

6.9.4.1. Approach to starting SOA

Organizations may choose different approaches to starting SOA, such as top-down from business strategy, bottom-up from IT projects. Their initiatives can be driven from IT architecture or driven by vendor/consultant. While a number of respondents reported a combination of different approaches; the most widely used approach is to start SOA projects from IT architecture/strategy (50.5%).

To explore the influence of this variable on SOA adoption, Chi-square test was executed first. The results of the tests are provided in Table 46. The results show significant relationship between *approach to starting SOA* and stage of SOA adoption ($p<0.05$), although relationship to *SOA project success* variable is not significant. When expected and observed frequencies were analysed, it appeared that organizations with SOA projects deployed in production more often use top-down approach or build their SOA projects from IT architecture.

Categorical variable	Use of SOA - Nominal	SOA project success - Nominal
Approach to starting SOA	Chi-square: 19.2138, df=8, p=.013764	Chi-square: 18.4485, df=12, p=.102758

Table 46: Pearson Chi-square test results for *approach to starting SOA* item

The variable was also tested with Kruskal-Wallis test. The results are provided in Table 47. They show significant differences in medians between the groups (p<.01), which confirms that approach to starting SOA projects affects SOA adoption.

Independent variable	Use of SOA-Ordinal	SOA project success - Ordinal
Approach to starting SOA	H (4, N= 111) =14.20187 p =.0067	H (4, N= 111) =12.37299 p =.0148

Table 47: Kruskal-Wallis ANOVA by ranks – *approach to starting SOA*

6.9.4.2. SOA project ownership

In order to establish who 'owns' SOA projects in organizations, the question related to SOA project ownership was included in the questionnaire. A number of options were analysed, which included SOA project ownership by business units, by central IT departments of business units, by IT architects and other option.

The influence of *SOA project ownership* on SOA adoption was examined with both Chi-square and Kruskal-Wallis tests. Chi-square test results (Table 48) show highly significant relationship between *SOA project ownership* and stage of SOA (p<.001).

Categorical variable	Use of SOA - Nominal	SOA project success-Nominal
SOA project ownership	Chi-square: 66.6508, df=6, p=.000000	Chi-square: 42.3854, df=9, p=.000003

Table 48: Pearson Chi-square test results for *SOA project ownership* item

Kruskal-Wallis test results are provided in Table 49. They also show highly significant relationship between the *SOA project ownership* and stage of SOA adoption (p<.001). Based on the outcomes of the analysis, the relationship between SOA ownership and SOA adoption is confirmed.

Independent variable	Use of SOA-Ordinal	SOA project success-Ordinal
SOA project ownership	H (3, N= 111) =38.16449 p =.0000	H (3, N= 111) =33.98317 p =.0000

Table 49: Kruskal-Wallis ANOVA by ranks – *SOA project ownership*

6.9.4.3. Use of external services

Organizations can be consumers and providers of external services. The effect of external services use on SOA adoption was therefore examined in the questionnaire. Two items

consumer of external services and *provider of external services* were tested using Chi-square and Mann-Whitney tests. The results of the tests are provided in Table 50 and Table 51 respectively. The results show no evidence of significant relationship between the externals services use and SOA adoption.

Categorical variable	Use of SOA - Nominal	SOA project success-Nominal
Consumer of ext.services	Chi-square: .373589, df=2, p=.829614	Chi-square: .556591, df=3, p=.906294
Provider of ext.services	Chi-square: 4.96975, df=2, p=.083341	Chi-square: 2.31686, df=3, p=.509301

Table 50: Pearson Chi-square test results for *consumer of ext. services* & *provider of ext. services* variables

Independent variable	Use of SOA-Ordinal	SOA project success-Ordinal
Consumer of ex.services	U=1352.50, Z=-0.101, p=.920	U=1276.00, Z=0.579, p=.563
Provider of ex.services	U=1271.00, Z=0.999, p=.318	U=1260.50, Z=1.063, p=.288

Table 51: Mann-Whitney U test for two independent samples – *use of external services*

6.10. Summary of findings

The results of the hypotheses testing reveal significant correlation between various stages of SOA adoption (*use of SOA*) and *use of standards & platforms*, *compatibility*, *cost*, *organizational change implementation challenges*, *top management support*, *governance & strategy*, *human & financial resources*, *intra-organizational benefits*, and *vendor support for integration & development tools*. While the results show no correlation between *complexity* and *vendor influence* and stages of SOA adoption (*use of SOA*), they show significant correlation to *SOA project success*. For *SOA project success* the following variables show significant correlation: *use of standards & platforms*, *complexity*, *compatibility*, *cost*, *top management support*, *governance & strategy*, *human & financial resources*, *vendor influence*, and *vendor support for integration & development tools*.

A summary of the hypotheses testing is provided in Table 52. The research model with the significant results of the hypotheses testing is presented in Figure 34. A detailed discussion of the findings is followed.

Hypo-thesis	Explanation	Use of SOA	SOA project success
H1	Use of standards and platforms positively affects SOA adoption	Supported	Supported
H2	Complexity negatively affects SOA adoption	Not supported	Supported
H3	Compatibility positively affects SOA adoption	Supported	Supported
H4	Cost negatively affects SOA adoption	Supported	Supported
H5	Technology implementation challenges affect SOA adoption	Not supported	Not supported
H6	Relative advantage positively affects SOA adoption	Not supported	Not supported
H7	Size of an organization positively affects SOA adoption	Not supported	Not supported
H8	Industries show different SOA adoption patterns	Not supported	Not supported
H9	Perceived risks negatively affect SOA adoption	Not supported	Not supported
H10	Organizational change implementation challenges affect SOA	Supported	Not supported
H11	Top management support positively affects SOA adoption	Supported	Supported
H12	SOA governance & strategy positively affect SOA adoption	Supported	Supported
H13	Human and financial resources positively affect SOA adoption	Supported	Supported
H14	Intra-organizational SOA benefits positively affect SOA adoption	Supported	Not supported
H15	Inter-organizational benefits positively affect SOA adoption	Not supported	Not supported
H16	Vendor influence positively affects SOA adoption	Not supported	Supported
H17	Vendor support for integration and development tools positively affects SOA adoption	Supported	Supported
H18	Industry pressure and IT media influence positively affect SOA adoption	Not supported	Not supported

Table 52: Summary of hypothesis testing

H1: Use of standards and platforms positively affect SOA adoption

Use of wide range of standards and multiple platforms is considered vital for a successful SOA implementation. The study results confirm that the use of standards and platforms significantly influence the use of SOA and SOA project success.

H2: Complexity negatively affects SOA adoption

The study results suggest that complexity of SOA technology shows no significant relationship to SOA use, but significantly affects SOA project success. SOA technology is known for its large number of existing standards and specifications that are still evolving and maturing. Apart from new standards and specifications, SOA also represents a software architecture shift which is a steep learning curve in itself. These perceptions of SOA complexity might have contributed to the fact that the respondents' perceptions about complexity of SOA in relation to SOA use show no correlation. While awareness of SOA complexity does not prevent organizations from

initiating their SOA projects, it, nonetheless, affects their perceptions about the success of those projects.

H3: Compatibility positively affects SOA adoption

Compatibility with existing enterprise architecture, infrastructure, and existing service-based platforms within an organization, is essential for a successful SOA implementation. The study results confirm that compatibility significantly influences SOA use and SOA project success.

H4: Cost negatively affects SOA adoption

As with any technology adoption, SOA technology adoption requires upfront investments in software, infrastructure, training, setting up governance strategies and procedures, etc. These initial costs of adopting SOA technology are generally high, so it comes as no surprise that SOA is considered to be expensive. Therefore, cost is expected to be a critical factor affecting SOA adoption. The study results confirm that cost of SOA technology significantly influences the use of SOA and SOA project success.

H5: Technology implementation challenges affect SOA adoption

The SOA technology implementation challenges, such as evaluating and selecting SOA tools and frameworks, SOA standards stability and maturity, SOA interoperability, and legacy application integration, were rated highly by the respondents. Although, the respondents demonstrated strong opinions about the SOA technology implementation challenges, the results suggest that there is no correlation between the SOA technology implementation challenges and SOA adoption.

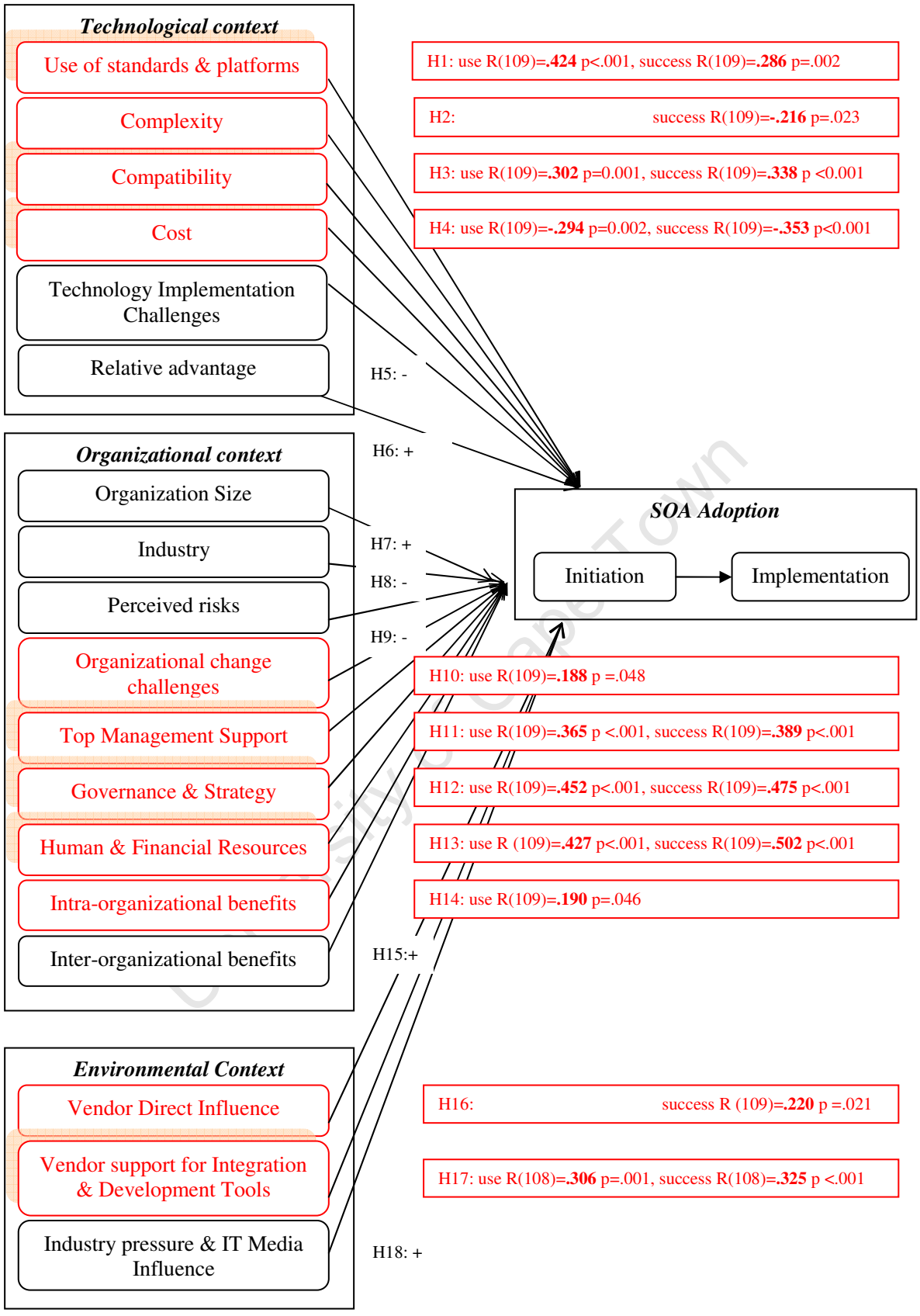

Figure 34: Research model with the hypotheses testing results

H7: Size of an organization positively affects SOA adoption.

While many empirical studies found that large organizations adopt new technology sooner, the study results show that organization size and SOA use do not correlate. While larger companies have access to larger pools of human, financial, and technological resources, small companies tend to be more agile and more cost-conscious. They also might have a less complex organizational structure, with fewer business units and less systems to integrate. Thus, the size of an organization may not be a critical factor in SOA adoption.

H8: Industries show different SOA adoption patterns

Academic literature on innovation suggests that industries show different attitudes towards technology adoption. Innovation activities in “high-tech”, “medium-tech”, and “low-tech” industries differ (Fagerberg, 2004). Furthermore, industries differ in their market size and structure, regulatory requirements, and degrees of demand (Hall, 2004). Although, the study results do not show significant relationship between industry type and SOA use, it has to be mentioned that 69.4% of responses came from just four industries. Under-representation of other industries and adopter’s bias in the survey could be an explanation of the result of this hypothesis testing.

H9: Perceived risks negatively affect SOA adoption

SOA technology risks, such as security, performance, interoperability, reliability, and testing, are widely acknowledged. Although, the respondents demonstrated strong opinions about the SOA risks, the results suggest that there is no correlation between the SOA risks and SOA adoption.

H10: Organizational change implementation challenges affect SOA adoption

Effective technology adoption requires an organizational change (Greenan and Guellec, as cited in Hall, 2004, p.473). SOA adoption triggers a number of organizational activities, such as establishing of SOA base line metrics, enabling design time and run time governance,

integration with BPM and BI initiatives, crafting SOA development process, which enables designing, testing & deploying of high quality and secure services, etc. The respondents demonstrated strong opinions about the SOA organizational change implementation challenges (see section 6.2.10). Although, the results show that there is no correlation between the organizational change implementation challenges and SOA project success, they suggest a weak positive correlation between the variable and the use of SOA. One of the possible explanations in relation to the SOA use is that the magnitude of the organizational change increases along with the stage of SOA adoption, therefore organizational change affects the use of SOA.

H11: Top management support positively affects SOA adoption

Top management hand-on involvement in defining SOA strategy and aligning it with implementation of strategic business planes is critical for any SOA implementation. High-level of top management involvement demonstrates high maturity of SOA initiatives. The study results confirm that top management support significantly affects the use of SOA and the SOA project success.

H12: Effective SOA governance & strategy positively affect SOA adoption

Aligning SOA strategy with existing business and IT strategies and creating effective SOA governance models are important for SOA implementations. Similar to top management support, effective governance demonstrates higher level of maturity of SOA initiatives. The study results confirm that governance and strategy have significant influence on SOA use and SOA project success.

H13: Availability of human & financial resources positively affects SOA adoption

Literature on innovation suggests that “the decision to adopt new technology is fundamentally an investment decision made in an uncertain environment” (Hall, 2004, p.475). Like any technology adoption, SOA adoption requires investment in technology, training and acquisition

of staff, and other complementary investment. The study results confirm that human and financial resources significantly influence use of SOA and SOA project success.

H14: Intra-organizational benefits positively affect SOA adoption

The perceived benefits are often cited as a major factor influencing technology adoption in general and SOA adoption in particular. The perceived SOA benefits at an organizational level are determined by the SOA technology benefits, and these benefits are in turn determined by providers and suppliers of technology. Often adopters have to evaluate the benefits of a technology adoption in an environment of uncertainty about the future path of the technology, its costs and benefits (Hall, 2004). Since the benefits can only be realised *ex post*, at the time of adoption, the adopters have to make a decision to adopt, based on their expectations about the new technology and the benefits it could offer.

The hype surrounding the SOA technology and subsequently the high expectations of the technology benefits may have contributed to the fact that a number of SOA benefits were rated high by the survey respondents (see section 6.2.12). Benefits at the intra-organizational level, reuse, composability, standardised data representation, vendor neutral communications infrastructure, improved business processes, reduced TCO within IT portfolio, show significant correlation to SOA use which is in line with the DOI theory. While the intra-organizational benefits significantly influence the use of SOA, the results show no correlation between the intra-organizational benefits and SOA project success. One of the possible explanations is the above-mentioned delay in the realisation of the technology adoption benefits.

H15: Inter-organizational benefits positively affect SOA adoption

The perceived benefits at an inter-organizational level, improved system integration, improved information flow, improved organizational agility (increased TTM), and improved B2B integration, did not show significant correlation to SOA use and SOA project success. One of the possible explanations is that the inter-organizational benefits may be secondary to the intra-organizational benefits as an organization may view their priority in realising the benefits within

the organization first. Similar to the intra-organizational benefits, the realization of the inter-organizational benefits is normally delayed and this may explain the results of this hypothesis testing.

H16: Vendor influence positively affects SOA adoption

Technology providers often try to promote the adoption of new technology by giving discounts on new technology purchases, offering competitive upgrades to newer technology, providing free help and training to potential customers (Hall, 2004). All this constitutes direct support for technology. Although, vendor support for SOA examined in the survey showed no significant correlation to SOA use, it shows significant correlation to SOA project success.

H17: Vendor support for integration and development tools positively affects SOA adoption

Various integration and development tools supporting heterogeneous environments and run time monitoring tools are important in SOA lifecycle; therefore, indirect vendor support for these capabilities was examined in the survey. The survey results confirm that vendor support for system integration and development tools is significant for the use of SOA and SOA project success.

H18: Industry pressure and IT media influence positively affect SOA adoption

This hypothesis explores network effects of SOA technology adoption and IT media influence on the adoption. The adoption literature suggests that the value of new technology increases when business partners belonging to the same business network adopt technology (Hall, 2004). Hence, the effect of business partners as well as competitors pressure on SOA technology adoption was examined. Another factor included in the hypothesis was media exposure. The results of the hypothesis testing suggested that industry pressure and IT media influence showed no significant relationship to SOA use and SOA project success. The lack of significance for industry pressure may be attributed to the fact that SOA is normally contained

within organizational boundaries and does not require external interaction as opposed to cloud computing options. Although the media coverage of the SOA technology does not directly affect SOA use, the hype surrounding SOA may have indirectly contributed to the way the technology is perceived by the respondents.

SOA project ownership

Analysis of expected and observed frequencies revealed that SOA implementations deployed in production are more often than not 'owned' by business units or central IT departments of business units. One possible explanation is that SOA project ownership may change during the SOA project lifecycle, i.e. a business unit may take ownership of SOA project when its implementation is stable and mature. Similarly, when a link between SOA project ownership and their success is analysed, it revealed that successful implementation are more often than not owned by business units or central IT departments of business units, while partially successful implementations are more often than not owned by IT architects at a project level.

7. Conclusion

This chapter summarises the results of the study. It reviews the theoretical contribution of the research, its implications and limitations, and discusses further research opportunities.

7.1. Review of theory

To date, there is paucity of academic research on the topic of SOA adoption. Empirical research using large–scale surveys is scarce. To the best of author's knowledge, no survey on SOA adoption in South Africa has been conducted before.

A number of researchers highlighted the need for a conceptual model which would help to explore SOA adoption, its drivers and inhibitors, and could be used as a basis for future studies on SOA adoption. This study developed a model of SOA adoption, which was built on the basis of DOI theory, TOE framework, and extensive review of IT diffusion literature and SOA literature. Based on the suggested model of SOA adoption, a survey research instrument was developed and validated. Furthermore, a survey on organizational adoption of SOA in South Africa was conducted.

7.2. Implications of the research

The results presented in the study give some insight into the state of SOA adoption among South African enterprises. The results confirm that SOA is an emerging technology in South African organizations. While some organizations are developing or pilot-testing their SOA projects, a number of organizations have their SOA implementations deployed in production either at an enterprise or department level.

The results of the study are consistent with previous industry surveys on SOA adoption conducted in developed countries. For example, similar to the results of the 2008 "State of SOA adoption survey" (AmberPoint, 2008), the South African respondents view SOA as a solution to inflexible and hard-to-integrate systems. Consistent with the "State of SOA Survey 2010" (TechTarget, 2010), organizational agility, improved business processes, reuse, reduced TCO, data integration and legacy application integration are among the most important benefits the

South African respondents are expecting to achieve in their SOA implementations. The most pressing challenges of SOA adoption are issues related to SOA lifecycle: designing high quality services, testing and deploying services, ensuring run-time governance, designing SOA security, and issues related to SOA standards stability and maturity.

The research findings improve our understanding of important factors affecting SOA adoption. Use of multiple standards and platforms, compatibility, cost, top management support, good governance and strategy, adequate human and financial resources, vendor support for integration and development tools are significant factors for both SOA adoption and SOA project success. Organizational change and intra-organizational benefits are significant factors for the use of SOA, while complexity and vendor influence are only significant for SOA project success. Therefore, organizations pursuing SOA need to ensure these factors are properly addressed and not overlooked.

7.3. Limitations and further research

One of the main limitations of the study is that, due to non-probability sampling technique used, the results of the study do not represent the general population of the South African organizations. However, despite the adopter's bias in the final sample, the researcher is of the opinion that the sample is representative of the companies that have adopted SOA or in the process of adoption.

The results of this study open opportunities for further research in the field of SOA adoption in South Africa. One of the promising options is a combination of quantitative and qualitative cross-sectional analysis. The qualitative analysis could aim at discovering the current status of SOA initiatives within an organization, challenges of SOA implementations, lesson learned and best practices adopted, perceived and realised benefits, SOA strategies and governance models, as well SOA-related metrics. Information collected could provide rich data that would supplement quantitative research results and allow reviewing the SOA adoption research model. Another option is to conduct a longitudinal case study of organizational adoption of SOA in the South African context. Similarly to the qualitative approach, case study approach will

allow for in-depth investigation of SOA adoption process. Both of the suggested approaches have the potential to further improve our understanding of a technology adoption phenomenon in general and SOA adoption in particular. It will also allow in-depth exploring of subsequent organizational change which is triggered by the technology adoption process.

References

AmberPoint. (2008). *State of SOA adoption survey: Gauging the Use of SOA Systems in the Enterprise*. Retrieved April 14, 2010, from http://www.ebizq.net/white_papers/8864.html.

Arsanjani, A., & Holley, K. (2005). *Increase flexibility with the Service Integration Maturity Model (SIMM): Maturity, adoption, and transformation to SOA*. Retrieved June 23, 2009, from http://www.ibm.com/developerworks/webservices/library/ws-soa-simm/.

Arsanjani, A., Zhang, L.-J., Ellis, M., Allam, A., & Channabasavaiah, K. (2007). *Design an SOA solution using a reference architecture.* Retrieved June 11, 2009, from https://www.ibm.com/developerworks/library/ar-archtemp/.

Baer, T. (2008). Web paradigm arises as alternative to SOA. *Manufacturing Business Technology*, 26(6), 44-47.

Barry, D.K. (2003). *Web Services and Service-Oriented Architectures: The Savvy Manager's Guide*. San-Francisco: Morgan Kaufmann Publishers.

Basoglu, N., Daim, T., & Kerimoglu, O. (2007). Organizational adoption of enterprise resource planning systems: A Conceptual framework. *Journal of High technology Management Research*, 18, 73-97.

Basole, R.C. (2005). *Mobilizing the enterprise: A conceptual model of transformational value and enterprise readiness*. Paper presented at the 26th American Society for Engineering Management (ASEM) National Conference, Virginia Beach, Virginia, USA.

Beack, T. (2006). *SOA Maturity Model: Compass on the SOA Journey.* Retrieved June 23, 2009, from http://www.soainstitute.org/articles/article/article/soa-maturity-model-compass-on-the-soa-journey.html.

Boh, W.F., & Yellin, D. (2006). Using Enterprise Architecture Standards in Managing Information Technology. *Journal of Management Information Systems*, 23(3), 163-207.

Bradford, M., & Florin, J. (2003). Examining the role of innovation diffusion factors on the implementation success of enterprise resource planning systems. *International Journal of Accounting Information Systems*, 4, 205-225.

CA Wily. (2008). *CA Wily TechWeb Study Results*. Retrieved May 31, 2009, from http://www.ca.com/files/SupportingPieces/cmp-global-survey_196383.pdf.

Chen, M. (2003). Factors affecting the adoption and diffusion of XML and Web services standards for E-business systems. *International Journal of Human-computer Studies*, 58, 259-279.

Chen, M. (2005). An analysis of the driving forces for Web services adoption. *Information Systems and E-Business Management*, 3(3), 265-279.

Chen, A.N.K., Sen, S., & Shao, B.B.M. (2006). Strategies for effective Web services adoption for dynamic e-businesses. *Decision Support Systems,* 42(2), 789–809.

Chwelos, P., Benbasat, I., & Dexter, A.S. (2001). Research Report: Empirical Test of an EDI Adoption Model. *Information Systems Research*, 12(3), 304-321.

Ciganek, A.P., Haines, M.N., & Haseman, W.D. (2005). *Challenges of Adopting Web Services: Experiences from the Financial Industry*. Paper presented at the 38th Annual Hawaii international Conference on System Sciences, Waikoloa, Hawaii, USA.

Ciganek, A.P., Haines, M.N., & Haseman, W.D. (2006). *Horizontal and vertical factors influencing the adoption of Web services*. Paper presented at the 39th Annual Hawaii international Conference on System Sciences, Kauai, Hawaii, USA.

CIO Council. (2008). *Practical Guide to Service Oriented Architecture (PGFSOA) v1.1*. Retrieved June 27, 2009, from http://www.cio.gov/index.cfm?function=specdoc&id=Practical%20Guide%20to%20Service%20Oriented%20Architecture%20(PGFSOA)%20v1.1&structure=Enterprise%20Architecture&category=Enterprise%20Architecture.

Clarke, G.M., & Cooke, D. (1992). *A basic course in statistics* (3rd ed.). London: Edward Arnold.

Cohen, S. (2007). Ontology and Taxonomy of Services in a Service-Oriented Architecture. *Microsoft Architect Journal,* Journal 11. Retrieved June 27, 2009, from http://msdn.microsoft.com/en-us/library/bb491121.aspx.

DeVellis, R.F. (1991). *Scale development*. Newbury Park, NJ: Sage Publications.

Erickson, J., & Siau, K. (2008). Web Services, Service-Oriented Computing, and Service-Oriented Architecture: Separating Hype from Reality. *Journal of Database Management*, 19 (3), 42-54.

Erl, T. (2005). *Service-Oriented Architecture: Concepts, Technology, and Design*. Upper Saddle River: Prentice Hall Professional Technical Reference.

Fagerberg, J. (2004). Innovation: A guide to the literature. In J. Fagerberg, D.C. Mowery, & R.R. Nelson (Eds.), *The Oxford Handbook of Innovation* (pp. 459-484). Oxford: Oxford University Press.

Flowers, K. (2009). *Changing the Game: How Coca Cola Enterprises is leveraging SOA to transform their enterprise*. Presentation at SOA Summit 2009, Scottsdale, AZ, USA. Retrieved June 21, 2009, from http://softwareag.s3.amazonaws.com/presentations/game.pdf.

Frambach, R.T., & Schillewaert, N. (2002). Organizational innovation adoption: A multi-level framework of determinants and opportunities for future research. *Journal of Business Research*, 55, 163-176.

Gartner. (2009). Gartner Survey Shows 40 Per Cent of SOA Users Don't Measure Time to Achieve Return on Investment. Retrieved May 31, 2009, from http://www.gartner.com/it/page.jsp?id=978712.

Ghazizadeh, Y. A. (2009). *Total Cost of Ownership: Factors to Consider*. Retrieved February 21, 2011, from http://software.intel.com/en-us/articles/total-cost-of-ownership-factors-to-consider/.

Grandon, E.E., & Pearson, J.M. (2004). Electronic commerce adoption: an empirical study of small and medium US businesses. *Information & Management*, 42, 197-216.

Gulledge, T., & Deller, G. (2009). Service-oriented concepts: bridging between managers and technologists. *Industrial Management& Data Systems*, 109(1), 5-15.

Hackney, R., Xu, H., & Ranchhod, A. (2006). Evaluating Web Services: Towards a framework for emerging contexts. *European Journal of Operational Research*, 173, 1161-1174.

Haines, M.N., & Haseman, W.D. (2009). *Service-Oriented Architecture Adoption Patterns*. Paper presented at the 42nd Annual Hawaii international Conference on System Sciences, Waikoloa, Hawaii, USA.

Haines, M. N. (2007). *The Impact of Service-Oriented Application Development on Software Development Methodology*. In Proceedings of the 40th Annual Hawaii international Conference on System Sciences. Retrieved June 21, 2009, from http://www2.computer.org/portal/web/csdl/doi/10.1109/HICSS.2007.537.

Hall, B.H. (2004). Innovation and diffusion. In J. Fagerberg, D.C. Mowery, & R.R. Nelson (Eds.), *The Oxford Handbook of Innovation* (pp. 459-484). Oxford: Oxford University Press.

Iacovou, C.L., Benbasat, I., Dexter, A.S. (1995). Electronic Data Interchange and Small Organizations: Adoption and Impact of Technology. *MIS Quarterly*, 19(4), 465-485.

IBM. (n.d.a). *IBM SOA Maturity Assessment Tool*. . Retrieved April 17, 2010, from https://www14.software.ibm.com/iwm/web/cc/flash/soa/en/us/Tool.htm.

IBM. (n.d.b). *Service-oriented architecture – SOA*. Retrieved June 21, 2009, from http://www-01.ibm.com/software/solutions/soa/.

innoQ. (2007). *Web Services Standards Overview.* Retrieved June 23, 2009, from http://www.innoq.com/soa/ws-standards/poster/innoQ%20WS-Standards%20Poster%202007-02.pdf.

Jamieson, S. (2004). Likert scales: how to (ab)use them. *Medical education*, 38, 1217-1218.

Kajko-Mattsson, M., Lewis, G.A., & Smith, D.B. (2008). *Evolution and Maintenance of SOA-Based Systems at SAS*. Paper presented at the 41th Annual Hawaii international Conference on System Sciences, Waikoloa, Hawaii, USA.

