THE IMPACT OF SERVICE ORIENTED ARCHITECTURE ADOPTION ON ORGANIZATIONS

NAGHMEH NIKNEJAD

A dissertation report submitted in partial fulfillment of the
requirements for the award of the degree of
Master of Science (Information Technology - Management)

Faculty of Computing
Universiti Teknologi Malaysia

FEBRUARY 2014

This dissertation is dedicated to my dear parents and my siblings for their endless support and encouragement.

ACKNOWLEDGEMENT

ABSTRACT

Service-Oriented Architecture (SOA) is one of the technologies in the area of information systems' design and architecture in the recent technology world. SOA adoption is known as an evolutionary process, instead of revolutionary one. In this process an application is developed in a long period of time which will be improved gradually. Since there is a limited number of researches that focus on the effects of SOA adoption in an organization, this study investigated the significant factors which affected SOA and have been more discussible in the last five years based on previous studies such as governance, strategy, complexity, Return on Investment (ROI), business and IT alignment, culture and communication, costs, and security. Since most of the researches focus on qualitative analysis for SOA adoption, a need for empirical research was felt. So, this study conducted a quantitative analysis to investigate the influential factors for adopting SOA. In addition, an SOA adoption framework was proposed to measure the effect of factors on SOA adoption and the performance of organizations. Based on the proposed framework, an online questionnaire was created and distributed among SOA experts through LinkedIn (the largest social networking website for people in professional occupations) to collect data about the influence of SOA adoption on organizations. Subsequently, this study has made recommendations for improving the organizations planning to adopt SOA or in the way of adopting SOA to promote the performance of their organizations. On the other hand, the outcomes of this study may pave the way to form the basic knowledge in the domain of organizational and technological SOA adoption and trigger further research in the field

ABSTRAK

Rekacipta berteraskan perkhidmatan (SOA) adalah salah satu teknologi dalam bidang reka bentuk sistem maklumat dan seni bina yang terkini dalam dunia teknologi . Perlaksanaan SOA merupakan satu proses evolusi dan bukan satu proses revolusi . Dalam proses ini, aplikasi dibangunkan dalam tempoh masa yang panjang dan akan diperbaiki dari masa ke semasa . Oleh kerana terdapat bilangan yang terhad terhadap penyelidikan yang tertumpu kepada kesan-kesan penggunaan SOA dalam sesebuah organisasi, kajian ini adalah penting kerana faktor-faktor penting yang memberi kesan SOA dalam tempoh lima tahun lepas akan dikaji. Ini adalah berdasarkan kajian terdahulu seperti tadbir urus, strategi , tahap kerumitan , pulangan ke atas pelaburan (ROI) , perniagaan dan penjajaran IT , budaya dan komunikasi , kos dan keselamatan. Oleh kerana kebanyakan kajian memberi tumpuan kepada analisis kualitatif untuk diterima pakai SOA, keperluan untuk penyelidikan empirikal adalah penting. Jadi, kajian ini menggunakan analisis kuantitatif untuk menyiasat faktor-faktor yang mempengaruhi perlaksanaan SOA. Di samping itu, rangka kerja pakai SOA telah dicadangkan untuk mengukur kesan faktor-faktor perlaksanaan SOA terhadap prestasi organisasi. Berdasarkan rangka kerja yang dicadangkan itu, soal selidik dalam talian telah dirangka dan diedarkan di kalangan pakar-pakar SOA melalui LinkedIn (laman web rangkaian sosial terbesar untuk pekerjaan profesional) bagi proses pengumpulan data mengenai pengaruh penggunaan SOA pada organisasi. Selepas itu, kajian ini telah membuat cadangan-cadangan untuk penambahbaikan dan perancangan untuk penerimaan SOA atau penambahbaikan SOA bagi menggalakkan peningkatan prestasi organisasi. Selain itu , hasil kajian ini boleh menjadi pembentukan pengetahuan asas dalam domain organisasi dan teknologi SOA bagi menjalankan penyelidikan lanjut dalam bidang ini.

TABLE OF CONTENTS

CHAPTER	TITLE	PAGE

LIST OF TABLES

LIST OF FIGURE

LIST OF APPENDICES

LIST OF ABBREVIATIONS

AVE	Average Variance Extracted
CIO	Chief Information Officer
CTO	Chief Technology Officer
CISO	Chief Information Security Officer
IS	Information System
IT	Information Technology
ROI	Return on Investment
SMARTPLS	Smart Partial Least Squares
SOA	Service Oriented Architecture
TOE	Technology-Organization-Environment
UTM	University Technology Malaysia
VP	Vice President

CHAPTER 1

INTRODUCTION

1.1 Overview

SOA adoption is known as an evolutionary, instead of revolutionary, process. In other words, adopting SOA is similar to a trip for an organization in a long period of time. It is not developing an application in a short period of time. (Erl 2005) Specialists in many fields are concerned with organizational performance including strategic planners, operations, finance, legal, and organizational development (Marisoosay 2009).