Karahanna, E., Straub, D.W., & Chervany, N.L. (1999). Information Technology Adoption Across Time: A Cross-Sectional Comparison of Pre-adoption and Post-adoption Beliefs. *MIS Quarterly*, 23(2), 183-213.

Kontogiannis, K., Lewis, G.A., & Smith, D.B. (2007). *The Landscape of Service-Oriented Systems: A Research Perspective for Maintenance and Reengineering*. Paper presented at the 11th European Conference on Software Maintenance and Reengineering “Software Evolution in

Complex Software Intensive Systems", Amsterdam, the Netherlands. Retrieved June 21, 2009, from http://www.cs.vu.nl/csmr2007/workshops/1-%20PositionPaper-SOAM-v2-4.pdf.

Kuan, K.K.Y., & Chau, P.Y.K. (2001). A perception-based model for EDI adoption in small businesses using a technology-organization-environment framework. *Information & Management*, 38, 507-521.

Kwon, T.H., & Zmud, R.W. (1987). Unifying the Fragmented Models of Information Systems Implementation. In R. J. Boland & R. A. Hirschheim (Eds.), *Critical Issues in Information Systems Research* (pp. 252-257). New York: John-Wiley.

Legner, C., & Heutschi, R. (2007). *SOA adoption in practice - findings from early SOA implementations*. Paper presented at 15th European Conference on Information Systems, St.Gallen, Switzerland.

Lewis, G., Simanta, S., Morris, E., Wrage, L., & Smith, D. (2007). Common Misconceptions About Service-Oriented Architecture. *CrossTalk – The Journal of Defence Software Engineering*, November'2007. Retrieved May 31, 2009, from http://www.stsc.hill.af.mil/CrossTalk/2007/11/0711LewisMorrisSmithSimantaWrage.html.

Lewis, G., & Smith, D. (2007). Four Pillars of Service-Oriented Architecture. *CrossTalk – The Journal of Defence Software Engineering*, September'2007. Retrieved May 31, 2009, from http://www.stsc.hill.af.mil/CrossTalk/2007/09/0709LewisSmith.html.

Little, M. (2009). SOA in the Real World blog: Important SOA Metrics You Need to Know About. Retrieved June 21, 2009, from http://www.ebizq.net/topics/soa/features/11174.html?page=1.

Luthria, H., & Rabhi, F. (2009). Service Oriented Computing in Practice – An Agenda for Research into the Factors Influencing the Organizational Adoption of Service Oriented Architectures. *Journal of Theoretical and Applied Electronic Commerce Research*, 4(1), 39-56.

Lippert, S.K., & Govindarajulu, C. (2006). Technological, organizational, and environmental antecedents to Web services adoption. *Communications of the International Information Management Association*, 6(1), 146-158.

Manes, A.T. (2009a). *Application Platform Strategies Blog: SOA is Dead; Long Live Services*. Retrieved May 31, 2009, from http://apsblog.burtongroup.com/2009/01/soa-is-dead-long-live-services.html.

Manes, A.T. (2009b). *Application Platform Strategies Blog: SOA: It's Dead, Jim!* Retrieved June 19, 2009, from http://apsblog.burtongroup.com/2009/05/soa-its-dead-jim.html.

McKendrick, J. (2009). *Service-oriented architecture blog: Forrester: Only one percent have negative experience with SOA*. Retrieved June 20, 2009, from http://blogs.zdnet.com/service-oriented/?p=2053.

Meehan, M. (2008). *SOA adoption marked by broad failure and wild success*. Retrieved June 21, 2009, from http://searchsoa.techtarget.com/news/article/0,289142,sid26_gci1319609,00.html.

Neubarth, M. (2010). *SOA: Dead or Alive?* Retrieved April 14, 2010, from http://www.ciozone.com/index.php/SOA/SOA-Dead-or-Aliveu.html

Ngai, E.W.T., Cheng, T.C.E., & Ho, S.S.M. (2004). Critical Success Factors of Web-based Supply Chain Management System Using Exploratory Factor Analysis. *Production, Planning & Control*, 5(6), 622 - 630.

OASIS. (2006). *Reference Model for Service Oriented Architecture 1.0*. Retrieved June 21, 2009, from http://docs.oasis-open.org/soa-rm/v1.0/soa-rm.pdf.

Oates, B.J. (2006). *Researching Information Systems and Computing*. London: Sage Publications.

O'Brien , L., Bass, L., & Merson, P. (2005). *Quality Attributes and Service-Oriented Architectures*. Retrieved May 31, 2009, from http://www.sei.cmu.edu/pub/documents/05.reports/pdf/05tn014.pdf.

Open Group. (2009). *SOA source book*, Retrieved May 31, 2009, from http://www.opengroup.org/projects/soa-book/.

Open Group. (n.d.). *Service-oriented architecture*. Retrieved June 21, 2009, from http://www.opengroup.org/projects/soa/.

Papazoglou, M.P. (2003). *Service-oriented computing: Concepts, Characteristics and Directions*. Paper presented at the Fourth International Conference on Web Information Systems Engineering. Retrieved June 27, 2009, from https://noppa.tkk.fi/noppa/kurssi/t-

86.5141/materiaali/l7__service-oriented_computing__concepts__characteristics_and_directrions.pdf.

Phippen, A.D., Taylor, J., & Allen, R. (2005*).* Issues in moving from web services to service orientation. *Internet Research*, 15(5), 518-526.

Premkumar, G., & Potter, M. (1995). Adoption of Computer Aided Software Engineering (CASE) Technology: An Innovation Adoption Perspective. *Data Base Advances*, 26(2-3), 105-124.

Ren, M., & Lyytinen, K. (2008). Building Enterprise Architecture Agility and Sustenance with SOA. *Communications of AIS*, 2008(22), 75-86.

Rogers, E.M. (2003). *Diffusion of Innovations* (5th ed.). New York: The Free Press.

Salasin, J., & Madni, A.M. (2007). Metrics for Service-Oriented Architecture (SOA) Systems: What Developers Should Know. *Journal of Integrated Design & Process Science*, 11(2), 55-71.

Schepers, T.G.J., Iacob, M.E., & Van Eck, P.A.T. (2008). *A lifecycle approach to SOA governance*. Paper presented at the 2008 ACM Symposium on Applied Computing, Fortaleza, Ceara, Brazil.

Schindler, E. (2008). *Service-Oriented Architecture Pays Off for Synovus Financial*. Retrieved June 27, 2009, from http://www.cio.com/article/451894/Service_Oriented_Architecture_Pays_Off_for_Synovus_Financial.

Schmidt, M.-T., & Kalyana, S.S. (2004). *The On Demand operating environment*. Retrieved June 30, 2009, from http://www.ibm.com/developerworks/library/i-odoe1/.

Smith, J. (2009). *SOA in the Real World blog*: *SOA Isn't Dead, It Just Needs to be Measured Effectively.* Retrieved June 21, 2009, from http://www.ebizq.net/topics/soa/features/11160.html?page=1.

SOA Consortium. (2007). *SOA Industry Case Studies*. Retrieved June 27, 2009, from http://www.soa-consortium.org/SOA_Consortium_Business_Case_Studies.pdf.

SOA Summit. (2009). *SOA Summit 2009*. Retrieved June 27, 2009, from http://www.soasummit2009.com/.

Sonic Software. (2005). *A New Service-Oriented Architecture (SOA) Maturity Model*. Retrieved June 23, 2009, from http://www.sonicsoftware.com/products/whitepapers/docs/soa_mm_wp-en.pdf.

StatSoft. (n.d.). *Principal Components and Factor Analysis*. Retrieved January 31, 2011, from http://www.statsoft.com/textbook/principal-components-factor-analysis/#index.

Swanson, E.B. (1994). Information Systems Innovation among Organizations. *Management Science*, 40(9), 1069-1092.

TechTarget. (2010). *State of SOA Survey 2010*. Retrieved April 22, 2010, from http://media.techtarget.com/searchSOA/downloads/TTAG-State-of-SOA-2010-execSummary-working-523%5B1%5D.pdf.

Tornatzky, L.G., & Klein, R.J. (1982). Innovation characteristics and innovation adoption-implementation: A meta-analysis of findings. *IEEE Transactions on Engineering Management*, EM-29(1), 28–45.

Tornatzky, L.G., & Fleischer, M. (1990). *The Processes of Technological Innovation*. Lexington, Massachusetts: Lexington Books.

Valcamp, S. (2009). *Performance-Driven SOA Adoption: Gaining Momentum from One Project to the Next.* Presentation at SOA Summit 2009, Scottsdale, AZ, USA. Retrieved June 27, 2009, from http://softwareag.s3.amazonaws.com/presentations/measuring.pdf.

Varadan, R., Channabasavaiah, K., Simpson, S., Holley, K., & Allam, A. (2008). Increasing business flexibility and SOA adoption through effective SOA governance. *IBM Systems Journal*, 47(3).

Veger, M. (2008). *A Stage Maturity Model for the adoption of an enterprise-wide Service-Oriented Architecture (SMM-SOA): a multi-case study research*. Master's thesis. University of Twente. Retrieved April 04, 2010, from http://www.via-nova-architectura.org/files/magazine/Veger.pdf.

Viering, G., Legner, C., & Ahlemann, F. (2009). *The (lacking) business perspective on SOA – critical themes in SOA research.* Retrieved June 21, 2009, from

http://web.iwi.unisg.ch/org/iwi/iwi_pub.nsf/wwwPublYearGer/70CF80884613176AC125750F005D0727/$file/SOA%20Impact%20Final%20015%20GVi.pdf.

Walker, L. (2007). IBM business transformation enabled by service-oriented architecture. *IBM Systems Journal*, 46(4).

World Wide Web Consortium. (2004). *Web Services Glossary*. Retrieved May 31, 2009, from http://www.w3.org/TR/ws-gloss/.

Wu, C. (2004). A readiness model for adopting Web services. *The Journal of Enterprise Information Management*, 17(5), 361-371.

Xu, H., Sharma, S.K., & Hackney, R. (2005). Web service innovation research: Towards a dual-core model. *International Journal of Information Management*, 25, 321-334.

Zaltman, G., Duncan, R., & Holbek, J. (1973). *Innovations and organizations*. New York: Willey.

Zhu, K., Kraemer, K., & Xu, S. (2003). Electronic business adoption by European firms: a cross-country assessment of facilitators and inhibitors. *European Journal of Information Systems*, 12, 251-268.

Zhu, K., Kraemer, K.L., & Xu, S. (2006). The process of Innovation Assimilation by Firms in Different Countries: A technology Diffusion Perspective on E-Business. Management Science, 52(10), 1557-1576.

Acronyms

B2B	Business-to-business integration
CASE	Computer Aided Software Engineering
CIO	Chief Information Officer
CISO	Chief Information Security Officer
CMMI	Capability Maturity Model Integration
CRM	Customer Relationship Management
CSO	Chief Security Officer
CSV	Comma separated values
CTO	Chief Technology Officer
DOI	Diffusion of Innovations
EA	Enterprise Architecture
EDI	Electronic Data Interchange
ERP	Enterprise Resource Planning
HRM	Human Resource Management
IaaS	Infrastructure-as-a-Service
IETF	Internet Engineering Task Force
LOB	Line of Business
OASIS	Organization for the Advancement of Structured Information Standards
OSIMM	The Open Group Services Integration Maturity model
PaaS	Platform-as-a-Service
PLM	Product Lifecycle management
QoS	Quality of Service
ROI	Return on investment
SaaS	Software-as-a-Service
SIMM	Service Integration Maturity Model
SOA	Service-Oriented Architecture
SOC	Service-Oriented Computing
SOA MM	Service oriented architecture maturity model
SOAP	Simple Object Access Protocol
TOE	Technology-organization-environment framework
TTM	Time to market
UDDI	Universal Description Discovery and Integration
VP	Vice-President
W3C	World Wide Web Consortium
WSDL	Web Service Definition Language
WS	Web Services
WS-I	Web Service Interoperability Organization
XML	Extensible Markup Language

Table 53: Table of acronyms

Appendix A. SOA adoption constructs and items (initial model)

Construct	Item	Label	Question
H1: Use of standards & platforms (STAND)	Specifications & standards used	STAND1	9
	Services & platforms utilised	STAND2	10
H2: Complexity (COMPL)	Steep learning curve	COMPL1	11
	Require a lot of research & prototyping	COMPL2	12
H3:Compatibility (COMPA)	Compatibility with existing EA	COMPA1	13
	Supported with secure & reliable infrastructure	COMPA2	14
	Compatibility with existing SOA platforms	COMPA3	15
H4: Cost (COST)	High initial investment to SOA infrastructure	COST1	16
	High cost to develop or integrate SOA solutions	COST2	17
	Difficult to accept business case for SOA	COST3	18
H5: Implementation challenges (IMPLC)	Evaluating and selecting tools & frameworks	IMPLC1	19.1
	SOA standards stability & maturity	IMPLC2	19.2
	Establishing base line metrics	IMPLC3	19.3
	Integration with other initiatives (BPM, BI, etc.)	IMPLC4	19.4
	Design of SOA security	IMPLC5	19.5
	Crafting SOA development process	IMPLC6	19.6
	Design of high quality services	IMPLC7	19.7
	Testing & deploying services	IMPLC8	19.8
	Effective design time governance	IMPLC9	19.9
	Effective run time governance	IMPLC10	19.10
H6: Relative advantage (RELADV)	Reduce lengthy application development cycles	RELADV1	37.1
	Reduce high cost of application development	RELADV2	37.2
	Improve system integration	RELADV3	37.3
	Improve information flow	RELADV4	37.4
H7: Organization size	Number of employees	n/a	47
	Number of IT staff	n/a	48
	Total revenue	n/a	49
H8: Industry	Industry	n/a	50
H9: Risks (RISK)	Security	RISK1	20.1
	Performance	RISK2	20.2
	Interoperability	RISK3	20.3
	Reliability	RISK4	20.4
	Testing	RISK5	20.5
H10: IT skills/ expertise (EXPR)	Previous experience in SOA	EXPR1	21
	Existing qualifications & skills in SOA	EXPR2	22
	Adequate training in SOA	EXPR3	23
H11: Top management support (TMSP)	Understanding of benefits in business terms	TMSP1	24
	Authority concerning SOA projects	TMSP2	25
	SOA as key mechanism to implementation of business plans	TMSP3	26
H12: Strategy & plan (STRAT)	Business strategy support for decomposing and use of services	STRAT1	27
	IT strategy support for application integration with services	STRAT2	28
	Business-driven SOA strategy	STRAT3	29
H13: Governance (GVRN)	SOA governance integration with IT governance	GVRN1	30
	Established governance body	GVRN2	31
	Existing service ownership model	GVRN3	32

	Service operational management & monitoring	GVRN4	33
H14: Resources (RSRC)	Adequate budget for SOA-enabling a solution project	RSRC1	34
	Adequate budget for SOA infrastructure	RSRC2	35
	Sufficient skilled staff on SOA projects	RSRC3	36
H15: Perceived benefits (BENEF)	Improved interoperability	BENEF1	38.1
	Reuse	BENEF2	38.2
	Composability	BENEF3	38.3
	Legacy application integration	BENEF4	38.4
	Standardized data representation	BENEF5	38.5
	Vendor neutral communications infrastructure	BENEF6	38.6
	Improved organizational agility (increased TTM)	BENEF7	38.7
	Improved business processes	BENEF8	38.8
	Improved B2B integration	BENEF9	38.9
	Reduced TCO within IT portfolio	BENEF10	38.10
H16: Vendor support (VENDS)	Support for SOA	VENDS1	39
	Support for integration of packaged applications	VENDS2	40
	Support for development tools	VENDS3	41
H17: Industry pressure (INDSP)	Request or recommendation from business partners	INDSP1	42
	Competitors SOA initiatives or plans	INDSP2	43
H18: IT Media influence (ITMED)	Coverage of successful SOA implementations	ITMED1	44
	SOA as the next 'big thing'	ITMED2	45

Table 54: SOA adoption constructs and items (initial model)

Appendix B. SOA adoption constructs and items (reviewed model)

Construct	Item	Label	Factor	Question
H1: Use of standards & platforms (STAND)	Specifications & standards used	STAND1	14	9
	Services & platforms utilised	STAND2		10
H2: Complexity (COMPL)	Steep learning curve	COMPL1	8(1)	11
	Require a lot of research & prototyping	COMPL2		12
H3: Compatibility (COMPA)	Compatibility with existing EA	COMPA1	10	13
	Supported with secure & reliable infrastructure	COMPA2		14
	Compatibility with existing SOA platforms	COMPA3		15
H4: Cost (COST)	High initial investment to SOA infrastructure	COST1	8(2)	16
	High cost to develop or integrate SOA solutions	COST2		17
	Difficult to accept business case for SOA	COST3		18
H5: Technology implementation challenges (ITIMPLC)	Evaluating and selecting tools & frameworks	IMPLC1	6	19.1
	SOA standards stability & maturity	IMPLC2		19.2
	Improved interoperability	BENEF1		38.1
	Legacy application integration	BENEF4		38.4
H6: Relative advantage (RELADV)	Reduce lengthy application development cycles	RELADV1	11	37.1
	Reduce high cost of application development	RELADV2		37.2
H7: Organization size	Number of employees		n/a	47
	Number of IT staff		n/a	48
	Total revenue		n/a	49
H8: Industry	Industry		n/a	50
H9: Risks (RISK)	Security	RISK1	13	20.1
	Performance	RISK2		20.2
	Interoperability	RISK3		20.3
	Reliability	RISK4		20.4
	Testing	RISK5		20.5
H10: Organizational change implementation challenges (ORIMPLC)	Establishing base line metrics	IMPLC3	1	19.3
	Integration with other initiatives (BPM, BI, etc.)	IMPLC4		19.4
	Design of SOA security	IMPLC5		19.5
	Crafting SOA development process	IMPLC6		19.6
	Design of high quality services	IMPLC7		19.7
	Testing & deploying services	IMPLC8		19.8
	Effective design time governance	IMPLC9		19.9
	Effective run time governance	IMPLC10		19.10
H11: Top management support (TMSP)	Understanding of benefits in business terms	TMSP1	9	24
	SOA as key mechanism to implementation of business plans	TMSP3		26
	Business-driven SOA strategy	STRAT3		29
H12: Governance & Strategy (GVRNSTRAT)	Business strategy support for decomposing and use of services	STRAT1	2(1)	27
	IT strategy support for application integration with services	STRAT2		28
	SOA governance integration with IT governance	GVRN1		30
	Established governance body	GVRN2		31

	Existing service ownership model	GVRN3		32
	Service operational management & monitoring	GVRN4		33
	Authority concerning SOA projects	TMSP2		25
H13: Human & Financial Resources (HFRSRC)	Adequate budget for SOA-enabling a solution project	RSRC1	2[(2)]	34
	Adequate budget for SOA infrastructure	RSRC2		35
	Sufficient skilled staff on SOA projects	RSRC3		36
	Previous experience in SOA	EXPR1		21
	Existing qualifications & skills in SOA	EXPR2		22
	Adequate training in SOA	EXPR3		23
H14: Intra-organizational benefits (INTRABENEF)	Reuse	BENEF2	7	38.2
	Composability	BENEF3		38.3
	Standardized data representation	BENEF5		38.5
	Vendor neutral communications infrastructure	BENEF6		38.6
	Improved business processes	BENEF8		38.8
	Reduced TCO within IT portfolio	BENEF10		38.10
H15: Inter-organizational benefits (INTERBENEF)	Improved system integration	RELADV3	4	37.3
	Improved information flow	RELADV4		37.4
	Improved organizational agility (increased TTM)	BENEF7		38.7
	Improved B2B integration	BENEF9		38.9
H16: Vendor influence (VENDI)	Support for SOA	VENDS1	5	39
H17: Vendor support for integration & dev tools (VENDS)	Support for integration of packaged applications	VENDS2	12	40
	Support for development tools	VENDS3		41
H18: Industry pressure & IT Media influence (INDSP)	Request or recommendation from business partners	INDSP1	3	42
	Competitors SOA initiatives or plans	INDSP2		43
	Coverage of successful SOA implementations	ITMED1		44
	SOA as the next 'big thing'	ITMED2		45

Table 55: SOA adoption constructs and items (reviewed model)

Appendix C. Online questionnaire sample

SOA adoption

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Introduction

Dear survey participant,

Thank you for visiting the SOA adoption survey site.

Service-oriented architecture (SOA), service-oriented computing (SOC), cloud computing, and web services have become the buzz words in the business world and IT community. The purpose of this survey is to examine the state of SOA adoption in South Africa and to gain a better understanding of factors affecting the adoption.

The success of this survey depends on your participation and your assistance is greatly appreciated. Please be assured that your responses will be kept strictly confidential. Only aggregated results will be analysed and presented.

If you have any queries, please do not hesitate to contact Liza Mac Lennan by email at elizaveta.maclennan@uct.ac.za

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SOA adoption

Section 1. General information.

Service-oriented architecture (SOA) is a paradigm for organizing and utilizing distributed capabilities that may be under the control of different ownership domains (OASIS, 2006). A service is an abstract resource that has a name, a job, job tasks, contract information and policies regarding security and service levels. A service is invoked by a request message, which is issued in accordance to the contract information and policies. If the request is appropriate, service sends back a reply message. SOA is most commonly implemented using Web services, however, other implementation technologies could be utilised.

1. Which of the following best describes your organization's approach to, or use of, service-oriented architecture (SOA)?*
   Please select one the most applicable item.

   - ☐ Not pursuing and no immediate plans to do so
   - ☐ Planning to pursue SOA within the next 6 months
   - ☐ SOA projects are in the pilot stage
   - ☐ SOA projects are in development
   - ☐ Deployed in production for use in a single department
   - ☐ Deployed in production for use by multiple departments
   - ☐ Deployed in production for enterprise-wide use

2. What approach have your organization used to starting SOA initiative?*
   Please select one the most applicable item.

   - ☐ Top-down from business strategy
   - ☐ Bottom-up from IT projects
   - ☐ Driven from IT (architecture) strategy
   - ☐ Consultant/vendor driven
   - ☐ Other, please specify

3. Is your organization a consumer of external services?*

   ☐ Yes ☐ No

4. Is your organization a service provider for external services?*

☐ Yes ☐ No

5. Who owns SOA/application services in your organization?*
Please select one the most applicable item.

☐ There are no SOA/application services

☐ Application services are owned by IT architects at a project level

☐ Application services are owned by central IT departments of business units

☐ Application services are owned by business units

6. How would you describe your SOA projects?*
Select at least 1 response.

☐ Successful: We have completed or will soon complete the project as planned and achieve(d) all the desired goals

☐ Partially Successful: We have completed or will soon complete the project and achieve(d) most of the goals

☐ Not Successful: We did not complete the project and did not achieve the desired goals

☐ A Fiasco: The project caused significant disruption, with no benefit

☐ It's too early to tell

7. How would you describe your organization's current approach to cloud computing options, including software-as-a-service (SaaS), platform-as-a-service (PaaS), and infrastructure-as-a-service (IaaS)?*
There is a significant amount of overlap between these services and considerable debate about the specific definitions of each, including which category of the three a given service would fall into. In general, the most popular examples in each category are: SaaS - Google Docs, Google Apps, Salesforce.com, PaaS - Google App Engine, Microsoft Azure, IaaS - Amazon Elastic Compute Cloud (EC2), Microsoft Live Mesh, Sun Network.com. Select at least 1 response.

☐ We use little or no cloud computing of any kind

☐ We are in early stages of learning/testing cloud computing options

☐ We use SaaS for non-critical applications

☐ We use PaaS for non-critical applications

☐ We use IaaS for non-critical applications

☐ We use SaaS for mission-critical applications

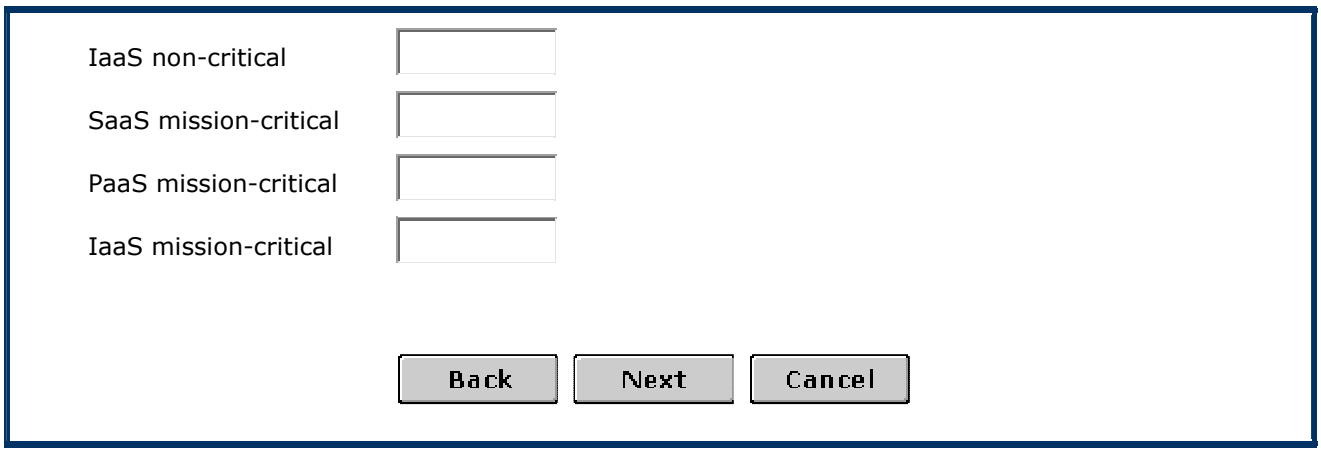
☐ We use PaaS for mission-critical applications

☐ We use IaaS for mission-critical applications

8. If you selected any SaaS, Paas or IaaS option, could you please provide us with example applications for each applicable option?

SaaS non-critical

PaaS non-critical



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SOA adoption

Section 2. SOA Technology.

The following questions ask you about the technological aspects of your SOA implementations.

9. Which specifications and standards are used in SOA applications within our organization?*
Select at least 1 response.

- [ ] XML, XQuery, XPath, XSLT
- [ ] WSDL
- [ ] UDDI
- [ ] SOAP
- [ ] WS-* standards
- [ ] REST
- [ ] WADL
- [ ] JSON
- [ ] RSS
- [ ] ATOM
- [ ] Other, please specify

10. Which Web services/SOA platforms are utilised within your organization?*
Select at least 1 response.

- [ ] Not using any Web services platforms/technologies
- [ ] Apache- Axis
- [ ] Eclipse - Web tools Platform/ SOA Tools Platform
- [ ] Sun - Java Web services developer pack
- [ ] Microsoft .Net framework

- [ ] SAP NetWeaver
- [ ] Spring Framework
- [ ] JBoss – Seam
- [ ] IBM Websphere
- [ ] Oracle SOA Suite/BEA WebLogic
- [ ] Progress Software (Sonic, Actional, DataDirect)
- [ ] Software AG (webMethods, CentraSite)
- [ ] SOA Software
- [ ] TIBCO (ActiveMatrix, BusinessWorks)
- [ ] WS02 SOA Platform
- [ ] Other, please specify

11. Learning to use SOA technologies and associated standards has been a steep learning curve for our SOA team.*
    - ○ Strongly Disagree
    - ○ Disagree
    - ○ Somewhat Disagree
    - ○ Neutral
    - ○ Somewhat Agree
    - ○ Agree
    - ○ Strongly Agree

12. Choosing the right standard for our SOA implementations required a lot of researching and prototyping.*
    - ○ Strongly Disagree
    - ○ Disagree
    - ○ Somewhat Disagree
    - ○ Neutral
    - ○ Somewhat Agree
    - ○ Agree
    - ○ Strongly Agree

13. SOA implementations within our organization are compatible with the existing enterprise

architecture (EA).*

- ☐ Strongly Disagree
- ☐ Disagree
- ☐ Somewhat Disagree
- ☐ Neutral
- ☐ Somewhat Agree
- ☐ Agree
- ☐ Strongly Agree

14. SOA implementations within our organization are supported with secure, reliable, and resilient infrastructure.*

- ☐ Strongly Disagree
- ☐ Disagree
- ☐ Somewhat Disagree
- ☐ Neutral
- ☐ Somewhat Agree
- ☐ Agree
- ☐ Strongly Agree

15. SOA applications utilize platforms that are compatible with the existing service-based platforms within our organization.*

- ☐ Strongly Disagree
- ☐ Disagree
- ☐ Somewhat Disagree
- ☐ Neutral
- ☐ Somewhat Agree
- ☐ Agree
- ☐ Strongly Agree

16. Our organization requires high initial investment to establish an SOA infrastructure environment.*

- ☐ Strongly Disagree
- ☐ Disagree
- ☐ Somewhat Disagree
- ☐ Neutral

- ☐ Somewhat Agree
- ☐ Agree
- ☐ Strongly Agree

17. In our organization cost and effort to develop in-house SOA solutions or integrate off-the-shelf SOA solutions is high.*
    - ☐ Strongly Disagree
    - ☐ Disagree
    - ☐ Somewhat Disagree
    - ☐ Neutral
    - ☐ Somewhat Agree
    - ☐ Agree
    - ☐ Strongly Agree

18. Our organization finds that high initial investment costs makes it difficult to accept the business case for SOA itself and SOA related purchases.*
    - ☐ Strongly Disagree
    - ☐ Disagree
    - ☐ Somewhat Disagree
    - ☐ Neutral
    - ☐ Somewhat Agree
    - ☐ Agree
    - ☐ Strongly Agree

19. Please rate significance of the following implementation challenges your organization is facing with SOA projects.*

	Not Important	Slightly Important	Somewhat Important	Moderately Important	Important	Very Important	Extremely Important
Evaluating and selecting the appropriate tools and/or frameworks	☐	☐	☐	☐	☐	☐	☐
SOA standards stability and maturity	☐	☐	☐	☐	☐	☐	☐
Establishing base line metrics (e.g. service reuse ratio, cost to build each service, mean time to service delivery,	☐	☐	☐	☐	☐	☐	☐

SOA ROI, etc.)							
Establishing how to do SOA in an integrated way with other initiatives (BPM, BI, etc.)	☐	☐	☐	☐	☐	☐	☐
Designing efficient and effective SOA security	☐	☐	☐	☐	☐	☐	☐
Crafting SOA development processes	☐	☐	☐	☐	☐	☐	☐
Understanding how to design high quality services	☐	☐	☐	☐	☐	☐	☐
Testing services/deploying services	☐	☐	☐	☐	☐	☐	☐
Ensuring that design time governance is effective	☐	☐	☐	☐	☐	☐	☐
Ensuring that run time governance is effective	☐	☐	☐	☐	☐	☐	☐

20. Please rate importance of controlling and mitigating the following risks in your organization's SOA projects.*

	Not Important	Slightly Important	Somewhat Important	Moderately Important	Important	Very Important	Extremely Important
Security	☐	☐	☐	☐	☐	☐	☐
Performance	☐	☐	☐	☐	☐	☐	☐
Interoperability	☐	☐	☐	☐	☐	☐	☐
Reliability	☐	☐	☐	☐	☐	☐	☐
Testing	☐	☐	☐	☐	☐	☐	☐

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Section 3. SOA-related organizational aspects.

The following questions ask you about the organizational aspects of your SOA implementations.

21. SOA team within our organization has had previous experience in architecture, design and implementation of SOA solutions.*

- ☐ Strongly Disagree
- ☐ Disagree
- ☐ Somewhat Disagree
- ☐ Neutral
- ☐ Somewhat Agree
- ☐ Agree
- ☐ Strongly Agree

22. SOA team within our organization has qualifications and skills in the field of SOA lifecycle.*

- ☐ Strongly Disagree
- ☐ Disagree
- ☐ Somewhat Disagree
- ☐ Neutral
- ☐ Somewhat Agree
- ☐ Agree
- ☐ Strongly Agree

23. SOA team has had adequate training on SOA technologies.*

- ☐ Strongly Disagree
- ☐ Disagree
- ☐ Somewhat Disagree
- ☐ Neutral
- ☐ Somewhat Agree
- ☐ Agree
- ☐ Strongly Agree

24. At the high level, top management understands the benefits of SOA in business terms.*

- ☐ Strongly Disagree
- ☐ Disagree
- ☐ Somewhat Disagree
- ☐ Neutral
- ☐ Somewhat Agree
- ☐ Agree
- ☐ Strongly Agree

25. Top management has given the SOA team the necessary authority concerning SOA projects and work.*

- ☐ Strongly Disagree
- ☐ Disagree
- ☐ Somewhat Disagree
- ☐ Neutral
- ☐ Somewhat Agree
- ☐ Agree
- ☐ Strongly Agree

26. Top management sees SOA architecture to be a key mechanism to implement business strategic plans.*

- ☐ Strongly Disagree
- ☐ Disagree
- ☐ Somewhat Disagree
- ☐ Neutral

- ☐ Somewhat Agree
- ☐ Agree
- ☐ Strongly Agree

27. Our organization's business strategy addresses the potential of decomposing the organization in business services and using them throughout the organization.*
    - ☐ Strongly Disagree
    - ☐ Disagree
    - ☐ Somewhat Disagree
    - ☐ Neutral
    - ☐ Somewhat Agree
    - ☐ Agree
    - ☐ Strongly Agree

28. Our organization’s IT strategy addresses application integration with internal and/or external application services.*
    - ☐ Strongly Disagree
    - ☐ Disagree
    - ☐ Somewhat Disagree
    - ☐ Neutral
    - ☐ Somewhat Agree
    - ☐ Agree
    - ☐ Strongly Agree

29. Our organization’s SOA strategy is business-driven and synchronised with organization’s strategic goals and objectives.*
    - ☐ Strongly Disagree
    - ☐ Disagree
    - ☐ Somewhat Disagree
    - ☐ Neutral
    - ☐ Somewhat Agree
    - ☐ Agree
    - ☐ Strongly Agree

30. Our organization has established SOA governance and policies that are fully integrated within IT governance and applied throughout the organization.*

- ☐ Strongly Disagree
- ☐ Disagree
- ☐ Somewhat Disagree
- ☐ Neutral
- ☐ Somewhat Agree
- ☐ Agree
- ☐ Strongly Agree

31. Our organization's SOA governance model is realized by establishing a governance body and identifying key decision makers.*
    - ☐ Strongly Disagree
    - ☐ Disagree
    - ☐ Somewhat Disagree
    - ☐ Neutral
    - ☐ Somewhat Agree
    - ☐ Agree
    - ☐ Strongly Agree

32. Our organization's SOA governance model puts in place service ownership model with identified decision rights.*
    - ☐ Strongly Disagree
    - ☐ Disagree
    - ☐ Somewhat Disagree
    - ☐ Neutral
    - ☐ Somewhat Agree
    - ☐ Agree
    - ☐ Strongly Agree

33. Our organization's SOA governance model handles key decisions related to service operational management and monitoring.*
    - ☐ Strongly Disagree
    - ☐ Disagree
    - ☐ Somewhat Disagree
    - ☐ Neutral
    - ☐ Somewhat Agree

- ☐ Agree
- ☐ Strongly Agree

34. Our organization allocates adequate budget for SOA-enabling a solution delivery project.*
    - ☐ Strongly Disagree
    - ☐ Disagree
    - ☐ Somewhat Disagree
    - ☐ Neutral
    - ☐ Somewhat Agree
    - ☐ Agree
    - ☐ Strongly Agree

35. Our organization allocates adequate budget for putting in place SOA infrastructure and/or processes.*
    - ☐ Strongly Disagree
    - ☐ Disagree
    - ☐ Somewhat Disagree
    - ☐ Neutral
    - ☐ Somewhat Agree
    - ☐ Agree
    - ☐ Strongly Agree

36. Our organization allocates sufficient qualified/skilled staff to work on SOA projects.*
    - ☐ Strongly Disagree
    - ☐ Disagree
    - ☐ Somewhat Disagree
    - ☐ Neutral
    - ☐ Somewhat Agree
    - ☐ Agree
    - ☐ Strongly Agree

37. Please rate the importance of addressing each of the following IT issues in terms of influencing your organization's decision to pursue SOA.*

	Not Important	Slightly Important	Somewhat Important	Moderately Important	Important	Very Important	Extremely Important

Lengthy application development cycles	☐	☐	☐	☐	☐	☐	☐
High cost of application development	☐	☐	☐	☐	☐	☐	☐
Inflexible, hard to integrate systems	☐	☐	☐	☐	☐	☐	☐
Restricted information flow due to information stovepipes	☐	☐	☐	☐	☐	☐	☐

38. Please rate the importance of achieving each of the following SOA benefits in terms of influencing your organization's decision to pursue SOA.*

	Not Important	Slightly Important	Somewhat Important	Moderately Important	Important	Very Important	Extremely Important
Improved interoperability	☐	☐	☐	☐	☐	☐	☐
Reuse	☐	☐	☐	☐	☐	☐	☐
Composability	☐	☐	☐	☐	☐	☐	☐
Legacy application integration	☐	☐	☐	☐	☐	☐	☐
Standardized data representation	☐	☐	☐	☐	☐	☐	☐
Vendor neutral communications infrastructure	☐	☐	☐	☐	☐	☐	☐
Improved organizational agility(aka increased time to market)	☐	☐	☐	☐	☐	☐	☐
Improved business processes	☐	☐	☐	☐	☐	☐	☐
Improved B2B integration	☐	☐	☐	☐	☐	☐	☐
Reduced TCO within IT portfolio	☐	☐	☐	☐	☐	☐	☐

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Section 4. SOA-related industry environment.

The following questions ask you about your organization's industry environment.

39. The support for SOA by IT vendors was a factor influencing our organization to adopt SOA.*

- ☐ Strongly Disagree
- ☐ Disagree
- ☐ Somewhat Disagree
- ☐ Neutral
- ☐ Somewhat Agree
- ☐ Agree
- ☐ Strongly Agree

40. IT vendors provide support for integration of packaged applications into our organization's SOA.*

- ☐ Strongly Disagree
- ☐ Disagree
- ☐ Somewhat Disagree
- ☐ Neutral
- ☐ Somewhat Agree
- ☐ Agree
- ☐ Strongly Agree

41. IT vendors provide development tools that increase SOA development efficiency.*

- ☐ Strongly Disagree
- ☐ Disagree
- ☐ Somewhat Disagree
- ☐ Neutral
- ☐ Somewhat Agree
- ☐ Agree

- ☐ Strongly Agree

42. Our organization started SOA initiatives because it was requested or recommended by important business partners.*
    - ☐ Strongly Disagree
    - ☐ Disagree
    - ☐ Somewhat Disagree
    - ☐ Neutral
    - ☐ Somewhat Agree
    - ☐ Agree
    - ☐ Strongly Agree
43. Our organization started SOA initiatives because important competitors have started their SOA initiatives or planning to use SOA.*
    - ☐ Strongly Disagree
    - ☐ Disagree
    - ☐ Somewhat Disagree
    - ☐ Neutral
    - ☐ Somewhat Agree
    - ☐ Agree
    - ☐ Strongly Agree
44. The IT media coverage of successful SOA implementations within other companies influenced our decision to start our own SOA initiatives.*
    - ☐ Strongly Disagree
    - ☐ Disagree
    - ☐ Somewhat Disagree
    - ☐ Neutral
    - ☐ Somewhat Agree
    - ☐ Agree
    - ☐ Strongly Agree
45. Our organization started SOA initiatives because it considers SOA to be the next "big thing".*
    - ☐ Strongly Disagree
    - ☐ Disagree

- Somewhat Disagree
- Neutral
- Somewhat Agree
- Agree
- Strongly Agree

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Section 5. Respondent's demographics

46. Which of the following best describes your job title?*
Please select one the most applicable item.

- ☐ CIO, CTO, Chief Technical Architect, CSO/CISO, VP of IS/IT
- ☐ IS Manager, Director, Planner
- ☐ IS/IT/Technical Architect
- ☐ Other IT Manager in IS Department
- ☐ IT Staff
- ☐ Consultant
- ☐ Other, please specify

47. Please estimate how many employees in total are in your organization?*
Please select one the most applicable item.

- ☐ Less than 50
- ☐ 50 - 99
- ☐ 100 - 499
- ☐ 500 - 999
- ☐ 1,000 - 4,999
- ☐ 5,000 - 9,999
- ☐ 10,000 or more

48. Please estimate the number of IT staff within your organization?*
Please select one the most applicable item.

- ☐ Less than 5
- ☐ 5 to 10
- ☐ 10 to 20
- ☐ 20 to 50
- ☐ 50 to 100
- ☐ More than 100

49. What was the approximate total revenue of your entire organization last year? (For non-profit organizations, indicate total operating budget)*
Please select one the most applicable item.

- ☐ Under R5 million
- ☐ R5 million to under R50 million
- ☐ R50 million to under R100 million
- ☐ R100 million to under R500 million
- ☐ R500 million to under R1 billion
- ☐ R1 billion to under R5 billion
- ☐ R5 billion and higher
- ☐ Don't Know/Prefer not to answer

50. Which of the following best describes your industry?*
Please select one the most applicable item.

- ☐ Biotech/Biomedical/ Pharmaceutical
- ☐ Consulting and Business Services
- ☐ Chemicals
- ☐ Consumer goods
- ☐ Construction/Engineering
- ☐ Distributor
- ☐ Education
- ☐ Electronics
- ☐ E-marketplace (portals, auction, vert.)
- ☐ Energy
- ☐ Financial services/Banking
- ☐ Food/Beverage

- ☐ Government
- ☐ Healthcare/Medical
- ☐ Hospitality/Travel
- ☐ Insurance/HMO
- ☐ IT Vendor
- ☐ Logistics/Transportation
- ☐ Manufacturing/Industrial (non-computer)
- ☐ Media/Entertainment
- ☐ Metals & Natural Resources
- ☐ Non-profit
- ☐ Retail/E-commerce
- ☐ Telecommunications/ISP
- ☐ Utilities
- ☐ Other, please specify

51. If you would like to receive the aggregated results of this survey, please provide an email address

52. If you are prepared to participate further in this study, please provide your name and contact number.

Thank you for completing the questionnaire. Any enquiry/question related to this questionnaire can be sent to the following email address: elizaveta.maclennan@uct.ac.za.

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Survey Completed

Thank you for taking the survey!

Close

Appendix D. Survey cover letter

Dear survey participant,

I am conducting a survey to obtain information on the state of service-oriented architecture (SOA) adoption in South Africa and factors affecting the adoption. This research is conducted as part of my Master's research at UCT Information Systems department.

I would greatly appreciate you completing the online questionnaire that could be accessed at the following address http://www.commerce.uct.ac.za/Services/SelectSurveyASP/TakeSurvey.asp?SurveyID=35H6n86I9n511. It will take 15 minutes of your time to answer the questions, but it could, however, be beneficial to you, as aggregated results of the survey will be forwarded to participants.

Due the very nature of the online questionnaire, your anonymity is protected. Please be assured that only aggregated results will be analysed and presented.

Please complete the questionnaire by answering every question as well as you can. Because a relatively small number of people are being surveyed, your response is very important to me.

Thank you in advance for your time and effort.

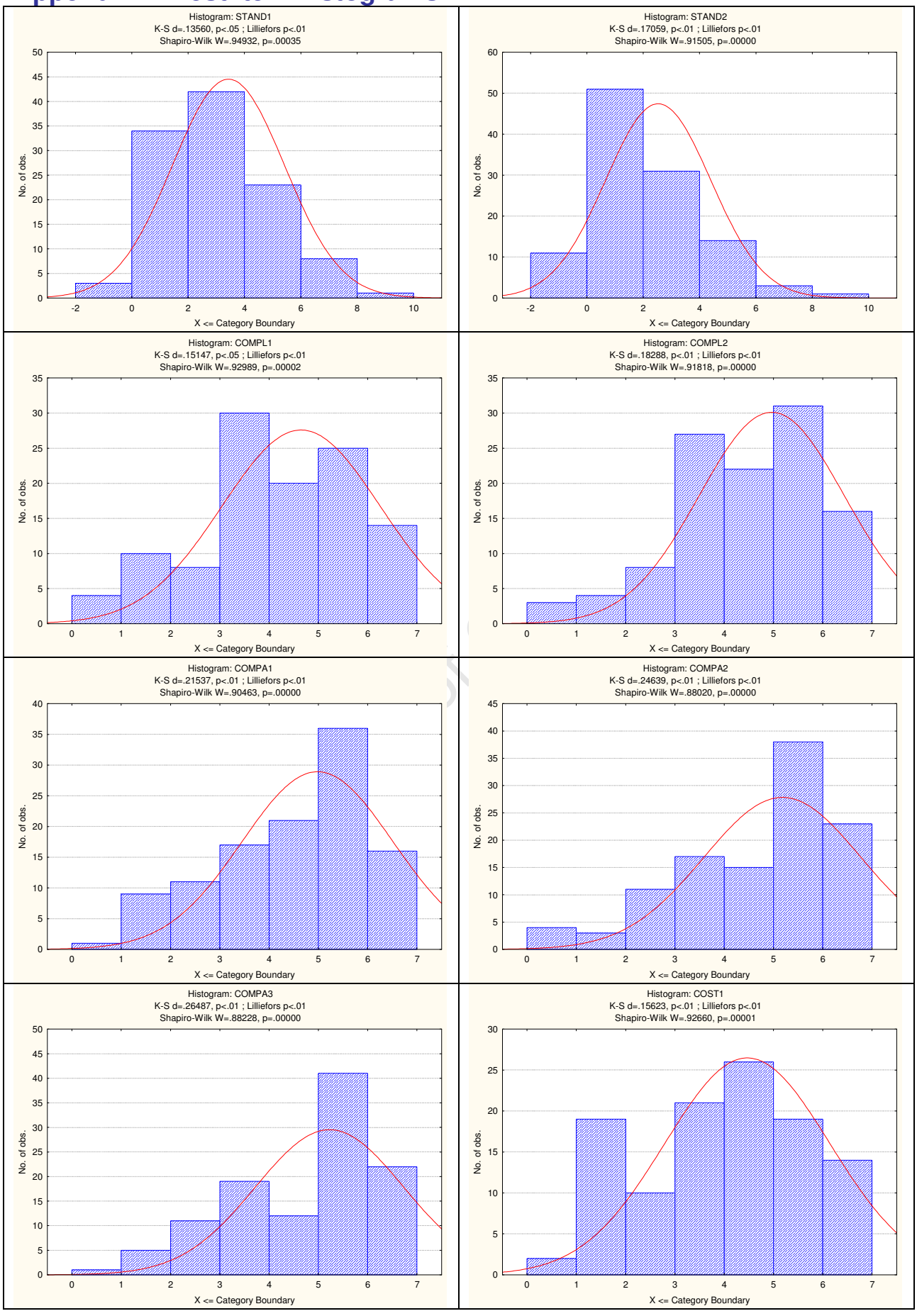
Sincerely,
Liza Mac Lennan
elizaveta.maclennan@uct.ac.za

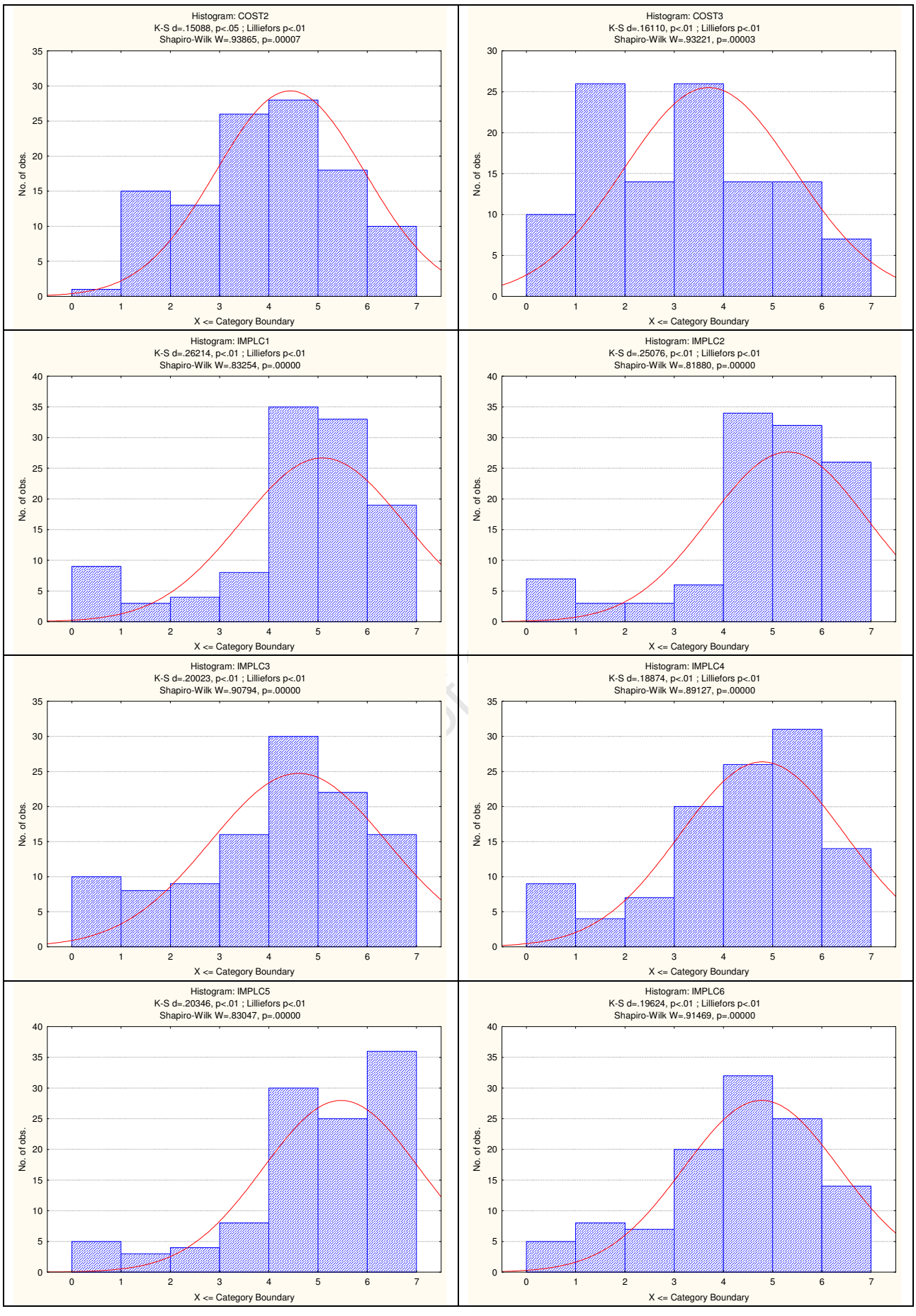
Appendix E. Descriptive statistics of test items

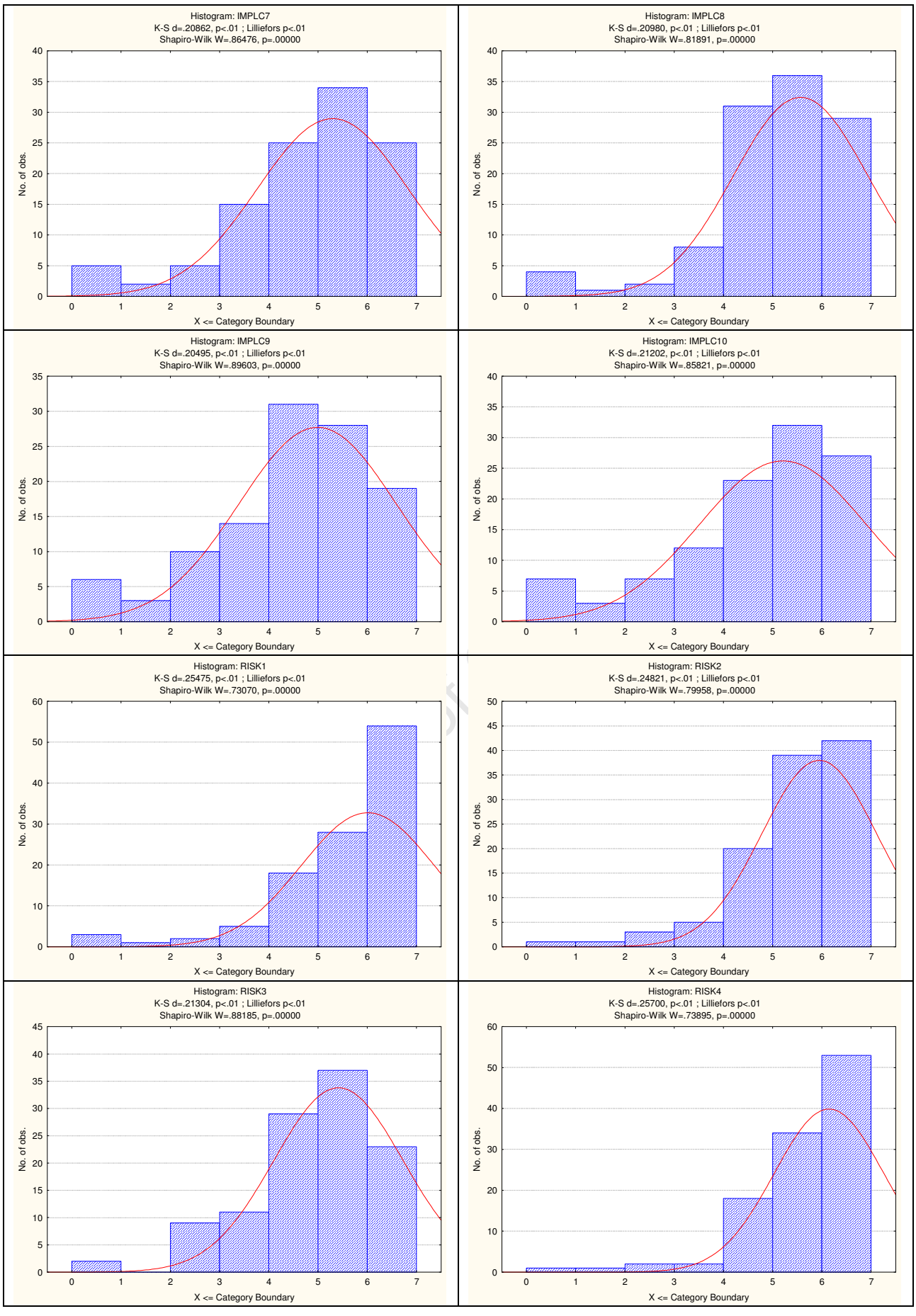
Variable	Descriptive Statistics									
	Valid N	% Valid obs.	Mean	Median	Mode	Frequency of Mode	Minimum	Maximum	Std.Dev.	Standard Err.
STAND1	111	100	3.432432	3	3	24	0	10	1.989160	0.188803
STAND2	111	100	2.531532	2	1	29	0	9	1.867521	0.177257
COMPL1	111	100	4.648649	5	4	30	1	7	1.604815	0.152322
COMPL2	111	100	4.963964	5	6	31	1	7	1.470485	0.139572
COMPA1	111	100	4.981982	5	6	36	1	7	1.531381	0.145352
COMPA2	111	100	5.180180	6	6	38	1	7	1.590873	0.150999
COMPA3	111	100	5.225225	6	6	41	1	7	1.499604	0.142336
COST1	111	100	4.468468	5	5	26	1	7	1.672341	0.158732
COST2	111	100	4.432432	5	5	28	1	7	1.511301	0.143446
COST3	111	100	3.702703	4	Multiple	26	1	7	1.735169	0.164695
IMPLC1	111	100	5.090090	5	5	35	1	7	1.659954	0.157556
IMPLC2	111	100	5.315315	6	5	34	1	7	1.601034	0.151963
IMPLC3	111	100	4.603604	5	5	30	1	7	1.790273	0.169925
IMPLC4	111	100	4.792793	5	6	31	1	7	1.679378	0.159400
IMPLC5	111	100	5.468468	6	7	36	1	7	1.582977	0.150249
IMPLC6	111	100	4.774775	5	5	32	1	7	1.582200	0.150176
IMPLC7	111	100	5.297297	6	6	34	1	7	1.529079	0.145134
IMPLC8	111	100	5.567568	6	6	36	1	7	1.365960	0.129651
IMPLC9	111	100	4.990991	5	5	31	1	7	1.598269	0.151701
IMPLC10	111	100	5.207207	6	6	32	1	7	1.690170	0.160424
RISK1	111	100	6.009009	6	7	54	1	7	1.351736	0.128301
RISK2	111	100	5.945946	6	7	42	1	7	1.166485	0.110718
RISK3	111	100	5.414414	6	6	37	1	7	1.310576	0.124394
RISK4	111	100	6.144144	6	7	53	1	7	1.110666	0.105420
RISK5	111	100	5.603604	6	6	38	1	7	1.177665	0.111779
EXPR1	111	100	4.243243	4	6	21	1	7	1.888801	0.179277
EXPR2	111	100	4.333333	5	6	29	1	7	1.775251	0.168499
EXPR3	111	100	4.261261	4	6	26	1	7	1.709395	0.162249
TMSP1	111	100	4.360360	5	6	25	1	7	1.802991	0.171132
TMSP2	111	100	4.639640	5	6	33	1	7	1.693800	0.160768
TMSP3	111	100	4.612613	5	6	37	1	7	1.738187	0.164981
STRAT1	111	100	4.459459	5	6	34	1	7	1.767298	0.167744
STRAT2	111	100	5.027027	5	6	44	1	7	1.479923	0.140468
STRAT3	111	100	4.567568	5	6	34	1	7	1.797077	0.170571
GVRN1	111	100	4.099099	4	5	27	1	7	1.737056	0.164874
GVRN2	111	100	4.000000	4	4	30	1	7	1.601136	0.151973
GVRN3	111	100	4.036036	4	4	30	1	7	1.623285	0.154075
GVRN4	111	100	4.126126	4	4	25	1	7	1.641048	0.155761
RSRC1	111	100	4.468468	5	6	29	1	7	1.688570	0.160272
RSRC2	111	100	4.549550	5	6	31	1	7	1.644488	0.156088
RSRC3	111	100	4.288288	5	6	26	1	7	1.675423	0.159024
RELADV1	111	100	5.072072	5	5	32	1	7	1.610825	0.152893
RELADV2	111	100	5.180180	5	5	33	1	7	1.567849	0.148814
RELADV3	111	100	5.387387	6	6	34	1	7	1.579247	0.149895
RELADV4	111	100	4.981982	5	6	33	1	7	1.700171	0.161373
BENEF1	111	100	5.342342	5	5	40	1	7	1.282721	0.121750
BENEF2	111	100	5.630631	6	6	38	1	7	1.135605	0.107787
BENEF3	111	100	4.891892	5	5	44	1	7	1.422874	0.135053
BENEF4	111	100	5.207207	6	6	37	1	7	1.601801	0.152036
BENEF5	111	100	5.423423	6	6	34	1	7	1.443163	0.136979
BENEF6	111	100	5.000000	5	6	32	1	7	1.656941	0.157270
BENEF7	111	100	5.576577	6	6	38	1	7	1.480476	0.140521
BENEF8	111	100	5.567568	6	5	37	1	7	1.262189	0.119802
BENEF9	111	100	5.009009	5	5	33	1	7	1.603947	0.152240
BENEF10	111	100	5.234234	5	5	36	1	7	1.433083	0.136022
VENDS1	110	99.0991	4.300000	5	5	29	1	7	1.673046	0.159519
VENDS2	110	99.0991	4.345455	4	6	30	1	7	1.547038	0.147504
VENDS3	110	99.0991	4.681818	5	6	34	1	7	1.585090	0.151132
INDSP1	110	99.0991	3.636364	4	4	29	1	7	1.695798	0.161688
INDSP2	110	99.0991	3.427273	4	2	32	1	7	1.616765	0.154152
ITMED1	110	99.0991	3.736364	4	4	33	1	7	1.463170	0.139508
ITMED2	110	99.0991	4.327273	5	5	26	1	7	1.822938	0.173810