SOA seems different for different users. In other words, it is different from various perspectives. For example according to IBM (2009), SOA has an architectural form and needs criteria, patterns, architectural principles, service description, requestor and a service provider that shows attributes like encapsulation, modularity, segregation of concerns, loose coupling, reuse and so forth. SOA is a model of programming that is completed with standards, technologies like Web services and a solution for middleware which optimize for monitoring, orchestration, service assembly and a management.

While more firms around the world have started to search about SOA, some implementation topics are represented that some aspects of implementation are undervalued like complexity, cost, and the attempt necessary for even a little

enhancing to implement SOA. (Lewis, Morris et al. 2007). A report expressed SOA impact organizations positively and negatively at the same time. When SOA positively influences on modifiability, extensibility and interoperability, on the other side it affects performance, auditability, testability, and security negatively. (O'Brien, Merson et al. 2007). So, the main aim of this study is to evaluate the impact of SOA adoption on organizations.

1.2   Background of Study

Growing competitiveness, globalization and ever faster creativity are the specification of modern economies. It is highly worth mentioning that a developing move toward new markets, a responsive change toward business strategies, or providing effective feedback to competitive pressures pave the way for the organizations to focus on a high level of flexibility (Barry 2003).

Currently, the preferred architectural design to supply organizational agility, to promote application adaptability and system interoperability, and to provide the reuse of legacy possessions referred to Service Oriented Architecture, henceforth SOA (Lewis, Morris et al. 2007). Consecutive innovation, competitive emprise and agility are changing into an important component of strategic thinking in a large number of current organizations. As a result, the growing of information systems has given birth to many organizations to re-evaluate their techniques as well as re-examine information technology function in forming their business strategies (Sambamurthy, Bharadwaj et al. 2003).

It is astonishing that although Service-oriented architecture has been used for a decade, only several research studies have been performed on critical aspects that must be concentrated on during such implementations. Results show that there are a number of resemblances to success factors found in attaining strategic alignment,

such as top management support and communication between collaborating parties (Emadi and Hanza 2013).

SOA is formed on the base that systems are divided into sub-systems –each managing individual tasks- based on group responsibility in the business course of a company and then eventually all the responsibilities are seen as an interoperable service (Erl). So, considering new information system, SOA is a complex solution of analysis, design, conserving, and combination of enterprise application dependent on services. Services are considered as unconnected program-autonomous existence which supplies one or more operational capabilities through their interface (Weiss 2010).

The fleeting environment of business organization challenges the flexibility and adaptability capabilities of organizations. It can be claimed that every IT manager is looking into SOA (Papazoglou and Van Den Heuvel 2006). SOA adoption is different from developing an application which is done in a short period of time. Therefore in applying SOA in organizations many problems appear, e.g. immature standards and inadequate knowledge (Tilley, Gerdes et al. 2004).

Naturally, as other different kinds of technologies, some groups of people accept SOA as a perfect and precise technology and this is when other groups of people reject it for being imperfect. But, it is crystal clear that no one tends to ignore the achievements which SOA has brought about in the cases of efficiency, reusability, agility and productivity of an enterprise (Erl 2008).

As identified in various sources, SOA is a developed method in the direction of IT and information system architecture based on a cluster of services which are in relation with each other. A highly business-special definition introduces service-oriented architecture as a design that applies roles via reusable business services (Galinium and Shahbaz 2009).

Regarding not only IT but also business perspectives pave the way for the most thorough definition of SOA, an architectural model that tends to promote the efficiency, practicality, agility, and productivity of an enterprise which this new description is revealed by locating services as the fundamental channels through which solution rationale is demonstrated in support of the achievement of the strategic aims related to service-oriented computing(Erl 2008). In order to make a great progress, organizations are supposed to modify their approaches, types of communication, channels of collaborating, and techniques of publishing relationships, so these are the most challenging difficulties of organization and governance (Varadan, Channabasavaiah et al. 2008).

A famous technology and market research company, Forrester Research, executed a study claiming that the uses of SOA have been developed from 44% in North-American, European and Asian-Pacific companies to 63% (Heffner, 2008). On the other hand, different conferences on the pattern of SOA were hold since 2002 such as, International Conference on Web Services (ICSOC), the IEEE International Conference on Web Services (ICWS), the International Conference on Services Computing (SCC) and the European Conference on Web Services (ECOWS). Consequently, a substantial SOA awareness exists in the domain of educational studies and industry practitioners and it is assumed that many companies performing something connected to SOA (Luthria and Rabhi 2009).

Providing the chance of fee-based services is an outstanding value that SOA serves to various companies of different sizes from small to medium-sized ones and it is not just in the possession of big organizations (Barry 2003). In spite of that, the 2009 Forrester SOA research demonstrated that in smaller organizations SOA adoption is much inferior, namely the companies with less than 1,000 staffs (McKendrick 2009). The desire of SOA adaption is not satisfactory as it supposed to be (Haines 2007, Kontogiannis, Lewis et al. 2007). Claims on the part of some industries proposed that SOA faced a failure at presenting its suggested and guaranteed benefits and it turns to be of a high expense (Meehan 2008).

1.3   Problem Statement

In spite of a large number of educational cases connected to SOA, it is being discussed that academic background and related literature is to some extent disintegrated and untimely considering why and to what extent companies accept SOA. Furthermore, there is a limited number of researches that focus on the effects of SOA adoption in an organization (Joachim, Beimborn et al. 2009).

The principal question of how SOA can promote organization agility and nurture closer alignment between IT and business has not been appropriately focused on. The vigorous communication among external business environmental factors, organizational agility, and IS architecture lead to a high complexity of the process of keeping IT and business in alignment (Choi, Nazareth et al. 2013).

One frequent problem in SOA adoption is that many associations initiate the project of adopting SOA with regard to an IT prospect rather than a business one. Regarding the technical perspectives of the project, implementations might emerge successful, but the effect of the adoption of the new architecture on the business cannot be recognized without having been counted right from scratch. Difficulties like these are mainly noticed in large associations with well-founded IT departments which try to obey every new fashion of technology. Not amazingly, the lack of business alignment with the SOA movement project is a definite result of such as infirm project planning. The most feasible rejecting consequence of such usual mistakes is the increasing expense of IT without any return on investment (ROI) for the corporation (Cherbakov, Ibrahim et al. 2005).

As far as the researcher knows, there has been little research done to examine the effect of the adoption of Service Oriented Architecture on the performance of organizations.

1.4 Research Questions

Based on the above mentioned problem, the present research attempts to answer the following questions:

1. Q1: What are the factors which influence SOA adoption in organization?
2. Q2: What are the relationships among significant factors, SOA adoption and the performance of organizations?
3. Q3: What are the recommendations for organizations towards success of SOA adoption?

1.5 Objectives of Study

In the light of the problem statement, the present study aims to determine the following objectives through which organizations can make progress:

1. To identify the factors influenced by adoption of SOA in organizations.
2. To understand the relationship among significant factors, SOA adoption and the performance of organizations.
3. To develop recommendation towards success of SOA adoption.

1.6 Scopes of Study

As it was mentioned before, the purpose of this study is to discover the factors that affect SOA adoption in an organization and estimating the impact of SOA adoption on the performance of enterprises. In order to narrow the scope of this

study down and based on the objectives of this research, the researcher focuses on organizations which have already adopted SOA. Data will be collected from skilled experts in SOA all over the world using online questionnaire. Some technical and organizational concepts will be presented in this study, but its purpose is to present a general horizon of SOA adoption and its performance.

1.7 Significance of Study

A number of limited researches exist studying the function of SOA adoption in organizations. This study tends to show how SOA adoption may pave the way for the organizations to make progress, by giving them the opportunity of being in an active access to the SOA. The results of this study might help organizations which not adopt SOA to promote their chance of development.

1.7.1 Theoretical Implication

Help organization to find out the key factors which influence SOA adoption to improve organizational performance.

Add performance of organization to the TOE framework would give this idea to organization to improve their performance by adopting SOA.

1.7.2 Practical Implication

Help organization to focus on significant factors to accelerate the process of SOA adoption.

Improve performance of organizations by successful adoption of SOA.

Develop recommendations based on SOA experts' perspectives for being successful in SOA adoption.

This study tends to show how SOA adoption may pave the way for the organizations to make progress, by giving them the opportunity of being in an active access to the SOA.

The results of this study might help organizations which adopt SOA to promote their chance of development.

The findings of this study will encourage those companies that have not been using SOA to improve their strategies by adopting SOA.

1.7.3   Methodological Implication

Use self-selected sampling and distribute online questionnaire among SOA professionals through LinkedIn.