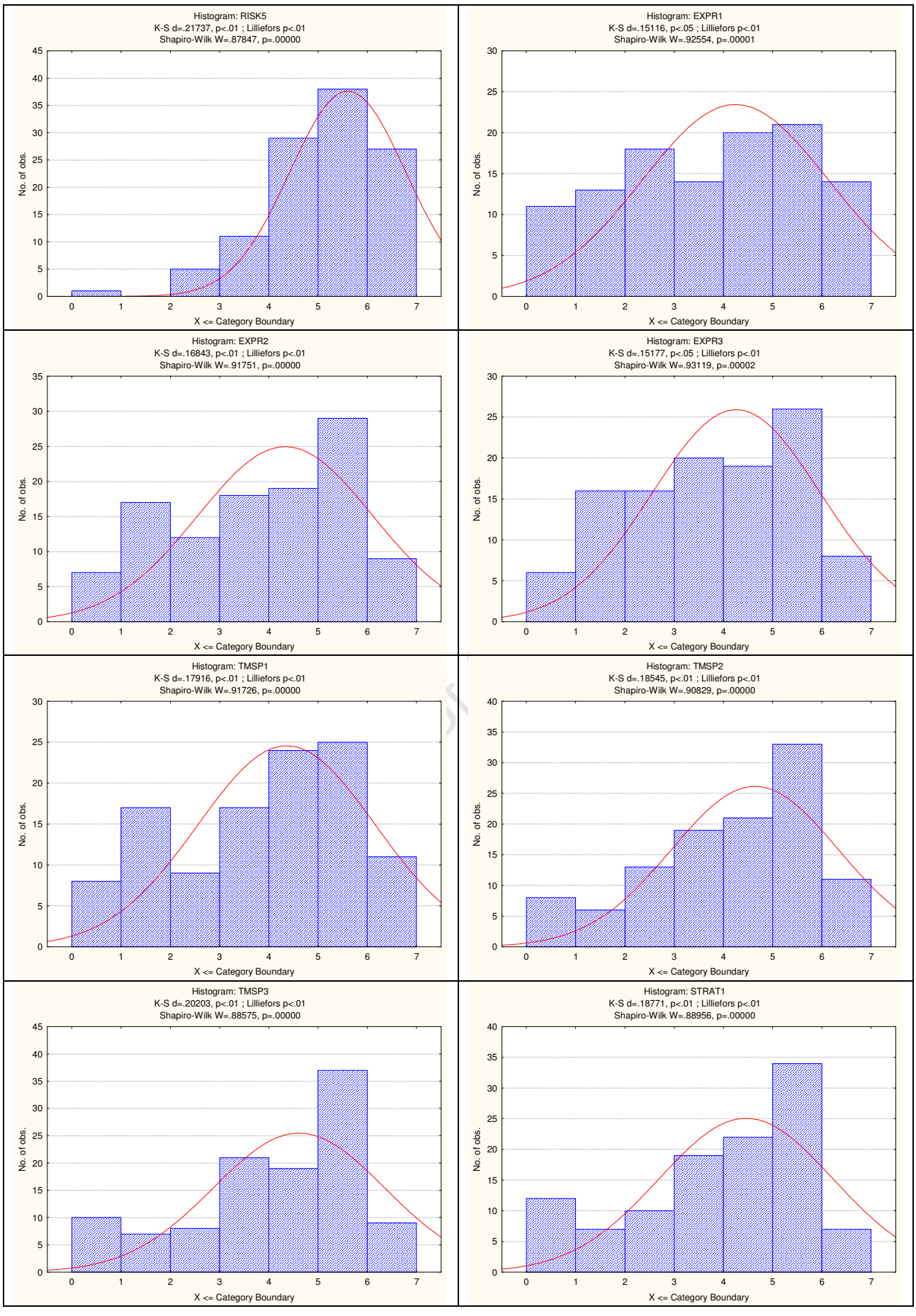
Table 56: Descriptive statistics of test items

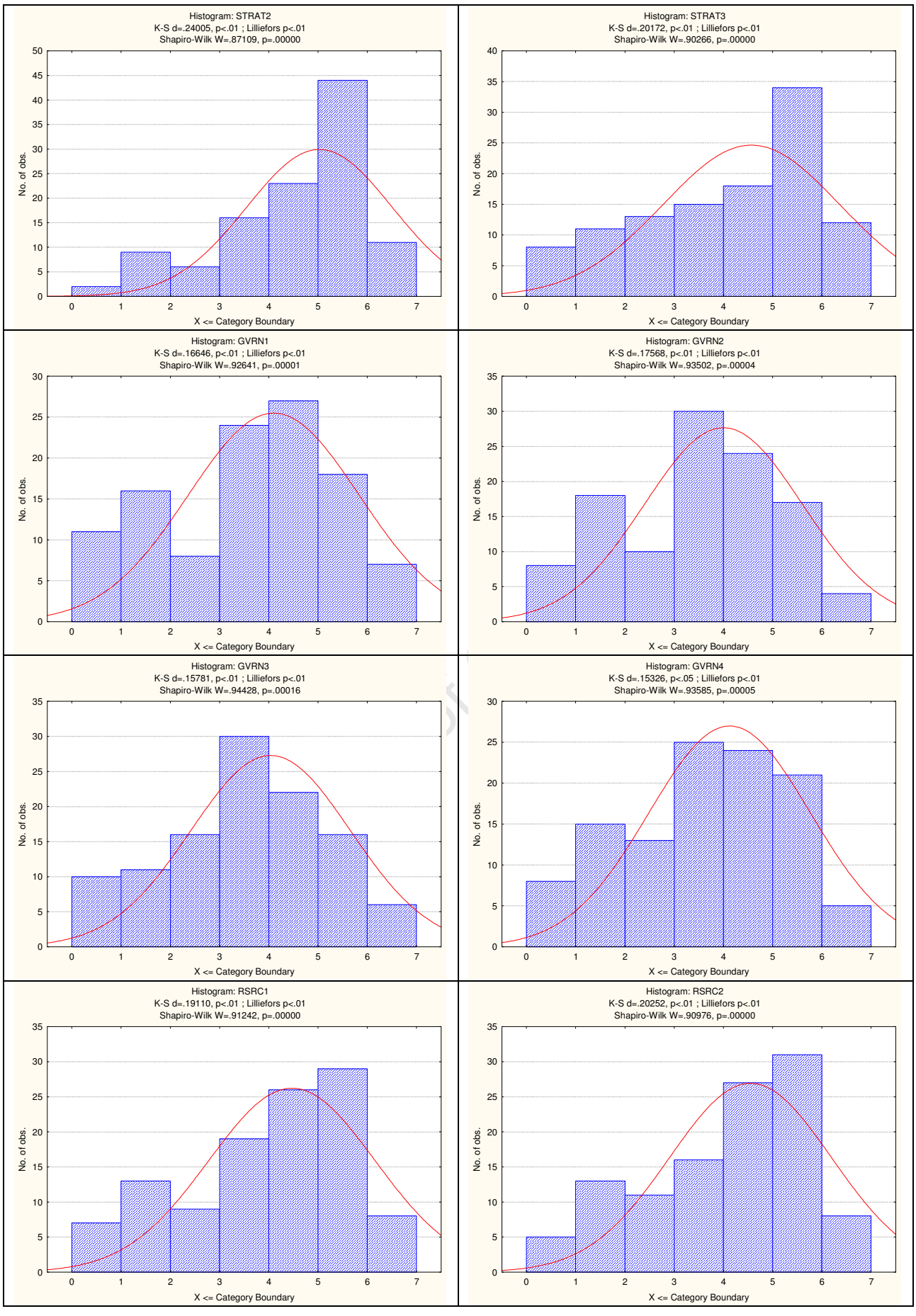
Appendix F. Test item histograms

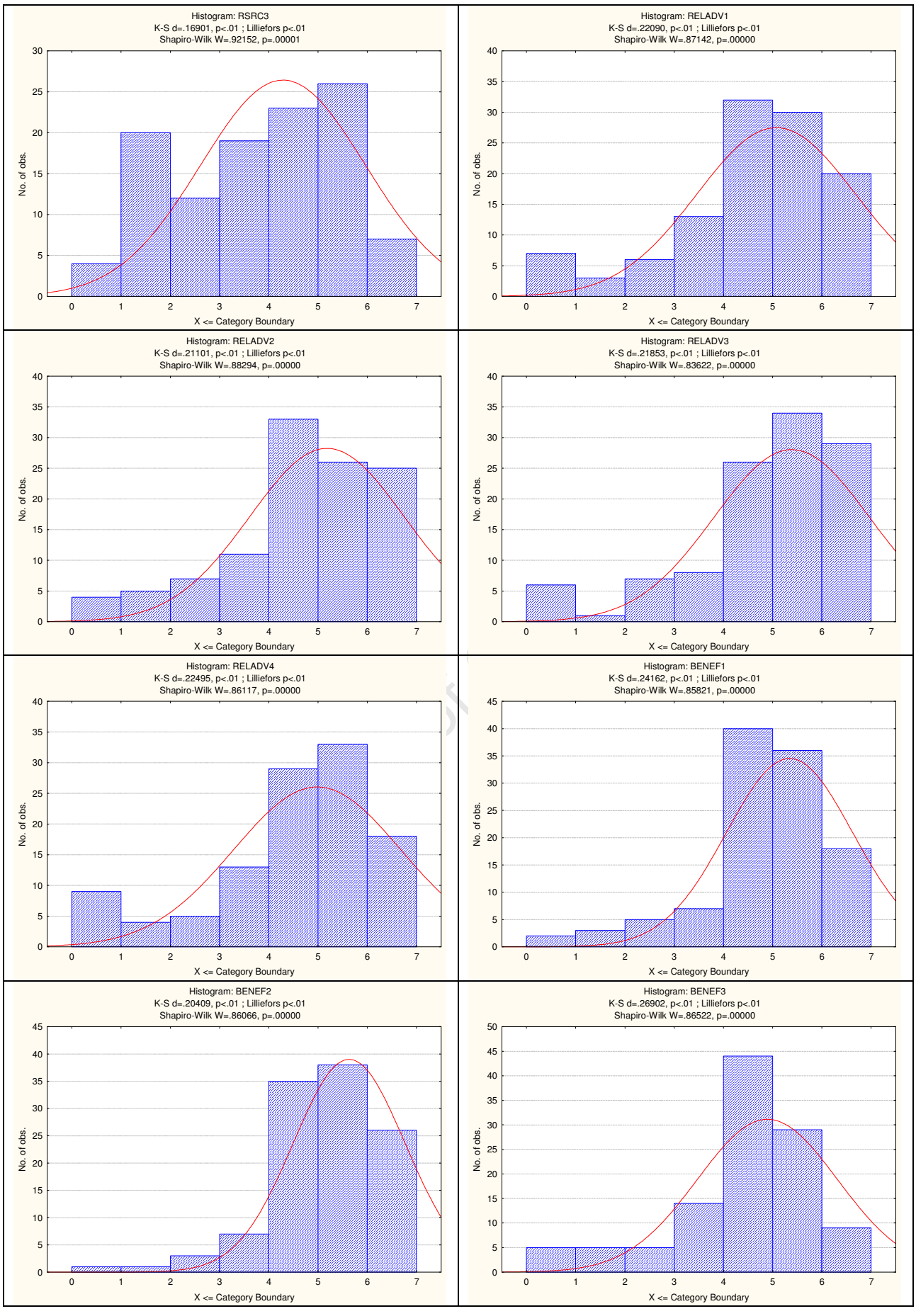


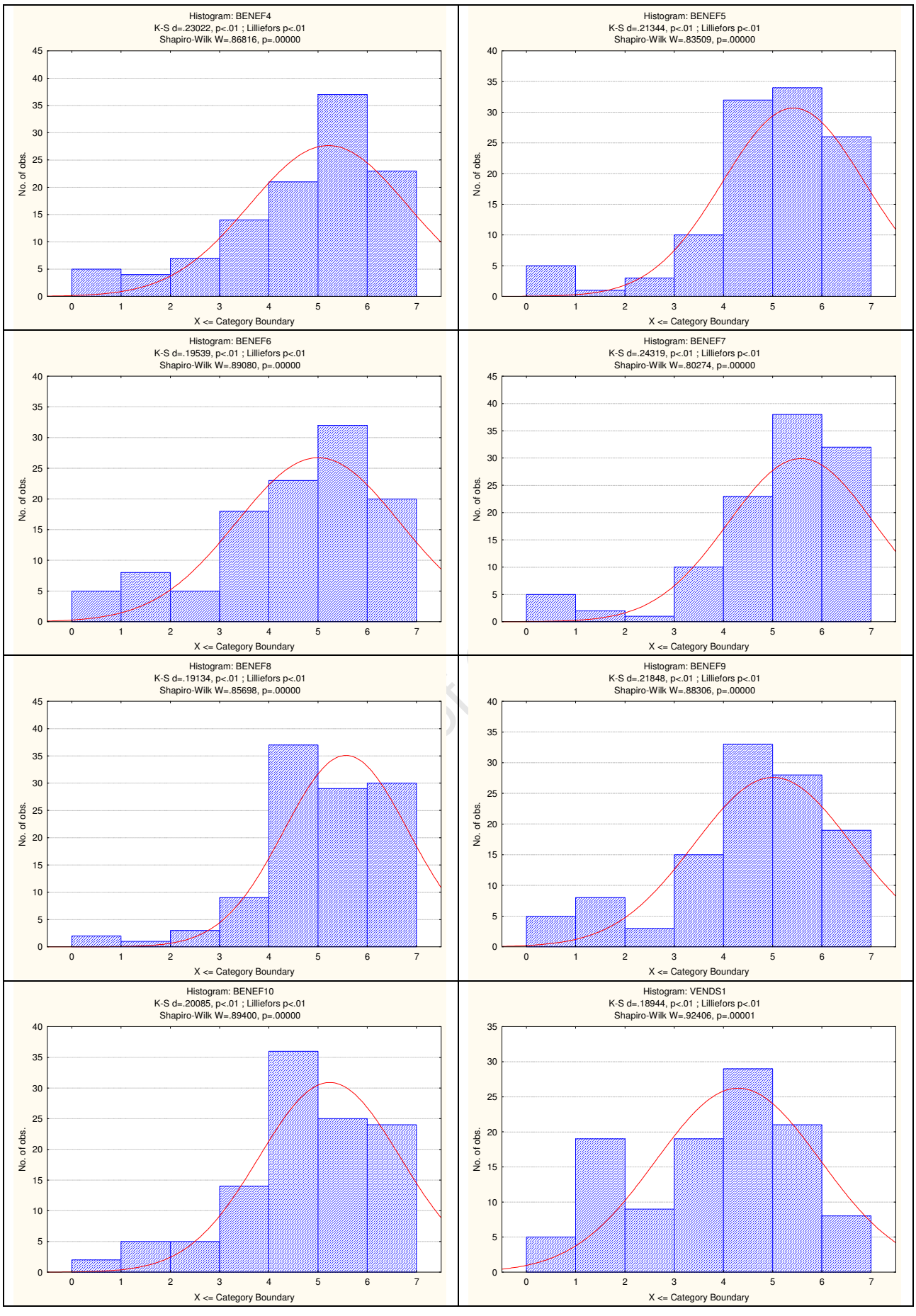

Histogram: COST2
K-S d=.15088, p<.05 ; Lilliefors p<.01
Shapiro-Wilk W=.93865, p=.00007
No. of obs.
X <= Category Boundary
Histogram: COST3
K-S d=.16110, p<.01 ; Lilliefors p<.01
Shapiro-Wilk W=.93221, p=.00003
No. of obs.
X <= Category Boundary
Histogram: IMPLC1
K-S d=.26214, p<.01 ; Lilliefors p<.01
Shapiro-Wilk W=.83254, p=.00000
No. of obs.
X <= Category Boundary
Histogram: IMPLC2
K-S d=.25076, p<.01 ; Lilliefors p<.01
Shapiro-Wilk W=.81880, p=.00000
No. of obs.
X <= Category Boundary
Histogram: IMPLC3
K-S d=.20023, p<.01 ; Lilliefors p<.01
Shapiro-Wilk W=.90794, p=.00000
No. of obs.
X <= Category Boundary
Histogram: IMPLC4
K-S d=.18874, p<.01 ; Lilliefors p<.01
Shapiro-Wilk W=.89127, p=.00000
No. of obs.
X <= Category Boundary
Histogram: IMPLC5
K-S d=.20346, p<.01 ; Lilliefors p<.01
Shapiro-Wilk W=.83047, p=.00000
No. of obs.
X <= Category Boundary
Histogram: IMPLC6
K-S d=.19624, p<.01 ; Lilliefors p<.01
Shapiro-Wilk W=.91469, p=.00000
No. of obs.
X <= Category Boundary


Histogram: IMPLC7
K-S d=.20862, p<.01 ; Lilliefors p<.01
Shapiro-Wilk W=.86476, p=.00000
No. of obs.
X <= Category Boundary
Histogram: IMPLC8
K-S d=.20980, p<.01 ; Lilliefors p<.01
Shapiro-Wilk W=.81891, p=.00000
No. of obs.
X <= Category Boundary
Histogram: IMPLC9
K-S d=.20495, p<.01 ; Lilliefors p<.01
Shapiro-Wilk W=.89603, p=.00000
No. of obs.
X <= Category Boundary
Histogram: IMPLC10
K-S d=.21202, p<.01 ; Lilliefors p<.01
Shapiro-Wilk W=.85821, p=.00000
No. of obs.
X <= Category Boundary
Histogram: RISK1
K-S d=.25475, p<.01 ; Lilliefors p<.01
Shapiro-Wilk W=.73070, p=.00000
No. of obs.
X <= Category Boundary
Histogram: RISK2
K-S d=.24821, p<.01 ; Lilliefors p<.01
Shapiro-Wilk W=.79958, p=.00000
No. of obs.
X <= Category Boundary
Histogram: RISK3
K-S d=.21304, p<.01 ; Lilliefors p<.01
Shapiro-Wilk W=.88185, p=.00000
No. of obs.
X <= Category Boundary
Histogram: RISK4
K-S d=.25700, p<.01 ; Lilliefors p<.01
Shapiro-Wilk W=.73895, p=.00000
No. of obs.
X <= Category Boundary


Histogram: RISK5
K-S d=.21737, p<.01 ; Lilliefors p<.01
Shapiro-Wilk W=.87847, p=.00000
Histogram: EXPR1
K-S d=.15116, p<.05 ; Lilliefors p<.01
Shapiro-Wilk W=.92554, p=.00001
Histogram: EXPR2
K-S d=.16843, p<.01 ; Lilliefors p<.01
Shapiro-Wilk W=.91751, p=.00000
Histogram: EXPR3
K-S d=.15177, p<.05 ; Lilliefors p<.01
Shapiro-Wilk W=.93119, p=.00002
Histogram: TMSP1
K-S d=.17916, p<.01 ; Lilliefors p<.01
Shapiro-Wilk W=.91726, p=.00000
Histogram: TMSP2
K-S d=.18545, p<.01 ; Lilliefors p<.01
Shapiro-Wilk W=.90829, p=.00000
Histogram: TMSP3
K-S d=.20203, p<.01 ; Lilliefors p<.01
Shapiro-Wilk W=.88575, p=.00000
Histogram: STRAT1
K-S d=.18771, p<.01 ; Lilliefors p<.01
Shapiro-Wilk W=.88956, p=.00000
No. of obs.
X <= Category Boundary


Histogram: STRAT2
K-S d=.24005, p<.01 ; Lilliefors p<.01
Shapiro-Wilk W=.87109, p=.00000
No. of obs.
X <= Category Boundary
Histogram: STRAT3
K-S d=.20172, p<.01 ; Lilliefors p<.01
Shapiro-Wilk W=.90266, p=.00000
No. of obs.
X <= Category Boundary
Histogram: GVRN1
K-S d=.16646, p<.01 ; Lilliefors p<.01
Shapiro-Wilk W=.92641, p=.00001
No. of obs.
X <= Category Boundary
Histogram: GVRN2
K-S d=.17568, p<.01 ; Lilliefors p<.01
Shapiro-Wilk W=.93502, p=.00004
No. of obs.
X <= Category Boundary
Histogram: GVRN3
K-S d=.15781, p<.01 ; Lilliefors p<.01
Shapiro-Wilk W=.94428, p=.00016
No. of obs.
X <= Category Boundary
Histogram: GVRN4
K-S d=.15326, p<.05 ; Lilliefors p<.01
Shapiro-Wilk W=.93585, p=.00005
No. of obs.
X <= Category Boundary
Histogram: RSRC1
K-S d=.19110, p<.01 ; Lilliefors p<.01
Shapiro-Wilk W=.91242, p=.00000
No. of obs.
X <= Category Boundary
Histogram: RSRC2
K-S d=.20252, p<.01 ; Lilliefors p<.01
Shapiro-Wilk W=.90976, p=.00000
No. of obs.
X <= Category Boundary


Histogram: RSRC3
K-S d=.16901, p<.01 ; Lilliefors p<.01
Shapiro-Wilk W=.92152, p=.00001
Histogram: RELADV1
K-S d=.22090, p<.01 ; Lilliefors p<.01
Shapiro-Wilk W=.87142, p=.00000
Histogram: RELADV2
K-S d=.21101, p<.01 ; Lilliefors p<.01
Shapiro-Wilk W=.88294, p=.00000
Histogram: RELADV3
K-S d=.21853, p<.01 ; Lilliefors p<.01
Shapiro-Wilk W=.83622, p=.00000
Histogram: RELADV4
K-S d=.22495, p<.01 ; Lilliefors p<.01
Shapiro-Wilk W=.86117, p=.00000
Histogram: BENEF1
K-S d=.24162, p<.01 ; Lilliefors p<.01
Shapiro-Wilk W=.85821, p=.00000
Histogram: BENEF2
K-S d=.20409, p<.01 ; Lilliefors p<.01
Shapiro-Wilk W=.86066, p=.00000
Histogram: BENEF3
K-S d=.26902, p<.01 ; Lilliefors p<.01
Shapiro-Wilk W=.86522, p=.00000
No. of obs.
X <= Category Boundary


Histogram: BENEF4
K-S d=.23022, p<.01 ; Lilliefors p<.01
Shapiro-Wilk W=.86816, p=.00000
Histogram: BENEF5
K-S d=.21344, p<.01 ; Lilliefors p<.01
Shapiro-Wilk W=.83509, p=.00000
Histogram: BENEF6
K-S d=.19539, p<.01 ; Lilliefors p<.01
Shapiro-Wilk W=.89080, p=.00000
Histogram: BENEF7
K-S d=.24319, p<.01 ; Lilliefors p<.01
Shapiro-Wilk W=.80274, p=.00000
Histogram: BENEF8
K-S d=.19134, p<.01 ; Lilliefors p<.01
Shapiro-Wilk W=.85698, p=.00000
Histogram: BENEF9
K-S d=.21848, p<.01 ; Lilliefors p<.01
Shapiro-Wilk W=.88306, p=.00000
Histogram: BENEF10
K-S d=.20085, p<.01 ; Lilliefors p<.01
Shapiro-Wilk W=.89400, p=.00000
Histogram: VENDS1
K-S d=.18944, p<.01 ; Lilliefors p<.01
Shapiro-Wilk W=.92406, p=.00001
No. of obs.
X <= Category Boundary

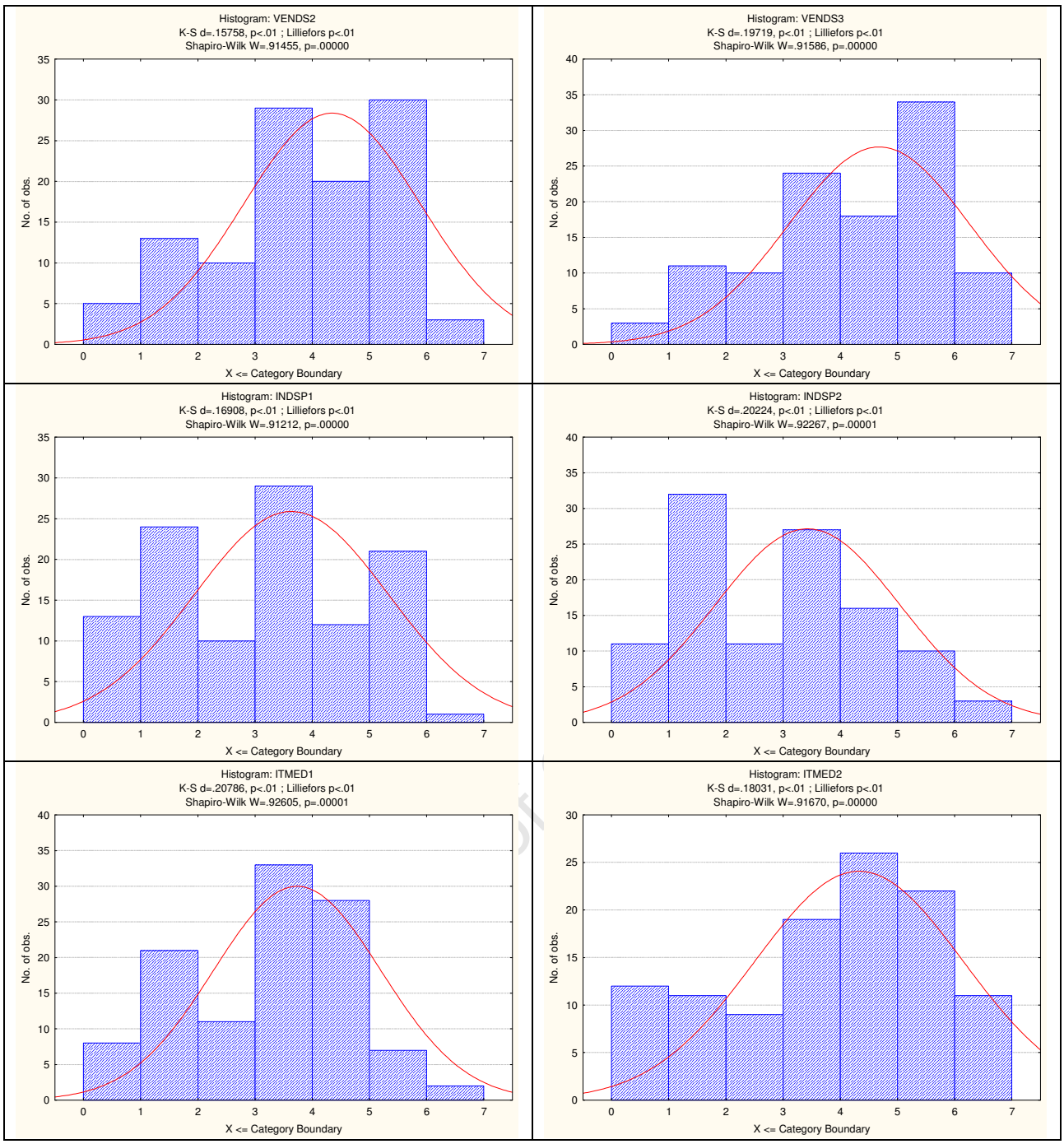
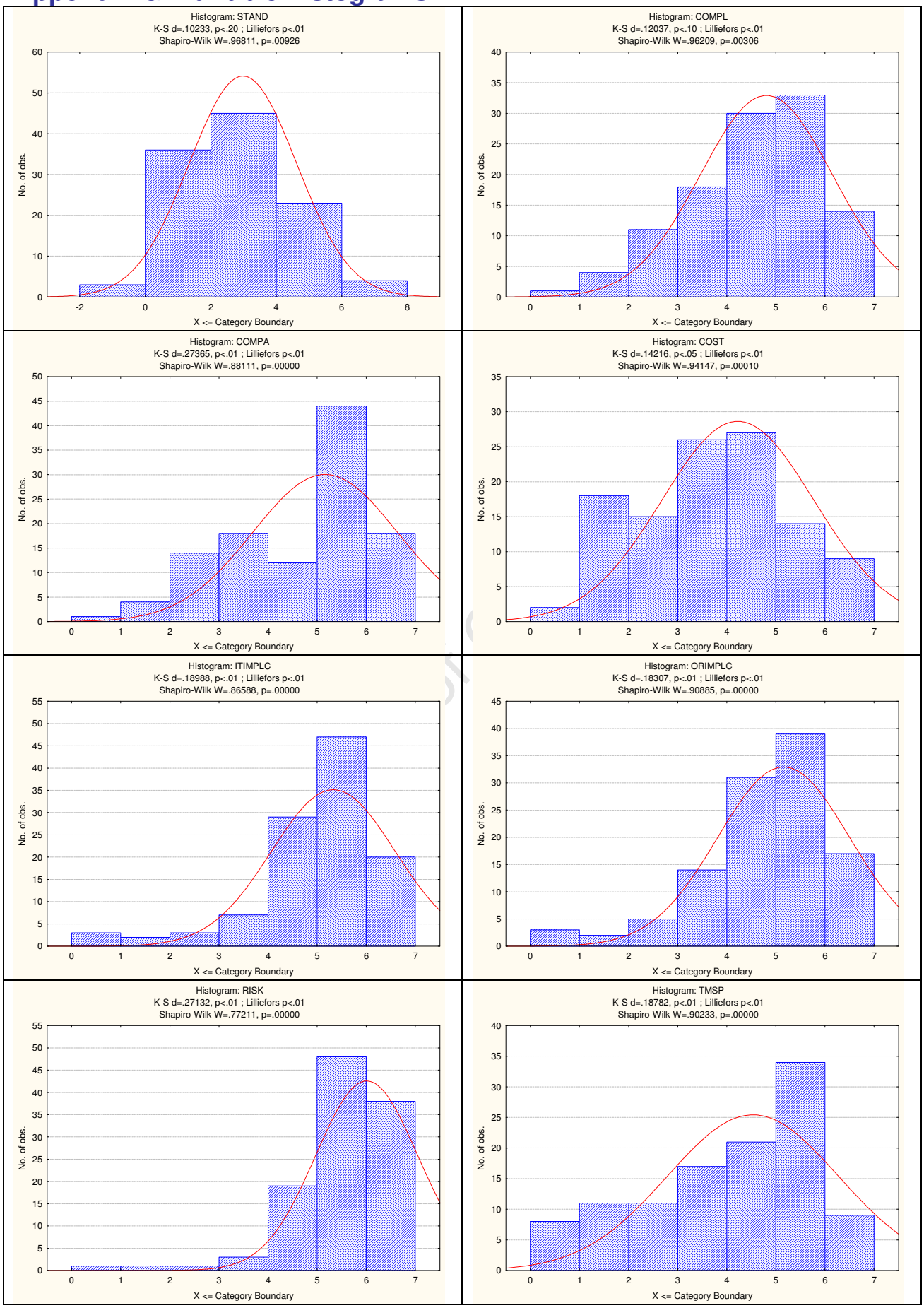


Table 57: Test item histograms

Appendix G. Variable histograms



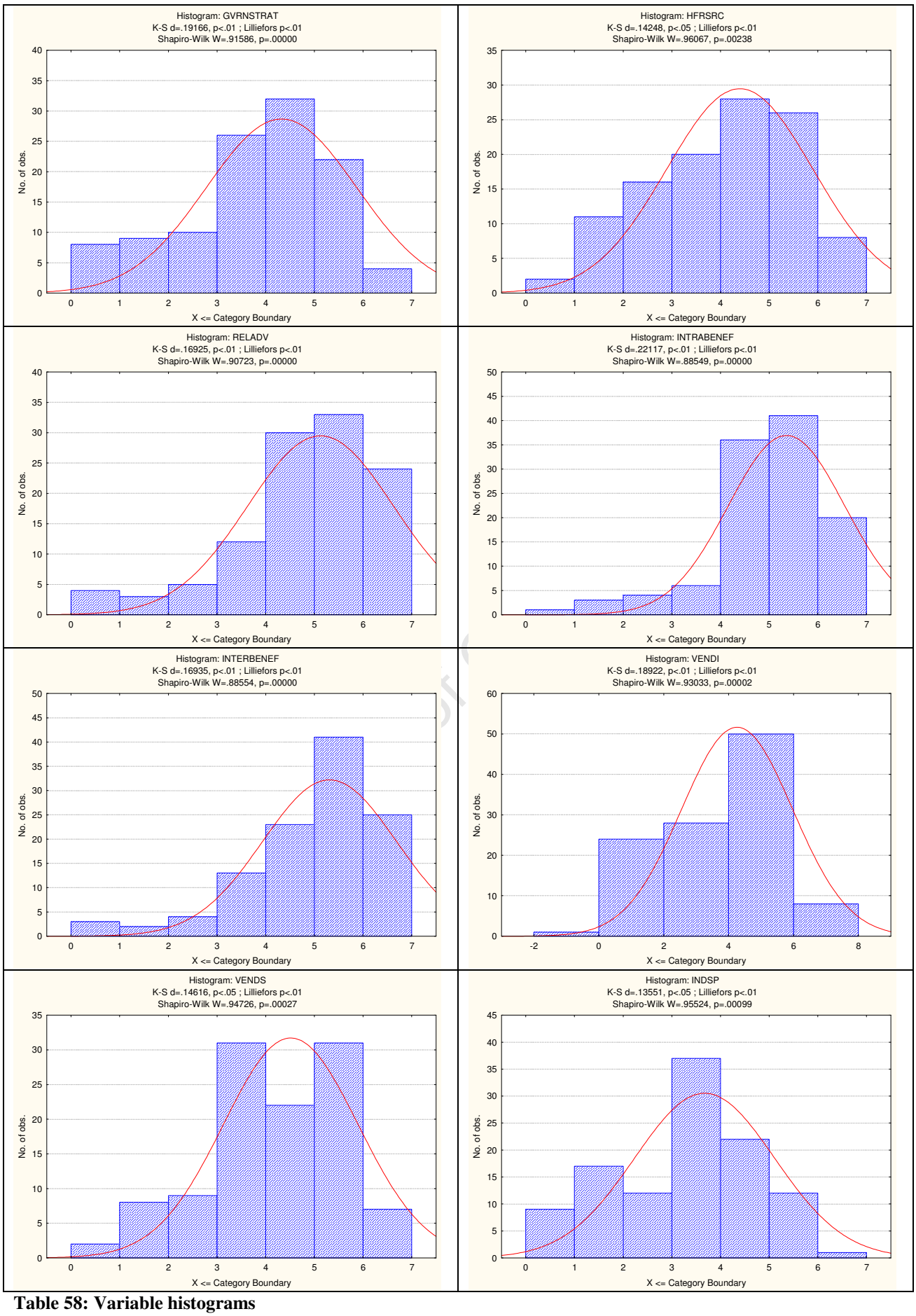


Table 58: Variable histograms

Appendix H. Correlation table for all test items

Variable	Correlations (Analysis_111_FA) Marked correlations are significant at p < .05000 N=110 (Casewise deletion of missing data)																							
	Means	Std.Dev.	Use of SOA-	STAND1	STAND2	COMPL1	COMPL2	COMPA1	COMPA2	COMPA3	COST1	COST2	COST3	IMPLC1	IMPLC2	IMPLC3	IMPLC4	IMPLC5	IMPLC6	IMPLC7	IMPLC8	IMPLC9	IMPLC10	RISK1
Use of SOA-	4.718182	2.133747	1.000000	0.420263	0.328618	-0.103314	-0.015780	0.277689	0.329957	0.322235	-0.234611	-0.086332	-0.361077	0.082041	0.202842	-0.050514	0.189929	0.196522	0.206455	0.294796	0.196788	0.208123	0.186092	0.107921
STAND1	3.427273	1.997517	0.420263	1.000000	0.438876	-0.198898	-0.058784	0.105548	0.099023	0.060273	-0.084217	-0.089303	-0.054929	0.145226	0.200058	0.026503	0.141104	0.091829	0.220588	0.194084	0.120863	0.049852	0.114086	0.044078
STAND2	2.527273	1.875526	0.328618	0.438876	1.000000	0.030475	0.168058	0.110183	0.120769	0.049889	0.230447	-0.004219	0.077079	0.207474	0.181131	0.148780	0.209146	0.038718	0.159145	0.151607	0.141925	0.147844	0.212839	0.025278
COMPL1	4.654545	1.610951	-0.103314	-0.198898	0.030475	1.000000	0.534288	-0.115127	0.003240	0.016241	0.446376	0.429968	0.296304	0.209880	0.018029	0.206395	0.152100	0.057193	0.056348	0.001483	-0.108973	-0.026054	-0.000183	0.063064
COMPL2	4.954545	1.473848	-0.015780	-0.058784	0.168058	0.534288	1.000000	0.003502	0.116501	0.141037	0.397821	0.287856	0.185053	0.266734	0.172608	0.149064	0.232299	0.197222	0.187833	0.147937	0.072019	0.054101	0.110158	0.206791
COMPA1	4.972727	1.535268	0.277689	0.105548	0.110183	-0.115127	0.003502	1.000000	0.626511	0.598335	-0.212127	-0.132657	-0.326594	0.133569	0.133609	0.019372	0.118217	0.155703	0.065284	0.186375	0.234117	0.078057	0.062043	0.158814
COMPA2	5.181818	1.598060	0.329957	0.099023	0.120769	0.003240	0.116501	0.626511	1.000000	0.593833	-0.175291	-0.161627	-0.239388	0.072924	0.141504	0.076070	0.123132	0.240334	0.084480	0.261662	0.215821	0.107918	0.073776	0.233100
COMPA3	5.218182	1.504622	0.322235	0.060273	0.049889	0.016241	0.141037	0.598335	0.593833	1.000000	-0.131182	-0.054129	-0.194077	0.010305	0.050672	-0.056371	0.079584	0.201976	0.119961	0.237416	0.272400	0.107162	0.114859	0.265581
COST1	4.463636	1.679216	-0.234611	-0.084217	0.230447	0.446376	0.397821	-0.212127	-0.175291	-0.131182	1.000000	0.513876	0.571006	0.210879	0.148718	0.294631	0.186753	0.044306	0.182818	0.084310	0.074875	0.137689	0.219905	-0.008067
COST2	4.436364	1.517647	-0.086332	-0.089303	-0.004219	0.429968	0.287856	-0.132657	-0.161627	-0.054129	0.513876	1.000000	0.510415	0.158190	0.119269	0.204348	0.175719	0.134278	0.157906	0.069275	0.024289	0.065649	0.067521	0.089255
COST3	3.718182	1.735394	-0.361077	-0.054929	0.077079	0.296304	0.185053	-0.326594	-0.239388	-0.194077	0.571006	0.510415	1.000000	0.062830	0.062015	0.231994	0.126977	0.068692	0.064052	-0.005852	-0.039503	0.081388	0.063776	0.000000
IMPLC1	5.090909	1.667528	0.082041	0.145226	0.207474	0.209880	0.266734	0.133569	0.072924	0.010305	0.210879	0.158190	0.062830	1.000000	0.519419	0.388434	0.355785	0.319367	0.374876	0.390471	0.386302	0.264162	0.265429	0.190896
IMPLC2	5.318182	1.608075	0.202842	0.200058	0.181131	0.018029	0.172608	0.133609	0.141504	0.050672	0.148718	0.119269	0.062015	0.519419	1.000000	0.370335	0.572624	0.482569	0.451457	0.551640	0.449191	0.427529	0.365208	0.256918
IMPLC3	4.609091	1.797529	-0.050514	0.026503	0.148780	0.206395	0.149064	0.019372	0.076070	-0.056371	0.294631	0.204348	0.231994	0.388434	0.370335	1.000000	0.499234	0.450564	0.490611	0.438334	0.415519	0.555049	0.559121	0.267519
IMPLC4	4.790909	1.686946	0.189929	0.141104	0.209146	0.152100	0.232299	0.118217	0.123132	0.079584	0.186753	0.175719	0.126977	0.355785	0.572624	0.499234	1.000000	0.615396	0.530868	0.463526	0.452853	0.476885	0.492687	0.381412
IMPLC5	5.472727	1.589582	0.196522	0.091829	0.038718	0.057193	0.197222	0.155703	0.240334	0.201976	0.044306	0.134278	0.068692	0.319367	0.482569	0.450564	0.615396	1.000000	0.604693	0.715516	0.682831	0.472599	0.517147	0.703028
IMPLC6	4.781818	1.587692	0.206455	0.220588	0.159145	0.056348	0.187833	0.065284	0.084480	0.119961	0.182818	0.157906	0.064052	0.374876	0.451457	0.490611	0.530868	0.604693	1.000000	0.681754	0.517292	0.485071	0.527602	0.443648
IMPLC7	5.300000	1.535811	0.294796	0.194084	0.151607	0.001483	0.147937	0.186375	0.261662	0.237416	0.084310	0.069275	-0.005852	0.390471	0.551640	0.438334	0.463526	0.715516	0.681754	1.000000	0.710580	0.592678	0.651266	0.515965
IMPLC8	5.572727	1.371125	0.196788	0.120863	0.141925	-0.108973	0.072019	0.234117	0.215821	0.272400	0.074875	0.024289	-0.039503	0.386302	0.449191	0.415519	0.452853	0.682831	0.517292	0.710580	1.000000	0.594155	0.637771	0.434688
IMPLC9	4.990909	1.605583	0.208123	0.049852	0.147844	-0.026054	0.054101	0.078057	0.107918	0.107162	0.137689	0.065649	0.081388	0.264162	0.427529	0.555049	0.476885	0.472599	0.485071	0.592678	0.594155	1.000000	0.879114	0.295282
IMPLC10	5.209091	1.697788	0.186092	0.114086	0.212839	-0.000183	0.110158	0.062043	0.073776	0.114859	0.219905	0.067521	0.063776	0.265429	0.365208	0.559121	0.492687	0.517147	0.527602	0.651266	0.637771	0.879114	1.000000	0.343073
RISK1	6.000000	1.354571	0.107921	0.044078	0.025278	0.063064	0.206791	0.158814	0.233100	0.265581	-0.008067	0.089255	0.000000	0.190896	0.256918	0.267519	0.381412	0.703028	0.443648	0.515965	0.434688	0.295282	0.343073	1.000000
RISK2	5.936364	1.167427	0.140054	0.070779	0.065746	-0.036188	0.152932	0.224246	0.202962	0.279571	-0.026931	0.010639	-0.031575	0.167944	0.362745	0.228490	0.426419	0.476133	0.393365	0.450798	0.418450	0.332516	0.404844	0.614961
RISK3	5.400000	1.307705	0.211742	0.288699	0.246131	-0.160262	0.080921	0.160850	0.215113	0.188373	0.027574	-0.070265	-0.079236	0.227187	0.453723	0.106159	0.441659	0.261278	0.329637	0.337118	0.305976	0.368785	0.313220	0.367723
RISK4	6.136364	1.112706	0.279094	0.196438	0.048757	-0.193558	0.076539	0.270718	0.300653	0.332774	-0.093068	-0.051858	-0.160458	0.181147	0.426729	0.196610	0.372121	0.513034	0.401285	0.496589	0.459474	0.324220	0.387845	0.602596
RISK5	5.600000	1.182440	0.114905	0.135171	0.178712	-0.106921	0.094758	0.110171	0.179640	0.240299	0.108119	0.001022	0.016095	0.176809	0.332918	0.275384	0.367025	0.452959	0.388015	0.516306	0.538709	0.457143	0.471618	0.544147
EXPR1	4.236364	1.896047	0.338626	0.287993	0.163284	-0.228328	0.049842	0.389890	0.467111	0.348365	-0.196099	-0.205150	-0.263968	-0.009760	0.083431	-0.007635	0.107378	0.154357	0.276334	0.205416	0.127428	0.057971	0.038656	0.092874
EXPR2	4.318182	1.776151	0.290160	0.325934	0.298939	-0.230566	0.044126	0.329560	0.386691	0.306780	-0.176031	-0.205137	-0.134345	-0.040832	0.076652	0.004833	0.199998	0.202943	0.272096	0.210202	0.142982	0.129706	0.129853	0.194474
EXPR3	4.245455	1.709050	0.290849	0.259234	0.279816	-0.242163	-0.108439	0.366212	0.396682	0.303646	-0.167889	-0.147787	-0.196086	0.011413	0.168276	0.016588	0.164342	0.173027	0.172065	0.230338	0.166534	0.228171	0.149726	0.166443
TMSP1	4.372727	1.806508	0.325010	0.263092	0.136422	-0.207547	0.116685	0.456878	0.494308	0.371462	-0.302459	-0.287415	-0.364179	0.064786	0.132497	0.036805	0.116122	0.254368	0.159758	0.293305	0.183409	0.045461	0.091015	0.284935
TMSP2	4.645455	1.700439	0.364132	0.177356	0.171345	-0.182435	0.085027	0.474195	0.486470	0.263588	-0.215006	-0.323442	-0.379264	0.144126	0.242940	-0.057765	0.210590	0.201735	0.056039	0.157030	0.131176	-0.004552	0.003669	0.171269
TMSP3	4.627273	1.739235	0.292813	0.196783	0.162051	-0.052926	0.186596	0.394714	0.509827	0.318837	-0.125623	-0.160262	-0.260052	0.207916	0.246169	0.067414	0.179569	0.230238	0.176267	0.282668	0.159586	0.025058	0.048383	0.194708
STRAT1	4.481818	1.759544	0.322400	0.165371	0.225334	0.020420	0.061588	0.480372	0.418815	0.254482	-0.153925	-0.120683	-0.219521	0.128767	0.233895	0.109408	0.262972	0.199909	0.198893	0.265147	0.124142	0.118472	0.125663	0.223254
STRAT2	5.027273	1.486694	0.311897	0.138148	0.165888	-0.137763	-0.032925	0.514820	0.507615	0.325422	-0.313803	-0.269621	-0.427262	0.047099	0.138324	-0.037170	0.086430	0.072137	-0.028550	0.100853	0.163292	0.092347	0.015894	0.109336
STRAT3	4.563636	1.804822	0.322737	0.146347	0.114670	-0.172228	-0.024770	0.495622	0.498529	0.342816	-0.359459	-0.268136	-0.470208	0.135236	0.177882	0.088333	0.192740	0.226058	0.116947	0.199912	0.198309	0.090432	0.083942	0.228911
GVRN1	4.090909	1.742851	0.305460	0.128409	0.153601	-0.057332	0.144487	0.498096	0.590220	0.370208	-0.190081	-0.157344	-0.285681	0.202319	0.202359	0.134442	0.215592	0.216153	0.173008	0.239924	0.166131	0.183896	0.117537	0.194304
GVRN2	3.990909	1.605583	0.277749	0.161413	0.342827	-0.015413	0.151024	0.308810	0.376087	0.183115	-0.086895	-0.096248	-0.195193	0.250456	0.267630	0.157698	0.263492	0.145486	0.279932	0.224347	0.152413	0.199262	0.165616	0.177169
GVRN3	4.027273	1.628074	0.340271	0.061268	0.124442	-0.136294	0.057872	0.323297	0.378906	0.196043	-0.216081	-0.242495	-0.386912	0.157905	0.220926	-0.024538	0.189158	0.097778	0.162038	0.205837	0.124453	0.115915	0.077576	0.070721
GVRN4	4.127273	1.648514	0.281541	0.133782	0.203609	-0.121477	0.096802	0.342125	0.388138	0.206928	-0.147450	-0.191084	-0.231070	0.172634	0.247603	-0.007825	0.253781	0.127374	0.129884	0.140597	0.121692	0.149486	0.105132	0.073952
RSRC1	4.463636	1.695527	0.409219	0.184765	0.225345	-0.149070	0.059908	0.438403	0.432473	0.251275	-0.198638	-0.211261	-0.422880	0.156933	0.254962	-0.087487	0.213824	0.101748	0.034514	0.122253	0.153081	0.075703	0.039316	0.143804
RSRC2	4.545455	1.651446	0.377278	0.209595	0.208418	-0.111292	0.025357	0.443756	0.559999	0.272885	-0.194587	-0.205653	-0.355623	0.138407	0.269148	-0.048044	0.238901	0.159491	0.031809	0.191711	0.201109	0.136827	0.060385	0.135339
RSRC3	4.300000	1.678521	0.428548	0.174847	0.153288	-0.280249	0.001854	0.455337	0.526714	0.297148	-0.280900	-0.314766	-0.392749	0.022944	0.226028	-0.103687	0.119556	0.204244	0.083310	0.242357	0.159851	0.143997	0.080805	0.137190
RELADV1	5.072727	1.618183	-0.039180	-0.023893	0.065844	0.083633	0.159115	0.008191	0.030317	-0.040490	0.149539	0.102766	0.285060	0.000927	0.135577	0.334732	0.126611	0.303945	0.091935	0.183101	0.080293	0.222718	0.261562	0.284612
RELADV2	5.181818	1.574929	0.029038	-0.056999	0.075954	0.071992	0.122165	0.055189	0.103391	0.134097	0.103124	0.093167	0.190112	-0.027311	0.056642	0.248944	0.166377	0.412437	0.166439	0.219990	0.121275	0.189321	0.242982	0.369836
RELADV3	5.390909	1.586037	0.122312	0.019191	0.223069	0.056929	0.227455	0.143823	0.192500	0.252265	0.093227	0.077130	0.090390	0.156414	0.249345	0.057309	0.315431	0.293565	0.190842	0.237658	0.157666	0.077065	0.040915	0.371516
RELADV4	4.981818	1.707951	0.006133	0.023811	0.280829	0.137740	0.345902	0.076782	0.085254	0.212189	0.242879	0.172979	0.233497	0.203525	0.282715	0.284539	0.441269	0.354633	0.286098	0.232935	0.180780	0.210708	0.260758	0.416376
BENEF1	5.336364	1.287037	0.181826	0.175540	0.264112	-0.000965	0.158065	0.246121	0.210863	0.179683	0.143673	0.187193	0.079799	0.502864	0.581702	0.311154	0.518626	0.347578	0.238280	0.403334	0.326534	0.374425	0.341189	0.284168
BENEF2	5.636364	1.139187	0.180137	0.141476	0.270908	0.070897	0.225025	0.204101	0.167677	0.132351	0.199249	0.119155	0.059063	0.225232	0.424322	0.498937	0.394501	0.374449	0.285437	0.414255	0.363627	0.469667	0.480814	0.356720
BENEF3	4.890909	1.429348	0.167305	0.103233	0.161966	0.047232	0.189242	0.262017	0.189503	0.134879	0.078601	0.005229	-0.027302	0.265940	0.426358	0.408169	0.458446	0.414579	0.442195	0.554168	0.434757	0.523253	0.576564	0.383812
BENEF4	5.200000	1.607323	0.182437	0.118870	0.168600	0.037557	0.100691	0.295937	0.060719	0.137326	0.070701	0.095529	0.033548	0.328601	0.408190	0.205129	0.394519	0.364822	0.236554	0.369419	0.392975	0.274445	0.246765	0.400306
BENEF5	5.427273	1.449195	0.060066	0.044110	0.203260	0.032367	0.206760	0.285681	0.180066	0.150397	0.215678	0.072961	0.092094	0.287492	0.441097	0.452109	0.475946	0.337650	0.415695	0.399423	0.439003	0.419630	0.477924	0.359862
BENEF6	4.990909	1.661741	0.087243	0.053695	0.134017	-0.056018	0.142174	0.283990	0.297737	0.228297	0.040978	-0.038428	0.027736	0.278411	0.402781	0.339723	0.300406	0.390638	0.350450	0.468400	0.396908	0.312878	0.351876	0.334212
BENEF7	5.572727	1.486694	0.036887	-0.036819	0.088119	-0.062195	0.087355	0.219938	0.175875	0.210212	0.050680	-0.095517	-0.054212	0.123131	0.283799	0.129175	0.253038	0.280360	0.232215	0.426314	0.332680	0.328893	0.326495	0.355341
BENEF8	5.563636	1.267283	0.011782	-0.114129	0.113130	0.051312	0.146463	0.281465	0.053126	0.132183	0.182166	0.056981	0.093747	0.249037	0.239827	0.411746	0.377487	0.267293	0.285104	0.402550	0.372183	0.475972	0.490514	0.320664
BENEF9	5.000000	1.608464	0.144349	0.014277	0.255457	-0.024784	0.174149	0.156037	0.157044	0.235032	0.176628	0.045100	0.151190	0.194968	0.390165	0.187214	0.483501	0.387528	0.348472	0.404810	0.382713	0.426295	0.393065	0.353704
BENEF10	5.236364	1.439465	0.144352	0.021987	0.034971	-0.098980	-0.003538	0.256175	0.164605	0.170822	-0.034366	-0.014049	-0.068578	0.078874	0.248612	0.270050	0.337898	0.391764	0.319827	0.432417	0.344482	0.350257	0.381265	0.526973
VENDS1	4.300000	1.673046	0.113848	0.007961	0.302902	0.174963	0.243699	0.160372	0.284807	0.145051	0.201486	0.125018	0.013587	0.272942	0.284738	0.173581	0.227217	0.132469	0.062859	0.096760	0.100384	0.171791	0.093989	0.137639
VENDS2	4.345455	1.547038	0.257663	0.165551	0.205409	-0.084199	0.059257	0.100570	0.219281	0.188038	0.022538	0.114952	0.081019	0.094404	0.198805	0.039109	0.274007	0.138171	0.113141	0.056375	0.044273	0.152710	0.077035	0.048157
VENDS3	4.681818	1.585090	0.268912	0.254852	0.205079	-0.126076	0.135126	0.241448	0.320037	0.229405	-0.006110	-0.037097	-0.019556	0.052695	0.234443	-0.060154	0.218491	0.209531	0.194535	0.182778	0.105723	0.110603	0.110175	0.162368
INDSP1	3.636364	1.695798	-0.015904	-0.146006	0.011800	0.336439	0.176860	0.077204	0.078787	0.031380	0.101632	0.247588	0.086439	0.186992	0.116833	0.031191	0.149563	0.037128	0.035004	-0.098632	-0.012196	-0.014703	-0.091250	0.071890
INDSP2	3.427273	1.616765	0.045863	-0.111022	0.118656	0.307285	0.169930	-0.035919	-0.005488	-0.117873	0.196703	0.203742	0.125057	0.227068	0.166011	0.073784	0.160880	0.038489	0.090261	-0.015149	-0.119680	0.036852	-0.022819	0.092161
ITMED1	3.736364	1.463170	0.037694	-0.020746	0.128012	0.276276	0.177326	0.062115	-0.010701	-0.065312	0.218234	0.234068	0.143900	0.118958	0.074970	-0.022103	0.111270	0.006742	0.046098	0.006940	-0.212146	-0.110376	-0.077321	0.120351
ITMED2	4.327273	1.822938	0.089971	-0.109300	0.150317	0.279405	0.227541	-0.026284	0.036073	0.013866	0.210720	0.259622	0.052622	0.171207	0.192616	0.008603	0.276039	0.018939	0.094634	0.039978	-0.123395	-0.005243	0.013258	0.115176

Variable	Correlations (Analysis_111_FA) Marked correlations are significant at p < .05000 N=110 (Casewise deletion of missing data)																					
	RISK2	RISK3	RISK4	RISK5	EXPR1	EXPR2	EXPR3	TMSP1	TMSP2	TMSP3	STRAT1	STRAT2	STRAT3	GVRN1	GVRN2	GVRN3	GVRN4	RSRC1	RSRC2	RSRC3	RELADV1	RELADV2	RELADV3	RELADV4
Use of SOA-	0.140054	0.211742	0.279094	0.114905	0.338626	0.290160	0.290849	0.325010	0.364132	0.292813	0.322400	0.311897	0.322737	0.305460	0.277749	0.340271	0.281541	0.409219	0.377278	0.428548	-0.039180	0.029038	0.122312	0.006133
STAND1	0.070779	0.288699	0.196438	0.135171	0.287993	0.325934	0.259234	0.263092	0.177356	0.196783	0.165371	0.138148	0.146347	0.128409	0.161413	0.061268	0.133782	0.184765	0.209595	0.174847	-0.023893	-0.056999	0.019191	0.023811
STAND2	0.065746	0.246131	0.048757	0.178712	0.163284	0.298939	0.279816	0.136422	0.171345	0.162051	0.225334	0.165888	0.114670	0.153601	0.342827	0.124442	0.203609	0.225345	0.208418	0.153288	0.065844	0.075954	0.223069	0.280829
COMPL1	-0.036188	-0.160262	-0.193558	-0.106921	-0.228328	-0.230566	-0.242163	-0.207547	-0.182435	-0.052926	0.020420	-0.137763	-0.172228	-0.057332	-0.015413	-0.136294	-0.121477	-0.149070	-0.111292	-0.280249	0.083633	0.071992	0.056929	0.137740
COMPL2	0.152932	0.080921	0.076539	0.094758	0.049842	0.044126	-0.108439	0.116685	0.085027	0.186596	0.061588	-0.032925	-0.024770	0.144487	0.151024	0.057872	0.096802	0.059908	0.025357	0.001854	0.159115	0.122165	0.227455	0.345902
COMPA1	0.224246	0.160850	0.270718	0.110171	0.389890	0.329560	0.366212	0.456878	0.474195	0.394714	0.480372	0.514820	0.495622	0.498096	0.308810	0.323297	0.342125	0.438403	0.443756	0.455337	0.008191	0.055189	0.143823	0.076782
COMPA2	0.202962	0.215113	0.300653	0.179640	0.467111	0.386691	0.396682	0.494308	0.486470	0.509827	0.418815	0.507615	0.498529	0.590220	0.376087	0.378906	0.388138	0.432473	0.559999	0.526714	0.030317	0.103391	0.192500	0.085254
COMPA3	0.279571	0.188373	0.332774	0.240299	0.348365	0.306780	0.303646	0.371462	0.263588	0.318837	0.254482	0.325422	0.342816	0.370208	0.183115	0.196043	0.206928	0.251275	0.272885	0.297148	-0.040490	0.134097	0.252265	0.212189
COST1	-0.026931	0.027574	-0.093068	0.108119	-0.196099	-0.176031	-0.167889	-0.302459	-0.215006	-0.125623	-0.153925	-0.313803	-0.359459	-0.190081	-0.086895	-0.216081	-0.147450	-0.198638	-0.194587	-0.280900	0.149539	0.103124	0.093227	0.242879
COST2	0.010639	-0.070265	-0.051858	0.001022	-0.205150	-0.205137	-0.147787	-0.287415	-0.323442	-0.160262	-0.120683	-0.269621	-0.268136	-0.157344	-0.096248	-0.242495	-0.191084	-0.211261	-0.205653	-0.314766	0.102766	0.093167	0.077130	0.172979
COST3	-0.031575	-0.079236	-0.160458	0.016095	-0.263968	-0.134345	-0.196086	-0.364179	-0.379264	-0.260052	-0.219521	-0.427262	-0.470208	-0.285681	-0.195193	-0.386912	-0.231070	-0.422880	-0.355623	-0.392749	0.285060	0.190112	0.090390	0.233497
IMPLC1	0.167944	0.227187	0.181147	0.176809	-0.009760	-0.040832	0.011413	0.064786	0.144126	0.207916	0.128767	0.047099	0.135236	0.202319	0.250456	0.157905	0.172634	0.156933	0.138407	0.022944	0.000927	-0.027311	0.156414	0.203525
IMPLC2	0.362745	0.453723	0.426729	0.332918	0.083431	0.076652	0.168276	0.132497	0.242940	0.246169	0.233895	0.138324	0.177882	0.202359	0.267630	0.220926	0.247603	0.254962	0.269148	0.226028	0.135577	0.056642	0.249345	0.282715
IMPLC3	0.228490	0.106159	0.196610	0.275384	-0.007635	0.004833	0.016588	0.036805	-0.057765	0.067414	0.109408	-0.037170	0.088333	0.134442	0.157698	-0.024538	-0.007825	-0.087487	-0.048044	-0.103687	0.334732	0.248944	0.057309	0.284539
IMPLC4	0.426419	0.441659	0.372121	0.367025	0.107378	0.199998	0.164342	0.116122	0.210590	0.179569	0.262972	0.086430	0.192740	0.215592	0.263492	0.189158	0.253781	0.213824	0.238901	0.119556	0.126611	0.166377	0.315431	0.441269
IMPLC5	0.476133	0.261278	0.513034	0.452959	0.154357	0.202943	0.173027	0.254368	0.201735	0.230238	0.199909	0.072137	0.226058	0.216153	0.145486	0.097778	0.127374	0.101748	0.159491	0.204244	0.303945	0.412437	0.293565	0.354633
IMPLC6	0.393365	0.329637	0.401285	0.388015	0.276334	0.272096	0.172065	0.159758	0.056039	0.176267	0.198893	-0.028550	0.116947	0.173008	0.279932	0.162038	0.129884	0.034514	0.031809	0.083310	0.091935	0.166439	0.190842	0.286098
IMPLC7	0.450798	0.337118	0.496589	0.516306	0.205416	0.210202	0.230338	0.293305	0.157030	0.282668	0.265147	0.100853	0.199912	0.239924	0.224347	0.205837	0.140597	0.122253	0.191711	0.242357	0.183101	0.219990	0.237658	0.232935
IMPLC8	0.418450	0.305976	0.459474	0.538709	0.127428	0.142982	0.166534	0.183409	0.131176	0.159586	0.124142	0.163292	0.198309	0.166131	0.152413	0.124453	0.121692	0.153081	0.201109	0.159851	0.080293	0.121275	0.157666	0.180780
IMPLC9	0.332516	0.368785	0.324220	0.457143	0.057971	0.129706	0.228171	0.045461	-0.004552	0.025058	0.118472	0.092347	0.090432	0.183896	0.199262	0.115915	0.149486	0.075703	0.136827	0.143997	0.222718	0.189321	0.077065	0.210708
IMPLC10	0.404844	0.313220	0.387845	0.471618	0.038656	0.129853	0.149726	0.091015	0.003669	0.048383	0.125663	0.015894	0.083942	0.117537	0.165616	0.077576	0.105132	0.039316	0.060385	0.080805	0.261562	0.242982	0.040915	0.260758
RISK1	0.614961	0.367723	0.602596	0.544147	0.092874	0.194474	0.166443	0.284935	0.171269	0.194708	0.223254	0.109336	0.228911	0.194304	0.177169	0.070721	0.073952	0.143804	0.135339	0.137190	0.284612	0.369836	0.371516	0.416376
RISK2	1.000000	0.437487	0.712999	0.586183	0.164357	0.213381	0.182633	0.211457	0.178012	0.155392	0.291971	0.122586	0.156514	0.156177	0.122052	0.092633	0.099588	0.103105	0.084790	0.047287	0.289001	0.325698	0.395082	0.468734
RISK3	0.437487	1.000000	0.479178	0.555342	0.190926	0.236993	0.341533	0.091651	0.159254	0.098423	0.134766	0.150062	0.074633	0.197242	0.167788	0.171503	0.154908	0.213505	0.208159	0.124553	-0.026880	0.040091	0.299903	0.327787
RISK4	0.712999	0.479178	1.000000	0.641507	0.202010	0.200665	0.247577	0.262020	0.234284	0.216129	0.167627	0.214021	0.285729	0.196972	0.129081	0.144793	0.085480	0.209322	0.208782	0.149819	0.233918	0.305069	0.333414	0.339238
RISK5	0.586183	0.555342	0.641507	1.000000	0.108031	0.205311	0.266942	0.139155	0.061142	0.060670	0.119940	0.084545	0.016336	0.106843	0.123709	0.067672	0.064009	0.084199	0.065775	0.033281	0.149596	0.221690	0.362982	0.368871
EXPR1	0.164357	0.190926	0.202010	0.108031	1.000000	0.764767	0.567989	0.606159	0.552654	0.480436	0.378042	0.430559	0.421837	0.498722	0.386458	0.446666	0.368923	0.422203	0.447749	0.559818	-0.110310	0.003910	0.069669	0.091996
EXPR2	0.213381	0.236993	0.200665	0.205311	0.764767	1.000000	0.729613	0.468789	0.465998	0.306030	0.355605	0.323271	0.375694	0.405487	0.406375	0.387205	0.402771	0.377063	0.315616	0.484672	-0.091118	-0.001193	0.072684	0.141040
EXPR3	0.182633	0.341533	0.247577	0.266942	0.567989	0.729613	1.000000	0.329650	0.409045	0.219335	0.356920	0.448685	0.335447	0.442128	0.478924	0.445991	0.447950	0.473263	0.433207	0.565744	-0.036370	0.068479	0.079353	0.032973
TMSP1	0.211457	0.091651	0.262020	0.139155	0.606159	0.468789	0.329650	1.000000	0.736298	0.762930	0.531778	0.457334	0.666573	0.595229	0.406044	0.495603	0.393650	0.413313	0.426331	0.522516	0.003195	0.021106	0.160012	0.201437
TMSP2	0.178012	0.159254	0.234284	0.061142	0.552654	0.465998	0.409045	0.736298	1.000000	0.674592	0.529826	0.533699	0.675541	0.602245	0.479333	0.576828	0.572621	0.588941	0.579149	0.632252	-0.087233	-0.020243	0.123297	0.124116
TMSP3	0.155392	0.098423	0.216129	0.060670	0.480436	0.306030	0.219335	0.762930	0.674592	1.000000	0.589848	0.458122	0.684226	0.616601	0.409445	0.434539	0.445470	0.444912	0.464309	0.418908	0.016240	0.008221	0.219596	0.266392
STRAT1	0.291971	0.134766	0.167627	0.119940	0.378042	0.355605	0.356920	0.531778	0.529826	0.589848	1.000000	0.542043	0.543489	0.559985	0.423731	0.430921	0.446769	0.484115	0.552806	0.500429	0.097133	0.044242	0.267210	0.296010
STRAT2	0.122586	0.150062	0.214021	0.084545	0.430559	0.323271	0.448685	0.457334	0.533699	0.458122	0.542043	1.000000	0.565216	0.579712	0.461317	0.515176	0.503922	0.686451	0.677701	0.533449	0.014422	-0.006055	0.189977	0.104976
STRAT3	0.156514	0.074633	0.285729	0.016336	0.421837	0.375694	0.335447	0.666573	0.675541	0.684226	0.543489	0.565216	1.000000	0.607716	0.489343	0.534867	0.496783	0.456462	0.493047	0.476669	-0.120969	-0.081570	0.072957	0.137285
GVRN1	0.156177	0.197242	0.196972	0.106843	0.498722	0.405487	0.442128	0.595229	0.602245	0.616601	0.559985	0.579712	0.607716	1.000000	0.698627	0.697500	0.695238	0.612739	0.648799	0.614671	-0.021884	0.030689	0.066681	0.133088
GVRN2	0.122052	0.167788	0.129081	0.123709	0.386458	0.406375	0.478924	0.406044	0.479333	0.409445	0.423731	0.461317	0.489343	0.698627	1.000000	0.747656	0.811521	0.591321	0.524348	0.474204	-0.102146	-0.104555	0.019422	0.070195
GVRN3	0.092633	0.171503	0.144793	0.067672	0.446666	0.387205	0.445991	0.495603	0.576828	0.434539	0.430921	0.515176	0.534867	0.697500	0.747656	1.000000	0.798571	0.680017	0.601789	0.524053	-0.185324	-0.123603	0.045574	0.056268
GVRN4	0.099588	0.154908	0.085480	0.064009	0.368923	0.402771	0.447950	0.393650	0.572621	0.445470	0.446769	0.503922	0.496783	0.695238	0.811521	0.798571	1.000000	0.625305	0.580848	0.509930	-0.086042	-0.115003	0.026412	0.105098
RSRC1	0.103105	0.213505	0.209322	0.084199	0.422203	0.377063	0.473263	0.413313	0.588941	0.444912	0.484115	0.686451	0.456462	0.612739	0.591321	0.680017	0.625305	1.000000	0.852475	0.643754	-0.059216	-0.038729	0.140092	0.031450
RSRC2	0.084790	0.208159	0.208782	0.065775	0.447749	0.315616	0.433207	0.426331	0.579149	0.464309	0.552806	0.677701	0.493047	0.648799	0.524348	0.601789	0.580848	0.852475	1.000000	0.688408	-0.066477	-0.038480	0.159529	0.039327
RSRC3	0.047287	0.124553	0.149819	0.033281	0.559818	0.484672	0.565744	0.522516	0.632252	0.418908	0.500429	0.533449	0.476669	0.614671	0.474204	0.524053	0.509930	0.643754	0.688408	1.000000	-0.045261	0.006941	0.079606	-0.094085
RELADV1	0.289001	-0.026880	0.233918	0.149596	-0.110310	-0.091118	-0.036370	0.003195	-0.087233	0.016240	0.097133	0.014422	-0.120969	-0.021884	-0.102146	-0.185324	-0.086042	-0.059216	-0.066477	-0.045261	1.000000	0.786732	0.392756	0.412099
RELADV2	0.325698	0.040091	0.305069	0.221690	0.003910	-0.001193	0.068479	0.021106	-0.020243	0.008221	0.044242	-0.006055	-0.081570	0.030689	-0.104555	-0.123603	-0.115003	-0.038729	-0.038480	0.006941	0.786732	1.000000	0.536899	0.430982
RELADV3	0.395082	0.299903	0.333414	0.362982	0.069669	0.072684	0.079353	0.160012	0.123297	0.219596	0.267210	0.189977	0.072957	0.066681	0.019422	0.045574	0.026412	0.140092	0.159529	0.079606	0.392756	0.536899	1.000000	0.720641
RELADV4	0.468734	0.327787	0.339238	0.368871	0.091996	0.141040	0.032973	0.201437	0.124116	0.266392	0.296010	0.104976	0.137285	0.133088	0.070195	0.056268	0.105098	0.031450	0.039327	-0.094085	0.412099	0.430982	0.720641	1.000000
BENEF1	0.399051	0.518931	0.396895	0.300215	0.019755	0.061112	0.166494	0.044230	0.126255	0.195871	0.162747	0.153387	0.107212	0.141662	0.116924	0.105040	0.169896	0.154904	0.137339	0.071770	0.292098	0.227538	0.469826	0.524503
BENEF2	0.437735	0.295604	0.372410	0.306487	0.014673	0.075844	0.102812	0.160082	0.117540	0.199529	0.262136	0.092581	0.167533	0.275568	0.198810	0.114221	0.181198	0.050089	0.047879	0.091160	0.407646	0.354225	0.272348	0.406796
BENEF3	0.556599	0.342595	0.413227	0.326778	0.151781	0.205326	0.146264	0.264602	0.229292	0.275038	0.374931	0.234548	0.219651	0.239715	0.235424	0.241777	0.278493	0.206554	0.153698	0.097892	0.320782	0.175985	0.269891	0.483966
BENEF4	0.309977	0.363148	0.379596	0.385207	0.035522	0.025709	0.145614	0.030964	0.093316	0.046602	0.176469	0.224213	0.061986	0.206324	0.238895	0.190720	0.184200	0.298936	0.245394	0.147582	0.174249	0.166712	0.336127	0.255322
BENEF5	0.574759	0.291429	0.458514	0.416531	0.103140	0.139167	0.072097	0.208445	0.151388	0.140202	0.310693	0.173386	0.159629	0.278699	0.230372	0.208878	0.172879	0.194934	0.154729	0.097683	0.342636	0.234965	0.293881	0.518379
BENEF6	0.434778	0.360544	0.427382	0.465040	0.111336	0.206140	0.204308	0.169226	0.144953	0.192451	0.255665	0.196919	0.084316	0.291720	0.151266	0.162864	0.187971	0.216416	0.098773	0.185179	0.409663	0.326648	0.345974	0.426627
BENEF7	0.438781	0.305786	0.379389	0.418550	-0.045210	-0.024478	0.038044	0.080337	0.044769	0.147181	0.279327	0.080035	0.066642	0.029291	-0.040077	0.031391	0.033622	0.035634	0.099532	0.092278	0.314302	0.264659	0.511145	0.477451
BENEF8	0.439941	0.233616	0.250780	0.402853	-0.071226	0.005187	0.062614	0.091733	0.021209	0.100351	0.358471	0.108633	0.104508	0.159353	0.056648	0.085859	0.022436	0.048053	0.031483	0.014664	0.333254	0.292930	0.318431	0.424402
BENEF9	0.361547	0.484145	0.302436	0.477549	0.063173	0.150932	0.166870	0.069462	0.093920	0.190209	0.314437	0.207174	0.066366	0.166906	0.110126	0.049047	0.155698	0.185021	0.162329	0.163109	0.271410	0.253512	0.532244	0.577741
BENEF10	0.478539	0.329465	0.483743	0.438750	-0.013935	0.031316	0.106723	0.202188	0.105765	0.204079	0.284244	0.228457	0.251944	0.174201	0.080329	0.044200	0.083861	0.112564	0.061047	0.061512	0.370661	0.304613	0.328856	0.345073
VENDS1	0.150779	0.062061	0.145381	0.024115	0.182782	0.180610	0.230696	0.211572	0.260242	0.287858	0.271446	0.225364	0.305046	0.302048	0.345973	0.168744	0.248814	0.173674	0.245716	0.196342	-0.018299	-0.041782	0.086781	0.146405
VENDS2	0.037683	0.185022	0.089634	0.006018	0.297187	0.216720	0.255637	0.222687	0.249259	0.188091	0.251733	0.247165	0.222059	0.369338	0.289370	0.232987	0.309959	0.221683	0.342119	0.305959	0.015525	0.056823	0.120193	0.182950
VENDS3	0.162481	0.106224	0.186076	-0.039159	0.480091	0.459916	0.266157	0.394226	0.400251	0.312665	0.200206	0.198372	0.323022	0.339338	0.305265	0.227361	0.296517	0.202179	0.287707	0.394819	-0.069585	-0.013364	-0.030355	0.055453
INDSP1	-0.048869	-0.049644	-0.143651	-0.169286	0.123990	0.090547	0.012087	0.056628	0.085323	0.193139	0.317530	0.225947	0.175492	0.191327	0.140294	0.113283	0.049525	0.199568	0.199236	0.048346	-0.080542	-0.074635	0.066980	0.152906
INDSP2	0.077727	0.048600	-0.139779	-0.116135	0.038580	-0.009439	0.034742	0.051772	0.028911	0.138721	0.278491	0.163049	0.070770	0.191208	0.195892	0.152375	0.086117	0.127876	0.063099	0.063894	0.033601	-0.037995	0.102422	0.152347
ITMED1	0.033056	0.079593	-0.090417	-0.024393	0.019361	0.032574	0.004102	0.047930	0.043209	0.061975	0.160261	0.049728	-0.075230	0.023875	0.073170	-0.008508	-0.027800	0.123683	0.048668	-0.038476	0.062420	0.116542	0.222717	0.122884
ITMED2	0.113339	0.129310	-0.017681	-0.023835	0.051735	0.123386	0.062321	0.140915	0.150243	0.229807	0.202088	0.040684	0.116305	0.103167	0.095061	0.145343	0.138656	0.158233	0.110817	-0.005397	-0.005033	0.017430	0.196504	0.249446

Variable	Correlations (Analysis_111_FA) Marked correlations are significant at p < .05000 N=110 (Casewise deletion of missing data)															
	BENEF1	BENEF2	BENEF3	BENEF4	BENEF5	BENEF6	BENEF7	BENEF8	BENEF9	BENEF10	VENDS1	VENDS2	VENDS3	INDSP1	INDSP2	ITMED1	ITMED2
Use of SOA	0.181826	0.180137	0.167305	0.182437	0.060066	0.087243	0.036887	0.011782	0.144349	0.144352	0.113848	0.257663	0.268912	-0.015904	0.045863	0.037694	0.089971
STAND1	0.175540	0.141476	0.103233	0.118870	0.044110	0.053695	-0.036819	-0.114129	0.014277	0.021987	0.007961	0.165551	0.254852	-0.146006	-0.111022	-0.020746	-0.109300
STAND2	0.264112	0.270908	0.161966	0.168600	0.203260	0.134017	0.088119	0.113130	0.255457	0.034971	0.302902	0.205409	0.205079	0.011800	0.118656	0.128012	0.150317
COMPL1	-0.000965	0.070897	0.047232	0.037557	0.032367	-0.056018	-0.062195	0.051312	-0.024784	-0.098980	0.174963	-0.084199	-0.126076	0.336439	0.307285	0.276276	0.279405
COMPL2	0.158065	0.225025	0.189242	0.100691	0.206760	0.142174	0.087355	0.146463	0.174149	-0.003538	0.243699	0.059257	0.135126	0.176860	0.169930	0.177326	0.227541
COMPA1	0.246121	0.204101	0.262017	0.295937	0.285681	0.283990	0.219938	0.281465	0.156037	0.256175	0.160372	0.100570	0.241448	0.077204	-0.035919	0.062115	-0.026284
COMPA2	0.210863	0.167677	0.189503	0.060719	0.180066	0.297737	0.175875	0.053126	0.157044	0.164605	0.284807	0.219281	0.320037	0.078787	-0.005488	-0.010701	0.036073
COMPA3	0.179683	0.132351	0.134879	0.137326	0.150397	0.228297	0.210212	0.132183	0.235032	0.170822	0.145051	0.188038	0.229405	0.031380	-0.117873	-0.065312	0.013866
COST1	0.143673	0.199249	0.078601	0.070701	0.215678	0.040978	0.050680	0.182166	0.176628	-0.034366	0.201486	0.022538	-0.006110	0.101632	0.196703	0.218234	0.210720
COST2	0.187193	0.119155	0.005229	0.095529	0.072961	-0.038428	-0.095517	0.056981	0.045100	-0.014049	0.125018	0.114952	-0.037097	0.247588	0.203742	0.234068	0.259622
COST3	0.079799	0.059063	-0.027302	0.033548	0.092094	0.027736	-0.054212	0.093747	0.151190	-0.068578	0.013587	0.081019	-0.019556	0.086439	0.125057	0.143900	0.052622
IMPLC1	0.502864	0.225232	0.265940	0.328601	0.287492	0.278411	0.123131	0.249037	0.194968	0.078874	0.272942	0.094404	0.052695	0.186992	0.227068	0.118958	0.171207
IMPLC2	0.581702	0.424322	0.426358	0.408190	0.441097	0.402781	0.283799	0.239827	0.390165	0.248612	0.284738	0.198805	0.234443	0.116833	0.166011	0.074970	0.192616
IMPLC3	0.311154	0.498937	0.408169	0.205129	0.452109	0.339723	0.129175	0.411746	0.187214	0.270050	0.173581	0.039109	-0.060154	0.031191	0.073784	-0.022103	0.008603
IMPLC4	0.518626	0.394501	0.458446	0.394519	0.475946	0.300406	0.253038	0.377487	0.483501	0.337898	0.227217	0.274007	0.218491	0.149563	0.160880	0.111270	0.276039
IMPLC5	0.347578	0.374449	0.414579	0.364822	0.337650	0.390638	0.280360	0.267293	0.387528	0.391764	0.132469	0.138171	0.209531	0.037128	0.038489	0.006742	0.018939
IMPLC6	0.238280	0.285437	0.442195	0.236554	0.415695	0.350450	0.232215	0.285104	0.348472	0.319827	0.062859	0.113141	0.194535	0.035004	0.090261	0.046098	0.094634
IMPLC7	0.403334	0.414255	0.554168	0.369419	0.399423	0.468400	0.426314	0.402550	0.404810	0.432417	0.096760	0.056375	0.182778	-0.098632	-0.015149	0.006940	0.039978
IMPLC8	0.326534	0.363627	0.434757	0.392975	0.439003	0.396908	0.332680	0.372183	0.382713	0.344482	0.100384	0.044273	0.105723	-0.012196	-0.119680	-0.212146	-0.123395
IMPLC9	0.374425	0.469667	0.523253	0.274445	0.419630	0.312878	0.328893	0.475972	0.426295	0.350257	0.171791	0.152710	0.110603	-0.014703	0.036852	-0.110376	-0.005243
IMPLC10	0.341189	0.480814	0.576564	0.246765	0.477924	0.351876	0.326495	0.490514	0.393065	0.381265	0.093989	0.077035	0.110175	-0.091250	-0.022819	-0.077321	0.013258
RISK1	0.284168	0.356720	0.383812	0.400306	0.359862	0.334212	0.355341	0.320664	0.353704	0.526973	0.137639	0.048157	0.162368	0.071890	0.092161	0.120351	0.115176
RISK2	0.399051	0.437735	0.556599	0.309977	0.574759	0.434778	0.438781	0.439941	0.361547	0.478539	0.150779	0.037683	0.162481	-0.048869	0.077727	0.033056	0.113339
RISK3	0.518931	0.295604	0.342595	0.363148	0.291429	0.360544	0.305786	0.233616	0.484145	0.329465	0.062061	0.185022	0.106224	-0.049644	0.048600	0.079593	0.129310
RISK4	0.396895	0.372410	0.413227	0.379596	0.458514	0.427382	0.379389	0.250780	0.302436	0.483743	0.145381	0.089634	0.186076	-0.143651	-0.139779	-0.090417	-0.017681
RISK5	0.300215	0.306487	0.326778	0.385207	0.416531	0.465040	0.418550	0.402853	0.477549	0.438750	0.024115	0.006018	-0.039159	-0.169286	-0.116135	-0.024393	-0.023835
EXPR1	0.019755	0.014673	0.151781	0.035522	0.103140	0.111336	-0.045210	-0.071226	0.063173	-0.013935	0.182782	0.297187	0.480091	0.123990	0.038580	0.019361	0.051735
EXPR2	0.061112	0.075844	0.205326	0.025709	0.139167	0.206140	-0.024478	0.005187	0.150932	0.031316	0.180610	0.216720	0.459916	0.090547	-0.009439	0.032574	0.123386
EXPR3	0.166494	0.102812	0.146264	0.145614	0.072097	0.204308	0.038044	0.062614	0.166870	0.106723	0.230696	0.255637	0.266157	0.012087	0.034742	0.004102	0.062321
TMSP1	0.044230	0.160082	0.264602	0.030964	0.208445	0.169226	0.080337	0.091733	0.069462	0.202188	0.211572	0.222687	0.394226	0.056628	0.051772	0.047930	0.140915
TMSP2	0.126255	0.117540	0.229292	0.093316	0.151388	0.144953	0.044769	0.021209	0.093920	0.105765	0.260242	0.249259	0.400251	0.085323	0.028911	0.043209	0.150243
TMSP3	0.195871	0.199529	0.275038	0.046602	0.140202	0.192451	0.147181	0.100351	0.190209	0.204079	0.287858	0.188091	0.312665	0.193139	0.138721	0.061975	0.229807
STRAT1	0.162747	0.262136	0.374931	0.176469	0.310693	0.255665	0.279327	0.358471	0.314437	0.284244	0.271446	0.251733	0.200206	0.317530	0.278491	0.160261	0.202088
STRAT2	0.153387	0.092581	0.234548	0.224213	0.173386	0.196919	0.080035	0.108633	0.207174	0.228457	0.225364	0.247165	0.198372	0.225947	0.163049	0.049728	0.040684
STRAT3	0.107212	0.167533	0.219651	0.061986	0.159629	0.084316	0.066642	0.104508	0.066366	0.251944	0.305046	0.222059	0.323022	0.175492	0.070770	-0.075230	0.116305
GVRN1	0.141662	0.275568	0.239715	0.206324	0.278699	0.291720	0.029291	0.159353	0.166906	0.174201	0.302048	0.369338	0.339338	0.191327	0.191208	0.023875	0.103167
GVRN2	0.116924	0.198810	0.235424	0.238895	0.230372	0.151266	-0.040077	0.056648	0.110126	0.080329	0.345973	0.289370	0.305265	0.140294	0.195892	0.073170	0.095061
GVRN3	0.105040	0.114221	0.241777	0.190720	0.208878	0.162864	0.031391	0.085859	0.049047	0.044200	0.168744	0.232987	0.227361	0.113283	0.152375	-0.008508	0.145343
GVRN4	0.169896	0.181198	0.278493	0.184200	0.172879	0.187971	0.033622	0.022436	0.155698	0.083861	0.248814	0.309959	0.296517	0.049525	0.086117	-0.027800	0.138656
RSRC1	0.154904	0.050089	0.206554	0.298936	0.194934	0.216416	0.035634	0.048053	0.185021	0.112564	0.173674	0.221683	0.202179	0.199568	0.127876	0.123683	0.158233
RSRC2	0.137339	0.047879	0.153698	0.245394	0.154729	0.098773	0.099532	0.031483	0.162329	0.061047	0.245716	0.342119	0.287707	0.199236	0.063099	0.048668	0.110817
RSRC3	0.071770	0.091160	0.097892	0.147582	0.097683	0.185179	0.092278	0.014664	0.163109	0.061512	0.196342	0.305959	0.394819	0.048346	0.063894	-0.038476	-0.005397
RELADV1	0.292098	0.407646	0.320782	0.174249	0.342636	0.409663	0.314302	0.333254	0.271410	0.370661	-0.018299	0.015525	-0.069585	-0.080542	0.033601	0.062420	-0.005033
RELADV2	0.227538	0.354225	0.175985	0.166712	0.234965	0.326648	0.264659	0.292930	0.253512	0.304613	-0.041782	0.056823	-0.013364	-0.074635	-0.037995	0.116542	0.017430
RELADV3	0.469826	0.272348	0.269891	0.336127	0.293881	0.345974	0.511145	0.318431	0.532244	0.328856	0.086781	0.120193	-0.030355	0.066980	0.102422	0.222717	0.196504
RELADV4	0.524503	0.406796	0.483966	0.255322	0.518379	0.426627	0.477451	0.424402	0.577741	0.345073	0.146405	0.182950	0.055453	0.152906	0.152347	0.122884	0.249446
BENEF1	1.000000	0.515943	0.538784	0.419537	0.433790	0.477591	0.411428	0.372057	0.452034	0.328093	0.216866	0.222174	0.142884	0.064963	0.119884	0.071881	0.155986
BENEF2	0.515943	1.000000	0.572650	0.340709	0.589562	0.419870	0.427449	0.511854	0.375516	0.382983	0.274375	0.165635	0.184291	-0.026335	0.129963	-0.019514	0.053415
BENEF3	0.538784	0.572650	1.000000	0.360995	0.673776	0.513295	0.465721	0.545801	0.430971	0.516511	0.125068	0.021348	0.126265	0.025118	0.095785	-0.031425	-0.017861
BENEF4	0.419537	0.340709	0.360995	1.000000	0.439549	0.357911	0.385463	0.367525	0.436480	0.494862	0.090067	0.034681	-0.028808	0.067317	0.093909	0.092844	-0.035068
BENEF5	0.433790	0.589562	0.673776	0.439549	1.000000	0.637837	0.434684	0.567027	0.429004	0.448106	0.113138	0.072690	0.123628	0.119799	0.113232	-0.041575	0.040347
BENEF6	0.477591	0.419870	0.513295	0.357911	0.637837	1.000000	0.533164	0.385827	0.559482	0.484165	0.004290	0.051194	0.009341	0.063929	0.042436	-0.012315	0.007048
BENEF7	0.411428	0.427449	0.465721	0.385463	0.434684	0.533164	1.000000	0.499073	0.602338	0.574922	0.088892	0.020887	-0.038754	-0.025804	0.015580	-0.039606	0.014833
BENEF8	0.372057	0.511854	0.545801	0.367525	0.567027	0.385827	0.499073	1.000000	0.499588	0.559979	0.040674	0.026120	-0.042350	0.070633	0.127655	0.095716	0.050471
BENEF9	0.452034	0.375516	0.430971	0.436480	0.429004	0.559482	0.602338	0.499588	1.000000	0.566627	0.136369	0.235961	0.068369	0.188355	0.275176	0.171522	0.184605
BENEF10	0.328093	0.382983	0.516511	0.494862	0.448106	0.484165	0.574922	0.559979	0.566627	1.000000	0.050285	0.136027	0.073472	0.020500	0.117832	0.143111	0.106603
VENDS1	0.216866	0.274375	0.125068	0.090067	0.113138	0.004290	0.088892	0.040674	0.136369	0.050285	1.000000	0.381397	0.344219	0.404205	0.423625	0.163777	0.418729
VENDS2	0.222174	0.165635	0.021348	0.034681	0.072690	0.051194	0.020887	0.026120	0.235961	0.136027	0.381397	1.000000	0.561530	0.377043	0.384270	0.093293	0.203527
VENDS3	0.142884	0.184291	0.126265	-0.028808	0.123628	0.009341	-0.038754	-0.042350	0.068369	0.073472	0.344219	0.561530	1.000000	0.151106	0.160933	-0.000899	0.093519
INDSP1	0.064963	-0.026335	0.025118	0.067317	0.119799	0.063929	-0.025804	0.070633	0.188355	0.020500	0.404205	0.377043	0.151106	1.000000	0.672892	0.404705	0.392013
INDSP2	0.119884	0.129963	0.095785	0.093909	0.113232	0.042436	0.015580	0.127655	0.275176	0.117832	0.423625	0.384270	0.160933	0.672892	1.000000	0.528953	0.465735
ITMED1	0.071881	-0.019514	-0.031425	0.092844	-0.041575	-0.012315	-0.039606	0.095716	0.171522	0.143111	0.163777	0.093293	-0.000899	0.404705	0.528953	1.000000	0.455714
ITMED2	0.155986	0.053415	-0.017861	-0.035068	0.040347	0.007048	0.014833	0.050471	0.184605	0.106603	0.418729	0.203527	0.093519	0.392013	0.465735	0.455714	1.000000

Appendix I. Cronbach alpha reliability analysis (initial model)

variable	Summary for scale STAND: Mean=5.96396 Std.Dv.=3.27227 Valid N:111 Cronbach alpha: **.609536** Standardized alpha: .610380 Average inter-item corr.: .439242				
	Mean if deleted	Var. if deleted	StDv. If deleted	Itm-Totl Correl.	Alpha if deleted
STAND1	2.531532	3.456213	1.859089	0.439242	
STAND2	3.432432	3.921110	1.980179	0.439242	

Table 59: Cronbach alpha reliability analysis (initial model) - STAND variable

variable	Summary for scale COMPL: Mean=9.61261 Std.Dv.=2.69063 Valid N:111 Cronbach alpha: **.691133** Standardized alpha: .692860 Average inter-item corr.: .530058				
	Mean if deleted	Var. if deleted	StDv. If deleted	Itm-Totl Correl.	Alpha if deleted
COMPL1	4.963964	2.142846	1.463846	0.530058	
COMPL2	4.648649	2.552228	1.597569	0.530058	

Table 60: Cronbach alpha reliability analysis (initial model) - COMPL variable

variable	Summary for scale COMPA: Mean=15.3874 Std.Dv.=3.96845 Valid N:111 Cronbach alpha: **.821384** Standardized alpha: .821592 Average inter-item corr.: .605712				
	Mean if deleted	Var. if deleted	StDv. If deleted	Itm-Totl Correl.	Alpha if deleted
COMPA1	10.405410	7.538349	2.745605	0.686205	0.743325
COMPA2	10.207210	7.281390	2.698405	0.680626	0.749537
COMPA3	10.162160	7.847577	2.801353	0.661241	0.768518

Table 61: Cronbach alpha reliability analysis (initial model) - COMPA variable

variable	Summary for scale COST: Mean=12.6036 Std.Dv.=4.07939 Valid N:111 Cronbach alpha: **.770655** Standardized alpha: .771492 Average inter-item corr.: .529990				
	Mean if deleted	Var. if deleted	StDv. If deleted	Itm-Totl Correl.	Alpha if deleted
COST1	8.135135	7.900657	2.810811	0.621802	0.671721
COST2	8.171171	9.006736	3.001122	0.578205	0.722020
COST3	8.900901	7.602792	2.757316	0.619912	0.675492

Table 62: Cronbach alpha reliability analysis (initial model) - COST variable

variable	Summary for scale IMPLC: Mean=51.1081 Std.Dv.=11.9258 Valid N:111 Cronbach alpha: **.908236** Standardized alpha: .910148 Average inter-item corr.: .516777				
	Mean if deleted	Var. if deleted	StDv. If deleted	Itm-Totl Correl.	Alpha if deleted
IMPLC1	46.018020	121.044700	11.002030	0.472154	0.911201
IMPLC2	45.792790	117.065200	10.819670	0.618688	0.902103
IMPLC3	46.504510	114.214000	10.687090	0.618308	0.902803
IMPLC4	46.315320	114.414100	10.696450	0.663625	0.899442
IMPLC5	45.639640	114.122400	10.682810	0.722859	0.895793
IMPLC6	46.333330	114.979000	10.722830	0.695228	0.897477
IMPLC7	45.810810	113.396600	10.648790	0.778244	0.892678
IMPLC8	45.540540	117.761900	10.851810	0.722826	0.896819
IMPLC9	46.117120	114.229500	10.687820	0.711039	0.896483
IMPLC10	45.900900	112.053300	10.585520	0.731563	0.895052

Table 63: Cronbach alpha reliability analysis (initial model) - IMPLC variable

variable	Summary for scale RISK: Mean=29.1171 Std.Dv.=4.89478 Valid N:111 Cronbach alpha: **.857350** Standardized alpha: .862445 Average inter-item corr.: .563690				
	Mean if deleted	Var. if deleted	StDv. If deleted	Itm-Totl Correl.	Alpha if deleted
RISK1	23.108110	15.177500	3.895831	0.644253	0.837210
RISK2	23.171170	15.691420	3.961240	0.728629	0.814176
RISK3	23.702700	16.299000	4.037202	0.545065	0.862464
RISK4	22.972970	15.828100	3.978454	0.760719	0.808048
RISK5	23.513510	15.691260	3.961219	0.718936	0.816378

Table 64: Cronbach alpha reliability analysis (initial model) - RISK variable

variable	Summary for scale EXPR: Mean=12.8378 Std.Dv.=4.78357 Valid N:111 Cronbach alpha: **.868005** Standardized alpha: .868887 Average inter-item corr.: .697201				
	Mean if	Var. if	StDv. if	Itm-Totl Correl.	Alpha if
EXPR1	8.594595	10.421230	3.228193	0.718279	0.844891
EXPR2	8.504504	10.069800	3.173295	0.845538	0.722689
EXPR3	8.576576	11.739630	3.426315	0.689571	0.865629

Table 65: Cronbach alpha reliability analysis (initial model) - EXPR variable

variable	Summary for scale TMSP: Mean=13.6126 Std.Dv.=4.73319 Valid N:111 Cronbach alpha: **.887962** Standardized alpha: .887847 Average inter-item corr.: .727267				
	Mean if deleted	Var. if deleted	StDv. If deleted	Itm-Totl Correl.	Alpha if deleted
TMSP1	9.252253	9.774210	3.126373	0.820261	0.805593
TMSP2	8.972973	10.963230	3.311077	0.751832	0.866107
TMSP3	9.000000	10.522520	3.243844	0.773629	0.847310

Table 66: Cronbach alpha reliability analysis (initial model) - TMSP variable

variable	Summary for scale STRAT: Mean=14.0541 Std.Dv.=4.21434 Valid N:111 Cronbach alpha: **.778491** Standardized alpha: .782957 Average inter-item corr.: .546107				
	Mean if deleted	Var. if deleted	StDv. If deleted	Itm-Totl Correl.	Alpha if deleted
STRAT1	9.594595	8.349160	2.889491	0.605515	0.713444
STRAT2	9.027027	9.665936	3.109009	0.629247	0.697365
STRAT3	9.486486	8.051620	2.837538	0.625331	0.692029

Table 67: Cronbach alpha reliability analysis (initial model) - STRAT variable

variable	Summary for scale GVRN: Mean=16.2613 Std.Dv.=5.92332 Valid N:111 Cronbach alpha: **.918764** Standardized alpha: .919690 Average inter-item corr.: .745115				
	Mean if deleted	Var. if deleted	StDv. If deleted	Itm-Totl Correl.	Alpha if deleted
GVRN1	12.162160	20.099830	4.483284	0.753273	0.916366
GVRN2	12.261260	20.301110	4.505675	0.830447	0.888930
GVRN3	12.225230	20.192520	4.493608	0.823920	0.890901
GVRN4	12.135130	19.756510	4.444830	0.850012	0.881822

Table 68: Cronbach alpha reliability analysis (initial model) - GVRN variable

variable	Summary for scale RSRC: Mean=13.3063 Std.Dv.=4.52627 Valid N:111 Cronbach alpha: **.887714** Standardized alpha: .887996 Average inter-item corr.: .741310				
	Mean if deleted	Var. if deleted	StDv. If deleted	Itm-Totl Correl.	Alpha if deleted
RSRC1	8.837838	9.198930	3.032974	0.811851	0.812529
RSRC2	8.756757	9.193090	3.032010	0.849134	0.780097
RSRC3	9.018018	10.197870	3.193411	0.687451	0.920253

Table 69: Cronbach alpha reliability analysis (initial model) - RSRC variable

variable	Summary for scale RELADV: Mean=20.6216 Std.Dv.=5.24327 Valid N:111 Cronbach alpha: **.827123** Standardized alpha: .828273 Average inter-item corr.: .570031				
	Mean if deleted	Var. if deleted	StDv. If deleted	Itm-Totl Correl.	Alpha if deleted
RELADV1	15.549550	16.517810	4.064211	0.625656	0.794208
RELADV2	15.441440	15.958280	3.994782	0.709705	0.756736
RELADV3	15.234230	16.323510	4.040237	0.665107	0.776633
RELADV4	15.639640	16.032300	4.004036	0.615878	0.800262

Table 70: Cronbach alpha reliability analysis (initial model) - RELADV variable

variable	Summary for scale BENEF: Mean=52.8829 Std.Dv.=10.4008 Valid N:111 Cronbach alpha: **.897831** Standardized alpha: .899976 Average inter-item corr.: .478148				
	Mean if deleted	Var. if deleted	StDv. If deleted	Itm-Totl Correl.	Alpha if deleted
BENEF1	47.540540	91.041150	9.541549	0.596312	0.890869
BENEF2	47.252250	92.494930	9.617429	0.617606	0.890261
BENEF3	47.990990	86.729650	9.312876	0.699955	0.884104
BENEF4	47.675670	88.435350	9.404007	0.540985	0.895573
BENEF5	47.459460	86.212320	9.285059	0.709413	0.883411
BENEF6	47.882880	84.193490	9.175701	0.670246	0.886393
BENEF7	47.306300	86.771050	9.315098	0.665017	0.886368
BENEF8	47.315320	90.053730	9.489664	0.652903	0.887655
BENEF9	47.873870	84.957060	9.217216	0.669149	0.886270
BENEF10	47.648650	87.308980	9.343927	0.669845	0.886075

Table 71: Cronbach alpha reliability analysis (initial model) - BENEF variable

variable	Summary for scale VENDS: Mean=13.3273 Std.Dv.=3.77609 Valid N:110 Cronbach alpha: **.689461** Standardized alpha: .692722 Average inter-item corr.: .434321				
	Mean if deleted	Var. if deleted	StDv. If deleted	Itm-Totl Correl.	Alpha if deleted
VENDS1	9.027273	7.590165	2.755025	0.410334	0.719069
VENDS2	8.981818	7.072397	2.659398	0.572012	0.511592
VENDS3	8.645454	7.101570	2.664877	0.539620	0.550967

Table 72: Cronbach alpha reliability analysis (initial model) - VENDS variable

variable	Summary for scale INDSP: Mean=7.06364 Std.Dv.=3.02975 Valid N:110 Cronbach alpha: **.803918** Standardized alpha: .804465 Average inter-item corr.: .672892				
	Mean if deleted	Var. if deleted	StDv. If deleted	Itm-Totl Correl.	Alpha if deleted
INDSP1	3.427273	2.590165	1.609399	0.672892	
INDSP2	3.636364	2.849587	1.688072	0.672892	

Table 73: Cronbach alpha reliability analysis (initial model) - INDSP variable

variable	Summary for scale ITMED: Mean=8.06364 Std.Dv.=2.80980 Valid N:110 Cronbach alpha: **.615840** Standardized alpha: .626104 Average inter-item corr.: .455714				
	Mean if deleted	Var. if deleted	StDv. If deleted	Itm-Totl Correl.	Alpha if deleted
ITMED1	4.327273	3.292892	1.814633	0.455715	
ITMED2	3.736364	2.121405	1.456504	0.455715	

Table 74: Cronbach alpha reliability analysis (initial model) - ITMED variable

Appendix J. Factor analysis

	Factor Loadings (Varimax normalized) (Analysis_111) Extraction: Principal components (Marked loadings are >.600000)													
Variable	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8	Factor 9	Factor 10	Factor 11	Factor 12	Factor 13	Factor 14
STAND1	0.07608	0.07021	-0.09745	-0.09186	0.14558	0.23516	-0.02457	-0.16211	0.15390	0.01568	-0.00349	0.12290	0.07712	0.74789
STAND2	0.09200	0.19353	0.06095	0.18411	-0.22367	0.02220	0.09543	0.17882	0.00687	-0.01502	0.04470	0.02840	-0.07770	0.74613
COMPL1	0.02764	-0.11444	0.32679	-0.11429	-0.09293	0.07094	0.00829	0.70727	-0.02546	0.09059	0.05579	-0.20457	-0.07325	-0.13446
COMPL2	0.05045	0.08292	0.05242	0.13123	-0.01948	0.05198	0.05214	0.74880	0.15525	0.04408	0.04078	0.00110	0.10109	-0.03100
COMPA1	-0.00761	0.38615	0.03263	-0.00263	0.04453	0.10126	0.27028	-0.10659	0.16249	0.70979	-0.00313	-0.01859	0.07222	0.07952
COMPA2	0.07876	0.46829	-0.06077	0.06577	-0.06650	-0.01114	0.00453	0.06405	0.22867	0.63376	0.07981	0.13971	0.10107	0.02311
COMPA3	0.06064	0.20583	-0.12154	0.19762	-0.01475	-0.10593	0.00137	0.12456	0.13041	0.73978	-0.04455	0.12845	0.22473	-0.03703
COST1	0.17853	-0.22832	0.13597	0.11054	-0.08567	0.02833	0.10556	0.65629	-0.22885	-0.08102	0.02484	0.03569	-0.14036	0.15609
COST2	0.09959	-0.26312	0.28598	-0.10721	0.05297	0.17722	0.00656	0.53982	-0.25595	0.04210	0.09296	0.13819	0.02856	-0.04132
COST3	0.08085	-0.37807	0.09814	0.06535	0.17536	0.00306	0.08041	0.47458	-0.30881	-0.14971	0.22170	0.23753	-0.14804	0.07860
IMPLC1	0.34474	0.11070	0.14042	0.01763	-0.01432	0.61438	0.11404	0.26863	0.10298	-0.01187	-0.13943	-0.05638	0.01074	0.12552
IMPLC2	0.42584	0.19560	0.06613	0.18713	-0.01075	0.57609	0.14850	0.07531	0.03871	-0.10016	-0.04135	0.19508	0.18711	0.10975
IMPLC3	0.61756	-0.04352	0.03343	-0.16954	-0.07945	0.12258	0.38747	0.22501	0.03573	-0.07094	0.21873	-0.03027	-0.04286	0.07807
IMPLC4	0.51608	0.18473	0.15134	0.23113	0.00167	0.27116	0.16132	0.18805	0.02519	-0.14937	0.01806	0.18960	0.24778	0.06038
IMPLC5	0.69831	0.08473	0.02578	0.07144	0.15867	0.20156	-0.03791	0.08211	0.17011	0.06465	0.30957	0.12722	0.36424	-0.11097
IMPLC6	0.68875	0.04936	0.08186	0.04519	0.31787	0.04452	0.13190	0.16400	0.13636	-0.10025	-0.04652	0.08125	0.24905	0.11732
IMPLC7	0.78358	0.10406	-0.03065	0.14105	0.11648	0.15731	0.10899	0.02678	0.16660	0.11307	0.06083	-0.02384	0.22805	0.07195
IMPLC8	0.76275	0.08068	-0.15137	0.12057	0.02790	0.20948	0.10272	-0.03263	0.01972	0.22928	-0.04718	-0.00117	0.17406	-0.02039
IMPLC9	0.79880	0.10511	-0.04673	0.12302	-0.23588	-0.04896	0.26914	-0.03703	-0.17663	-0.00261	0.03123	0.09791	0.02532	0.03861
IMPLC10	0.81425	0.03054	-0.08213	0.08178	-0.19089	-0.08608	0.31016	0.02307	-0.06420	-0.02756	0.05778	0.01664	0.08257	0.10096
RISK1	0.37808	0.07053	0.15395	0.09132	0.05015	0.04011	0.07370	0.05404	0.13902	0.10727	0.26903	-0.01560	0.67769	-0.10328
RISK2	0.23295	0.03011	0.02107	0.17328	-0.01318	0.00390	0.39621	0.01546	0.10737	0.07190	0.10100	0.06002	0.71088	-0.00163
RISK3	0.21474	0.14895	0.00748	0.41530	-0.02635	0.17225	0.10301	-0.07572	-0.15622	0.01676	-0.21528	0.08673	0.48866	0.31722
RISK4	0.27617	0.09589	-0.14822	0.11910	-0.04721	0.17791	0.17309	-0.11175	0.09398	0.17607	0.12989	0.08804	0.74014	0.04157
RISK5	0.43899	0.04474	-0.10673	0.34424	0.00032	-0.06242	0.13411	0.01461	-0.12741	0.10533	-0.01425	-0.12607	0.57195	0.15240
EXPR1	0.08698	0.46913	0.03057	-0.02165	0.34622	-0.25791	-0.04225	-0.04792	0.30269	0.24216	-0.06714	0.32850	0.10898	0.29019
EXPR2	0.13070	0.43596	0.03480	0.01771	0.31360	-0.39953	0.02614	-0.02304	0.15132	0.15196	-0.09036	0.30279	0.20369	0.42061
EXPR3	0.16126	0.56333	0.04666	0.02881	0.07611	-0.26564	-0.03068	-0.15000	-0.14006	0.20969	0.00816	0.18290	0.19926	0.38937
TMSP1	0.08416	0.44556	0.02709	0.00328	0.07731	-0.10408	0.07584	-0.09254	0.70983	0.18490	0.03756	0.11454	0.13343	0.11608
TMSP2	-0.01220	0.63642	-0.00267	0.05480	0.00903	0.05614	0.00355	-0.07364	0.52410	0.10722	-0.01275	0.13790	0.09934	0.09750
TMSP3	0.07466	0.43708	0.09308	0.13655	-0.01537	0.09776	0.06065	0.05147	0.72767	0.16187	0.01652	0.07271	-0.01246	0.06230
STRAT1	0.09943	0.49217	0.33392	0.17182	0.02471	-0.02649	0.28428	-0.08956	0.38637	0.19682	0.07160	-0.01800	-0.04847	0.09793
STRAT2	-0.03805	0.66609	0.16476	0.08521	-0.07431	0.06759	0.09863	-0.24927	0.12482	0.32813	0.07569	-0.02146	0.00179	0.05273
STRAT3	0.09283	0.51881	0.06162	-0.07226	-0.16560	0.04324	0.10719	-0.18721	0.58320	0.20154	-0.06366	0.10073	0.09540	-0.03104
GVRN1	0.09816	0.78047	0.06205	-0.04905	-0.00603	0.01455	0.17946	0.04979	0.21685	0.20312	0.03391	0.15430	0.02481	-0.02785
GVRN2	0.13428	0.81773	0.05595	-0.13325	-0.04952	0.00456	0.13954	0.15774	0.02469	-0.08216	-0.08968	0.07826	0.08623	0.12073
GVRN3	0.03948	0.86890	-0.01229	0.00727	0.03176	-0.00489	0.10931	0.01010	0.12230	-0.10466	-0.16577	0.02037	0.07258	-0.06615
GVRN4	0.02836	0.86223	-0.07928	0.03978	-0.04309	0.02428	0.13239	0.08161	0.06065	-0.11144	-0.09641	0.13705	0.02137	0.00352
RSRC1	-0.00541	0.84265	0.13176	0.09335	0.02806	0.16595	-0.03700	-0.11378	0.01080	0.13542	0.01746	-0.07147	0.05544	0.09280
RSRC2	0.08139	0.78598	0.08278	0.11525	-0.06598	0.19202	-0.13624	-0.12025	0.06918	0.23842	0.05632	0.05175	-0.03303	0.06249
RSRC3	0.14368	0.69639	-0.00851	0.07406	0.07308	-0.02090	-0.12450	-0.23841	0.13682	0.25843	0.08798	0.19737	-0.07312	0.07923
RELADV1	0.09824	-0.09023	-0.01625	0.14401	-0.01362	0.01776	0.31562	0.06236	-0.01992	-0.05087	0.84513	-0.00485	0.04211	0.00680
RELADV2	0.13506	-0.05863	-0.02291	0.19427	0.01475	-0.07891	0.07713	0.08975	-0.01754	0.04921	0.86174	0.01298	0.19230	0.00097
RELADV3	-0.02395	0.05379	0.10107	0.69102	0.03819	0.14710	0.04063	0.15659	0.13338	0.07864	0.39875	-0.04677	0.25824	0.08614
RELADV4	0.06498	0.00312	0.07634	0.60200	0.03028	0.04001	0.35210	0.33351	0.22099	-0.07735	0.25821	0.10846	0.24091	0.07970
BENEF1	0.18025	0.06184	-0.00047	0.37907	-0.11681	0.53154	0.33962	0.09837	-0.03231	0.07399	0.09249	0.19473	0.19788	0.20523
BENEF2	0.29512	0.07055	-0.05039	0.07742	-0.28707	0.15239	0.60000	0.12620	0.05947	0.02758	0.26165	0.15208	0.15822	0.14287
BENEF3	0.37881	0.16573	-0.02030	0.17882	0.04327	0.10593	0.67389	0.04455	0.15878	-0.01252	0.03998	-0.00547	0.18249	0.04233
BENEF4	0.21014	0.23155	0.13181	0.18113	0.11673	0.43988	0.26870	-0.03484	-0.28181	0.14533	0.10320	-0.16329	0.28424	0.05514
BENEF5	0.27137	0.15156	-0.00428	0.16394	0.11234	0.14686	0.73779	0.14404	0.00412	0.04630	0.07559	0.05241	0.21326	0.00531
BENEF6	0.25681	0.16172	-0.04495	0.37388	0.27178	0.14940	0.48593	0.01670	-0.02980	0.15613	0.17061	-0.00156	0.16080	0.00152
BENEF7	0.22554	-0.04415	-0.02761	0.64526	-0.09508	0.07711	0.36974	-0.11862	0.06265	0.16622	0.09638	-0.07838	0.14441	-0.09393
BENEF8	0.36804	0.00017	0.16114	0.29276	-0.08982	-0.04423	0.62027	0.00025	-0.01194	0.11858	0.11580	-0.16853	0.04279	-0.04405
BENEF9	0.34577	0.09194	0.23258	0.73798	0.04572	0.04538	0.24825	-0.00729	-0.09073	0.07999	0.06672	0.08334	0.08456	0.03498
BENEF10	0.29687	0.01176	0.23205	0.28554	-0.03856	0.04068	0.43616	-0.27772	0.05783	0.11693	0.20979	-0.06288	0.34661	-0.09497
VENDS1	0.08811	0.21081	0.35092	-0.04547	-0.54249	0.07566	0.03948	0.23244	0.12818	0.13240	-0.05641	0.35631	0.08323	0.11023
VENDS2	0.05736	0.26092	0.26079	0.14065	-0.12123	0.07110	-0.02446	-0.03753	-0.04017	0.03673	0.06859	0.75351	-0.05577	0.03634
VENDS3	0.08130	0.21876	0.03721	-0.09597	0.01967	-0.00875	0.01665	0.01122	0.22337	0.12408	-0.03446	0.75182	0.10071	0.14240
INDSP1	-0.02369	0.11560	0.75154	0.02975	0.05571	0.09615	0.06048	0.13938	0.03630	0.11683	-0.09687	0.23662	-0.14795	-0.18793
INDSP2	-0.01271	0.10887	0.80771	0.03967	-0.08726	0.05852	0.14278	0.10600	-0.00848	-0.12399	-0.02966	0.20670	-0.05949	-0.06430
ITMED1	-0.08912	0.01334	0.75572	0.05603	0.06946	0.01082	-0.08092	0.14994	-0.00735	-0.02424	0.12089	-0.15630	0.09782	0.18012
ITMED2	-0.01862	0.10190	0.57854	0.20103	-0.26385	-0.04995	-0.11428	0.28357	0.18154	-0.16998	-0.07574	0.06807	0.15751	0.03766
Expl.Var	6.03586	8.32853	3.08131	3.26777	1.26838	2.11809	3.80947	3.06369	2.89525	2.49473	2.40124	2.23233	3.39578	2.09346
Prp.Totl	0.09735	0.13433	0.04970	0.05271	0.02046	0.03416	0.06144	0.04941	0.04670	0.04024	0.03873	0.03601	0.05477	0.03377

Table 75: Factor analysis

Appendix K. Cronbach alpha reliability analysis (reviewed model)

variable	Summary for scale STAND: Mean=5.96396 Std.Dv.=3.27227 Valid N:111 Cronbach alpha: **.609536** Standardized alpha: .610380 Average inter-item corr.: .439242				
	Mean if deleted	Var. if deleted	StDv. If deleted	Itm-Totl Correl.	Alpha if deleted
STAND1	2.531532	3.456213	1.859089	0.439242	
STAND2	3.432432	3.921110	1.980179	0.439242	

Table 76: Cronbach alpha reliability analysis (reviewed model) - STAND variable

variable	Summary for scale COMPL: Mean=9.61261 Std.Dv.=2.69063 Valid N:111 Cronbach alpha: **.691133** Standardized alpha: .692860 Average inter-item corr.: .530058				
	Mean if deleted	Var. if deleted	StDv. If deleted	Itm-Totl Correl.	Alpha if deleted
COMPL1	4.963964	2.142846	1.463846	0.530058	
COMPL2	4.648649	2.552228	1.597569	0.530058	

Table 77: Cronbach alpha reliability analysis (reviewed model) - COMPL variable

variable	Summary for scale COMPA: Mean=15.3874 Std.Dv.=3.96845 Valid N:111 Cronbach alpha: **.821384** Standardized alpha: .821592 Average inter-item corr.: .605712				
	Mean if deleted	Var. if deleted	StDv. If deleted	Itm-Totl Correl.	Alpha if deleted
COMPA1	10.405410	7.538349	2.745605	0.686205	0.743325
COMPA2	10.207210	7.281390	2.698405	0.680626	0.749537
COMPA3	10.162160	7.847577	2.801353	0.661241	0.768518

Table 78: Cronbach alpha reliability analysis (reviewed model) - COMPA variable

variable	Summary for scale COST: Mean=12.6036 Std.Dv.=4.07939 Valid N:111 Cronbach alpha: **.770655** Standardized alpha: .771492 Average inter-item corr.: .529990				
	Mean if deleted	Var. if deleted	StDv. If deleted	Itm-Totl Correl.	Alpha if deleted
COST1	8.135135	7.900657	2.810811	0.621802	0.671721
COST2	8.171171	9.006736	3.001122	0.578205	0.722020
COST3	8.900901	7.602792	2.757316	0.619912	0.675492

Table 79: Cronbach alpha reliability analysis (reviewed model) - COST variable

variable	Summary for scale ITIMPLC: Mean=20.9550 Std.Dv.=4.72977 Valid N:111 Cronbach alpha: **.765334** Standardized alpha: .772758 Average inter-item corr.: .463557				
	Mean if deleted	Var. if deleted	StDv. If deleted	Itm-Totl Correl.	Alpha if deleted
IMPLC1	15.864870	12.855610	3.585472	0.555534	0.716675
IMPLC2	15.639640	12.464730	3.530543	0.636591	0.669197
BENEF1	15.612610	14.345430	3.787536	0.640264	0.682999
BENEF4	15.747750	14.116550	3.757200	0.459843	0.766671

Table 80: Cronbach alpha reliability analysis (reviewed model) - ITIMPLC variable

variable	Summary for scale ORIMPLC: Mean=40.7027 Std.Dv.=10.0405 Valid N:111 Cronbach alpha: **.908759** Standardized alpha: .910913 Average inter-item corr.: .573925				
	Mean if deleted	Var. if deleted	StDv. If deleted	Itm-Totl Correl.	Alpha if deleted
IMPLC3	36.099100	77.566760	8.807199	0.610331	0.906650
IMPLC4	35.909910	78.388280	8.853716	0.632344	0.903700
IMPLC5	35.234230	77.170360	8.784666	0.731373	0.894838
IMPLC6	35.927930	78.156970	8.840643	0.691759	0.898234
IMPLC7	35.405410	76.997800	8.774839	0.770682	0.891711
IMPLC8	35.135140	80.405160	8.966892	0.723703	0.896572
IMPLC9	35.711710	76.745730	8.760464	0.739880	0.894067
IMPLC10	35.495490	74.448180	8.628336	0.779179	0.890348

Table 81: Cronbach alpha reliability analysis (reviewed model) - ORIMPLC variable

variable	Summary for scale RISK: Mean=29.1171 Std.Dv.=4.89478 Valid N:111 Cronbach alpha: **.857350** Standardized alpha: .862445 Average inter-item corr.: .563690				
	Mean if deleted	Var. if deleted	StDv. If deleted	Itm-Totl Correl.	Alpha if deleted
RISK1	23.108110	15.177500	3.895831	0.644253	0.837210
RISK2	23.171170	15.691420	3.961240	0.728629	0.814176
RISK3	23.702700	16.299000	4.037202	0.545065	0.862464
RISK4	22.972970	15.828100	3.978454	0.760719	0.808048
RISK5	23.513510	15.691260	3.961219	0.718936	0.816378

Table 82: Cronbach alpha reliability analysis (reviewed model) - RISK variable

variable	Summary for scale TMSP: Mean=13.5405 Std.Dv.=4.77833 Valid N:111 Cronbach alpha: **.875786** Standardized alpha: .876148 Average inter-item corr.: .705166				
	Mean if deleted	Var. if deleted	StDv. If deleted	Itm-Totl Correl.	Alpha if deleted
TMSP1	9.180181	10.399970	3.224898	0.777898	0.808753
TMSP3	8.927928	10.679490	3.267949	0.791663	0.797343
STRAT3	8.972973	10.963230	3.311077	0.714380	0.866107

Table 83: Cronbach alpha reliability analysis (reviewed model) - TMSP variable

Item	Summary for scale GVRNSTRAT: Mean=30.3874 Std.Dv.=9.22563 Valid N:111 Cronbach alpha: **.904971** Standardized alpha: .905707 Average inter-item corr.: .592972				
	Mean if deleted	Var. if deleted	StDv. if deleted	Itm-Totl Correl.	Alpha if deleted
TMSP2	25.74775	63.37781	7.961018	0.675104	0.895607
STRAT1	25.92793	64.75157	8.046836	0.582705	0.906737
STRAT2	25.36036	66.75303	8.170253	0.640620	0.898906
GVRN1	26.28829	59.89887	7.739436	0.801620	0.880874
GVRN2	26.38739	62.84993	7.927795	0.750028	0.887274
GVRN3	26.35135	61.81349	7.862155	0.783974	0.883404
GVRN4	26.26126	61.20201	7.823172	0.801027	0.881368

Table 84: Cronbach alpha reliability analysis (reviewed model) - GVRNSTRAT variable

variable	Summary for scale HFRSRC: Mean=26.1441 Std.Dv.=8.22507 Valid N:111 Cronbach alpha: **.880651** Standardized alpha: .881383 Average inter-item corr.: .576171				
	Mean if deleted	Var. if deleted	StDv. If deleted	Itm-Totl Correl.	Alpha if deleted
EXPR1	21.900900	45.873060	6.772965	0.692334	0.860170
EXPR2	21.810810	47.558800	6.896289	0.671201	0.863151
EXPR3	21.882880	47.833130	6.916150	0.693065	0.859427
RSRC1	21.675680	48.309220	6.950484	0.680773	0.861462
RSRC2	21.594590	48.925740	6.994693	0.674041	0.862637
RSRC3	21.855860	47.510760	6.892805	0.728490	0.853779

Table 85: Cronbach alpha reliability analysis (reviewed model) - HFRSRC variable

variable	Summary for scale RELADV: Mean=10.2523 Std.Dv.=3.00445 Valid N:111 Cronbach alpha: **.880453** Standardized alpha: .880633 Average inter-item corr.: .786724				
	Mean if deleted	Var. if deleted	StDv. If deleted	Itm-Totl Correl.	Alpha if deleted
RELADV1	5.180180	2.436003	1.560770	0.786724	
RELADV2	5.072072	2.571382	1.603553	0.786724	

Table 86: Cronbach alpha reliability analysis (reviewed model) - RELADV variable

variable	Summary for scale INTRABENEF: Mean=31.7477 Std.Dv.=6.47859 Valid N:111 Cronbach alpha: **.862943** Standardized alpha: .866499 Average inter-item corr.: .524634				
	Mean if deleted	Var. if deleted	StDv. If deleted	Itm-Totl Correl	Alpha if deleted
BENEF2	26.117120	32.337640	5.686619	0.620541	0.847798
BENEF3	26.855860	28.591830	5.347133	0.725900	0.826949
BENEF5	26.324320	27.984900	5.290076	0.759553	0.820348
BENEF6	26.747750	28.044480	5.295703	0.619849	0.850534
BENEF8	26.180180	30.976550	5.565658	0.646251	0.842264
BENEF10	26.513510	30.123690	5.488505	0.602500	0.849661

Table 87: Cronbach alpha reliability analysis (reviewed model) - INTRABENEF variable

variable	Summary for scale INTERBENEF: Mean=20.9550 Std.Dv.=5.24385 Valid N:111 Cronbach alpha: **.841221** Standardized alpha: .841067 Average inter-item corr.: .575669				
	Mean if deleted	Var. if deleted	StDv. If deleted	Itm-Totl Correl.	Alpha if deleted
RELADV3	15.567570	15.921110	3.990127	0.706013	0.785282
RELADV4	15.972970	15.053320	3.879861	0.710588	0.783239
BENEF7	15.378380	17.496470	4.182878	0.614928	0.823958
BENEF9	15.945950	16.087170	4.010881	0.672496	0.799924

Table 88: Cronbach alpha reliability analysis (reviewed model) - INTERBENEF variable

variable	Summary for scale VENDS: Mean=9.02727 Std.Dv.=2.76763 Valid N:110 Cronbach alpha: **.719069** Standardized alpha: .719205 Average inter-item corr.: .561530				
	Mean if deleted	Var. if deleted	StDv. If deleted	Itm-Totl Correl.	Alpha if deleted
VENDS2	4.681818	2.489669	1.577869	0.561530	
VENDS3	4.345455	2.371570	1.539990	0.561530	

Table 89: Cronbach alpha reliability analysis (reviewed model) - VENDS variable

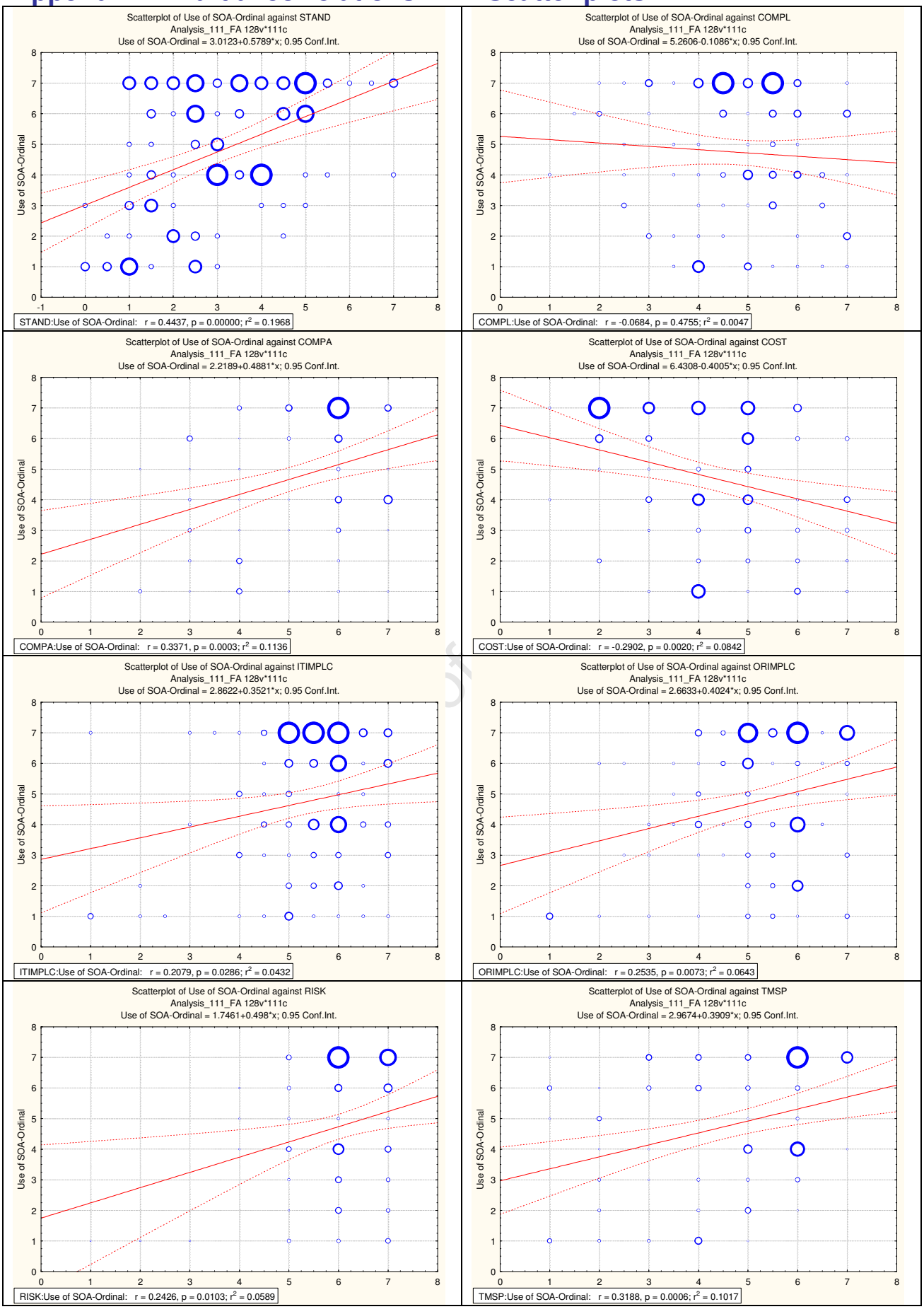
variable	Summary for scale INDSP: Mean=15.1273 Std.Dv.=5.17246 Valid N:110 Cronbach alpha: **.787446** Standardized alpha: .791329 Average inter-item corr.: .493573				
	Mean if deleted	Var. if deleted	StDv. if	Itm-Totl Correl.	Alpha if deleted
INDSP1	11.490910	15.613550	3.951399	0.603271	0.731008
INDSP2	11.700000	15.064540	3.881307	0.708898	0.677152
ITMED1	11.390910	17.510830	4.184594	0.564313	0.751950
ITMED2	10.800000	15.687270	3.960716	0.523908	0.777010

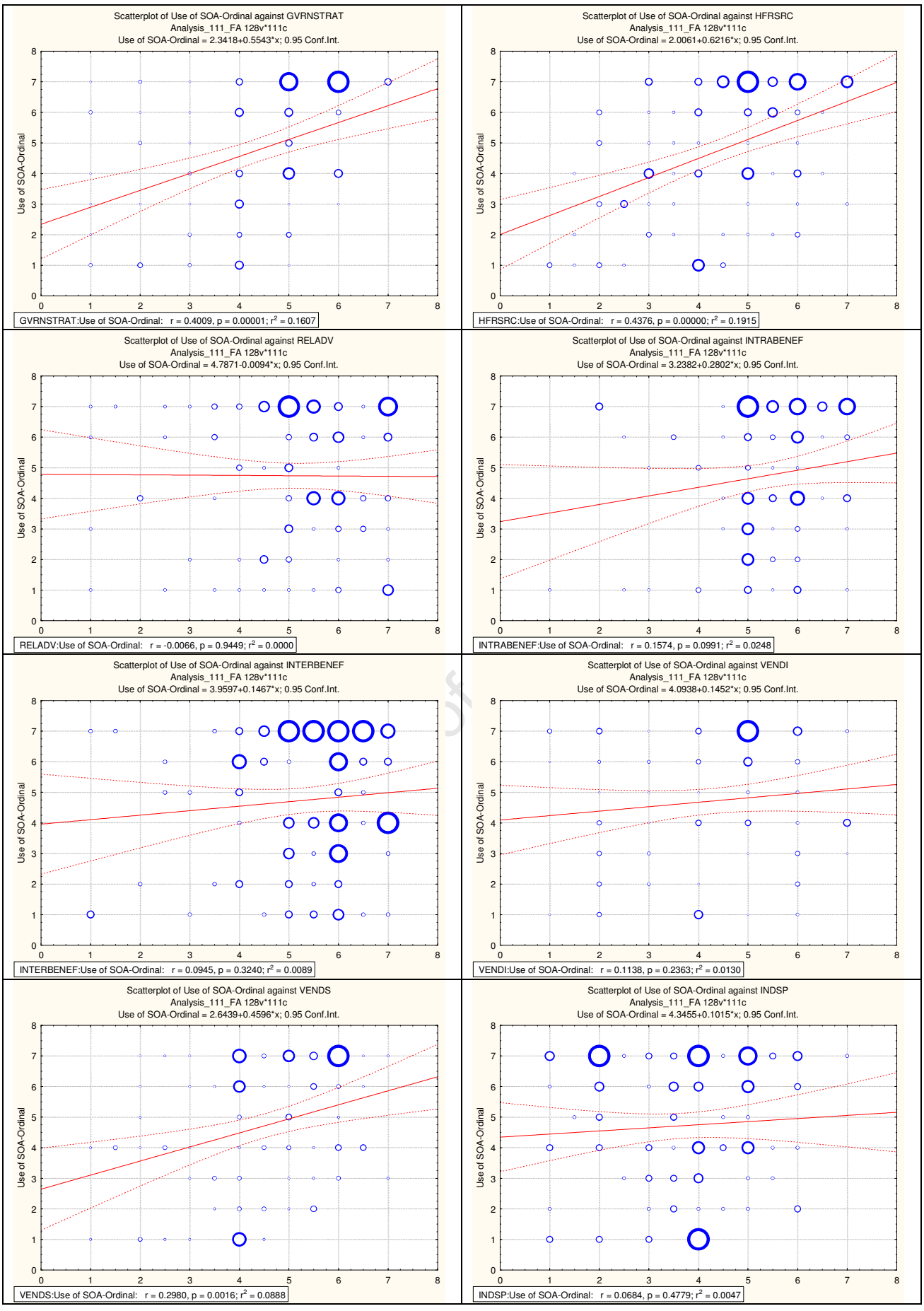
Table 90: Cronbach alpha reliability analysis (reviewed model) - INDSP variable

Appendix L. Spearman rank-order correlations

Variable	Spearman Rank Order Correlations (Analysis_111_FA) MD pairwise deleted Marked correlations are significant at p <.05000																	
	Use of SOA	SOA succes	STAND	COMPL	COMPA	COST	ITIMPLC	ORIMPLC	RISK	TMSP	GVRN STRAT	HFRSRC	RELADV	INTRA BENEF	INTER BENEF	VENDI	VENDS	INDSP
Use of SOA	1.000000	0.680203	0.423463	-0.062604	0.301880	-0.293758	0.109866	0.187903	0.162032	0.364855	0.451826	0.426763	-0.031003	0.189721	0.065203	0.109962	0.305585	0.067475
p-value	p= ---	0.000000	0.000004	0.513921	0.001282	0.001753	0.251017	0.048280	0.089313	0.000082	0.000001	0.000003	0.746683	0.046112	0.496567	0.252796	0.001169	0.483678
SOA succes	0.680203	1.000000	0.286329	-0.216131	0.337657	-0.352910	0.035021	0.153185	0.059946	0.388727	0.475089	0.501795	-0.080400	0.137671	0.069715	0.219633	0.324761	0.158044
p-value	0.000000	p= ---	0.002315	0.022708	0.000290	0.000145	0.715180	0.108467	0.531983	0.000025	0.000000	0.000000	0.401563	0.149611	0.467187	0.020551	0.000537	0.099143
STAND	0.423463	0.286329	1.000000	0.017165	0.133462	-0.009604	0.223853	0.069051	0.029272	0.247491	0.221655	0.324322	-0.001101	0.157183	0.124593	0.168476	0.304521	-0.018066
p-value	0.000004	0.002315	p= ---	0.858085	0.162578	0.920314	0.018187	0.471449	0.760387	0.008823	0.019387	0.000515	0.990846	0.099447	0.192611	0.078508	0.001218	0.851402
COMPL	-0.062604	-0.216131	0.017165	1.000000	-0.016833	0.509020	0.220827	0.165002	-0.082336	-0.059567	0.053757	-0.160268	0.139861	0.195945	0.156965	0.233192	-0.003597	0.328816
p-value	0.513921	0.022708	0.858085	p= ---	0.860802	0.000000	0.019856	0.083522	0.390284	0.534582	0.575234	0.092901	0.143180	0.039297	0.099923	0.014218	0.970252	0.000453
COMPA	0.301880	0.337657	0.133462	-0.016833	1.000000	-0.271064	0.236852	0.119200	0.273074	0.527295	0.481884	0.491178	0.123344	0.378142	0.326729	0.245485	0.318723	-0.020993
p-value	0.001282	0.000290	0.162578	0.860802	p= ---	0.004007	0.012319	0.212733	0.003734	0.000000	0.000000	0.000000	0.197143	0.000043	0.000465	0.009740	0.000690	0.827678
COST	-0.293758	-0.352910	-0.009604	0.509020	-0.271064	1.000000	0.236079	0.217203	-0.116140	-0.366976	-0.243354	-0.300750	0.133423	0.088165	0.071042	0.101678	-0.030149	0.167641
p-value	0.001753	0.000145	0.920314	0.000000	0.004007	p= ---	0.012615	0.022028	0.224795	0.000074	0.010062	0.001340	0.162703	0.357490	0.458734	0.290525	0.754539	0.080022
ITIMPLC	0.109866	0.035021	0.223853	0.220827	0.236852	0.236079	1.000000	0.524014	0.386828	0.117521	0.263128	0.209520	0.239453	0.536343	0.509278	0.219389	0.177503	0.037294
p-value	0.251017	0.715180	0.018187	0.019856	0.012319	0.012615	p= ---	0.000000	0.000027	0.219294	0.005268	0.027314	0.011368	0.000000	0.000000	0.021289	0.063573	0.698894
ORIMPLC	0.187903	0.153185	0.069051	0.165002	0.119200	0.217203	0.524014	1.000000	0.443440	0.129727	0.273474	0.222922	0.282480	0.607933	0.352693	0.104330	0.107926	-0.010129
p-value	0.048280	0.108467	0.471449	0.083522	0.212733	0.022028	0.000000	p= ---	0.000001	0.174771	0.003682	0.018687	0.002666	0.000000	0.000147	0.278061	0.261741	0.916359
RISK	0.162032	0.059946	0.029272	-0.082336	0.273074	-0.116140	0.386828	0.443440	1.000000	0.122808	0.084497	0.201341	0.355328	0.580141	0.453497	0.017401	0.064544	-0.121208
p-value	0.089313	0.531983	0.760387	0.390284	0.003734	0.224795	0.000027	0.000001	p= ---	0.199114	0.377923	0.034091	0.000130	0.000000	0.000001	0.856810	0.502918	0.207174
TMSP	0.364855	0.388727	0.247491	-0.059567	0.527295	-0.366976	0.117521	0.129727	0.122808	1.000000	0.640417	0.515119	0.004586	0.289437	0.229422	0.262132	0.357028	0.143411
p-value	0.000082	0.000025	0.008823	0.534582	0.000000	0.000074	0.219294	0.174771	0.199114	p= ---	0.000000	0.000000	0.961899	0.002062	0.015429	0.005668	0.000129	0.135002
GVRNSTRAT	0.451826	0.475089	0.221655	0.053757	0.481884	-0.243354	0.263128	0.273474	0.084497	0.640417	1.000000	0.638328	-0.039883	0.345009	0.157170	0.293619	0.391992	0.167300
p-value	0.000001	0.000000	0.019387	0.575234	0.000000	0.010062	0.005268	0.003682	0.377923	0.000000	p= ---	0.000000	0.677698	0.000209	0.099477	0.001850	0.000023	0.080647
HFRSRC	0.426763	0.501795	0.324322	-0.160268	0.491178	-0.300750	0.209520	0.222922	0.201341	0.515119	0.638328	1.000000	0.010520	0.224224	0.155498	0.222928	0.412980	0.097030
p-value	0.000003	0.000000	0.000515	0.092901	0.000000	0.001340	0.027314	0.018687	0.034091	0.000000	0.000000	p= ---	0.912742	0.017990	0.103173	0.019236	0.000007	0.313257
RELADV	-0.031003	-0.080400	-0.001101	0.139861	0.123344	0.133423	0.239453	0.282480	0.355328	0.004586	-0.039883	0.010520	1.000000	0.350696	0.451818	-0.071389	-0.015128	-0.097077
p-value	0.746683	0.401563	0.990846	0.143180	0.197143	0.162703	0.011368	0.002666	0.000130	0.961899	0.677698	0.912742	p= ---	0.000161	0.000001	0.458615	0.875353	0.313019
INTRABENEF	0.189721	0.137671	0.157183	0.195945	0.378142	0.088165	0.536343	0.607933	0.580141	0.289437	0.345009	0.224224	0.350696	1.000000	0.620683	0.190701	0.204401	0.126353
p-value	0.046112	0.149611	0.099447	0.039297	0.000043	0.357490	0.000000	0.000000	0.000000	0.002062	0.000209	0.017990	0.000161	p= ---	0.000000	0.045978	0.032197	0.188394
INTERBENEF	0.065203	0.069715	0.124593	0.156965	0.326729	0.071042	0.509278	0.352693	0.453497	0.229422	0.157170	0.155498	0.451818	0.620683	1.000000	0.118141	0.125650	0.101484
p-value	0.496567	0.467187	0.192611	0.099923	0.000465	0.458734	0.000000	0.000147	0.000001	0.015429	0.099477	0.103173	0.000001	0.000000	p= ---	0.218987	0.190885	0.291455
VENDI	0.109962	0.219633	0.168476	0.233192	0.245485	0.101678	0.219389	0.10433	0.017401	0.262132	0.293619	0.222928	-0.071389	0.190701	0.118141	1.000000	0.436384	0.406093
p-value	0.252796	0.020551	0.078508	0.014218	0.009740	0.290525	0.021289	0.278061	0.856810	0.005668	0.001850	0.019236	0.458615	0.045978	0.218987	p= ---	0.000002	0.000011
VENDS	0.305585	0.324761	0.304521	-0.003597	0.318723	-0.030149	0.177503	0.107926	0.064544	0.357028	0.391992	0.412980	-0.015128	0.204401	0.125650	0.436384	1.000000	0.296474
p-value	0.001169	0.000537	0.001218	0.970252	0.000690	0.754539	0.063573	0.261741	0.502918	0.000129	0.000023	0.000007	0.875353	0.032197	0.190885	0.000002	p= ---	0.001661
INDSP	0.067475	0.158044	-0.018066	0.328816	-0.020993	0.167641	0.037294	-0.010129	-0.121208	0.143411	0.167300	0.097030	-0.097077	0.126353	0.101484	0.406093	0.296474	1.000000
p-value	0.483678	0.099143	0.851402	0.000453	0.827678	0.080022	0.698894	0.916359	0.207174	0.135002	0.080647	0.313257	0.313019	0.188394	0.291455	0.000011	0.001661	p= ---

Appendix M. Partial correlations – 2D Scatter plots




Scatterplot of Use of SOA-Ordinal against GVRNSTRAT
Analysis_111_FA 128v*111c
Use of SOA-Ordinal = 2.3418+0.5543*x; 0.95 Conf.Int.
Use of SOA-Ordinal
GVRNSTRAT:Use of SOA-Ordinal: r = 0.4009, p = 0.00001; r² = 0.1607
Scatterplot of Use of SOA-Ordinal against HFRSRC
Analysis_111_FA 128v*111c
Use of SOA-Ordinal = 2.0061+0.6216*x; 0.95 Conf.Int.
Use of SOA-Ordinal
HFRSRC:Use of SOA-Ordinal: r = 0.4376, p = 0.00000; r² = 0.1915
Scatterplot of Use of SOA-Ordinal against RELADV
Analysis_111_FA 128v*111c
Use of SOA-Ordinal = 4.7871-0.0094*x; 0.95 Conf.Int.
Use of SOA-Ordinal
RELADV:Use of SOA-Ordinal: r = -0.0066, p = 0.9449; r² = 0.0000
Scatterplot of Use of SOA-Ordinal against INTRABENEF
Analysis_111_FA 128v*111c
Use of SOA-Ordinal = 3.2382+0.2802*x; 0.95 Conf.Int.
Use of SOA-Ordinal
INTRABENEF:Use of SOA-Ordinal: r = 0.1574, p = 0.0991; r² = 0.0248
Scatterplot of Use of SOA-Ordinal against INTERBENEF
Analysis_111_FA 128v*111c
Use of SOA-Ordinal = 3.9597+0.1467*x; 0.95 Conf.Int.
Use of SOA-Ordinal
INTERBENEF:Use of SOA-Ordinal: r = 0.0945, p = 0.3240; r² = 0.0089
Scatterplot of Use of SOA-Ordinal against VENDI
Analysis_111_FA 128v*111c
Use of SOA-Ordinal = 4.0938+0.1452*x; 0.95 Conf.Int.
Use of SOA-Ordinal
VENDI:Use of SOA-Ordinal: r = 0.1138, p = 0.2363; r² = 0.0130
Scatterplot of Use of SOA-Ordinal against VENDS
Analysis_111_FA 128v*111c
Use of SOA-Ordinal = 2.6439+0.4596*x; 0.95 Conf.Int.
Use of SOA-Ordinal
VENDS:Use of SOA-Ordinal: r = 0.2980, p = 0.0016; r² = 0.0888
Scatterplot of Use of SOA-Ordinal against INDSP
Analysis_111_FA 128v*111c
Use of SOA-Ordinal = 4.3455+0.1015*x; 0.95 Conf.Int.
Use of SOA-Ordinal
INDSP:Use of SOA-Ordinal: r = 0.0684, p = 0.4779; r² = 0.0047

Appendix N. Multiple regression analysis

N=110	Regression Summary for Dependent Variable: Use of SOA-Ordinal R= **.65422172** R²= **.42800606** Adjusted R²= **.32959850** F(16,93)=4.3493 p<.00000 Std.Error of estimate: 1.7471					
	b*	Std.Err. of b*	b	Std.Err. of b	t(93)	p-value
Intercept			0.238338	1.404900	0.169650	0.865655
STAND	0.381807	0.088557	0.495888	0.115017	4.311430	0.000040
COMPL	0.077083	0.098543	0.121713	0.155598	0.782230	0.436068
COMPA	0.156586	0.108526	0.225934	0.156589	1.442850	0.152423
COST	-0.283192	0.108316	-0.388773	0.148699	-2.614500	0.010424
ITIMPLC	-0.008044	0.110975	-0.013557	0.187030	-0.072490	0.942371
ORIMPLC	0.248671	0.113035	0.392728	0.178517	2.199950	0.030288
RISK	0.107515	0.111799	0.220487	0.229272	0.961680	0.338703
TMSP	-0.125317	0.122377	-0.153382	0.149783	-1.024030	0.308478
GVRNSTRAT	0.182252	0.131907	0.250895	0.181587	1.381680	0.170381
HFRSRC	0.044758	0.123191	0.063289	0.174198	0.363320	0.717191
RELADV	0.006943	0.094575	0.009817	0.133726	0.073410	0.941636
INTRABENEF	-0.152214	0.132671	-0.269706	0.235079	-1.147300	0.254200
INTERBENEF	-0.047158	0.113804	-0.072843	0.175789	-0.414380	0.679552
VENDI	-0.107017	0.098177	-0.136485	0.125212	-1.090030	0.278516
VENDS	0.076569	0.097465	0.118064	0.150284	0.785600	0.434098
INDSP	0.145339	0.099539	0.215743	0.147756	1.460130	0.147625

Table 91: Multiple regression analysis (reviewed model)

N=110	Regression Summary for Dependent Variable: Use of SOA-Ordinal R= **.64386111** R²= **.41455713** Adjusted R²= **.31383577** F(16,93)=4.1159 p<.00001 Std.Error of estimate: 1.7675					
	b*	Std.Err. of b*	b	Std.Err. of b	t(93)	p-value
Intercept			0.586254	1.397046	0.41964	0.675718
STAND	0.351461	0.090467	0.456475	0.117498	3.884980	0.000192
COMPL	0.064934	0.100053	0.102530	0.157983	0.649000	0.517939
COMPA	0.128049	0.107029	0.184758	0.154430	1.196390	0.234586
COST	-0.299498	0.108204	-0.411158	0.148545	-2.767900	0.006808
IMPLC	0.228970	0.111845	0.377338	0.184318	2.047210	0.043458
RISK	0.096835	0.117123	0.198586	0.240191	0.826780	0.410476
EXPR	-0.067493	0.106517	-0.081755	0.129026	-0.633630	0.527878
TMSP	-0.130875	0.133938	-0.162658	0.166465	-0.977130	0.331040
STRAT	0.092876	0.147600	0.122053	0.193970	0.629240	0.530736
GVRN	0.026222	0.119460	0.036373	0.165706	0.219500	0.826739
RSRC	0.141168	0.115760	0.181719	0.149013	1.219490	0.225743
RELADV	-0.022607	0.103336	-0.034790	0.159025	-0.218770	0.827307
BENEF	-0.165690	0.136558	-0.293139	0.241599	-1.213330	0.228077
VENDS	0.121504	0.108123	0.171373	0.152501	1.123750	0.264012
INDSP	-0.070357	0.123616	-0.099100	0.174116	-0.569160	0.570619
ITMED	0.130483	0.104878	0.198176	0.159287	1.244140	0.216574

Table 92: Multiple regression analysis (initial model)

Appendix O. Stepwise Analysis in multiple regression

Effect	Univariate Tests of Significance for Use of SOA-Ordinal R=.606884, R^2=.368308, Adjusted R^2=.344243, df=4, F=15.3051, p=.000000 Forward stepwise solution (P to enter: .05, P to remove: .05)				
	SS	Degr. Of Freedom	MS	F	p
Intercept	14.9242	1	14.92424	4.99877	0.027481
STAND	54.5277	1	54.52766	18.26367	0.000042
COMPL		0			
COMPA		0			
COST	27.6810	1	27.68098	9.27156	0.002942
ITIMPLC		0			
ORIMPLC	16.8490	1	16.84896	5.64345	0.019334
RISK		0			
TMSP		0			
GVRNSTRAT		0			
HFRSRC	14.5684	1	14.56837	4.87958	0.029349
RELADV		0			
INTRABENEF		0			
INTERBENEF		0			
VENDI		0			
VENDS		0			
INDSP		0			
Error	313.4859	105	2.98558		

Table 93: Forward stepwise analysis - univariate tests of significance

Effect	Univariate Tests of Significance for Use of SOA-Ordinal R=.603086, R^2=.363713, Adjusted R^2=.339473, df=4, F=15.0049, p=.000000 Backward stepwise solution (P to enter: .05, P to remove: .05)				
	SS	Degr. of	MS	F	p
Intercept	10.3839	1	10.38386	3.45289	0.065943
STAND	73.0259	1	73.02585	24.28288	0.000003
COMPL		0			
COMPA	12.2879	1	12.28794	4.08604	0.045783
COST	32.8906	1	32.89061	10.93693	0.001291
ITIMPLC		0			
ORIMPLC	19.7730	1	19.77305	6.57502	0.011756
RISK		0			
TMSP		0			
GVRNSTRAT		0			
HFRSRC		0			
RELADV		0			
INTRABENEF		0			
INTERBENEF		0			
VENDI		0			
VENDS		0			
INDSP		0			
Error	315.7663	105	3.0073		

Table 94: Backward stepwise analysis - univariate tests of significance