1.8   Structure of Study

This study is consisting of 6 chapters as shown in following figure:
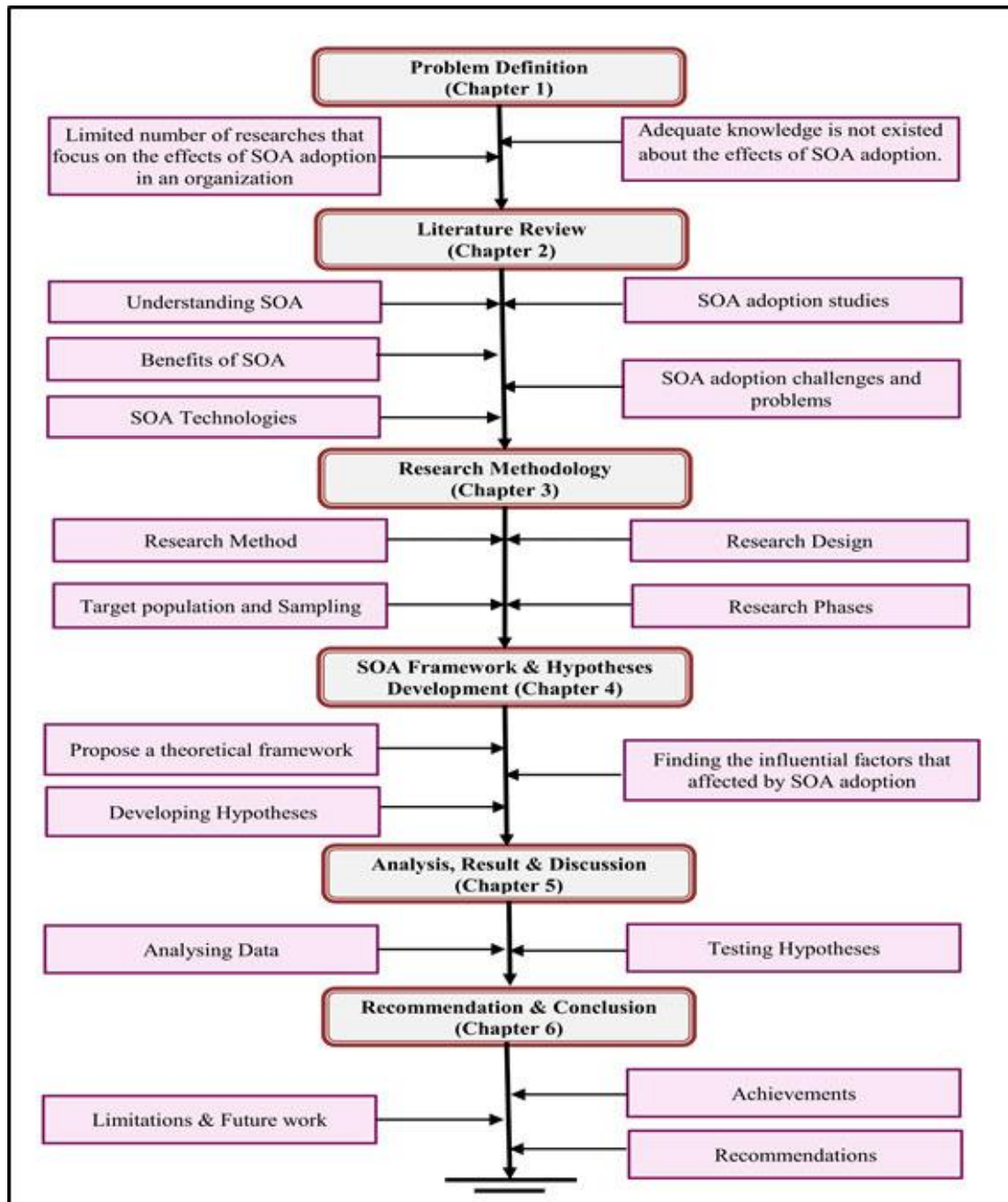
Figure 1.1   Structure of the study

1.9   Thesis Outline

In chapter one the researcher focuses on introduction and background of the study about the key points of the study and problem background in terms of the clear

background study of project. Moreover, research questions and research objectives have been discussed. Final steps consist of significant of the study, scope, structure and outline of the project.

In chapter two based on the problem of the study the academic literature will be studied. In this chapter author focuses more on the SOA adoption in an organization and extract significant factors influence by SOA adoption based on previous studies. Then TOE framework for adoption will be described.

In chapter three the research methodology of the study will be involved in the methods which are used in this research. The questionnaire will be distributed among the SOA experts and the results will be explained at the end of this chapter. The questionnaire will be distributed among the SOA experts.

In chapter four influential factors that concluded from papers reviewed in chapter two will be investigated as the initial findings of this study. Then the theoretical framework and hypotheses will be proposed in continue. Afterwards, pilot study will be performed. Final step includes the explanation of validity and reliability of the questionnaire.

In chapter five the researcher will be discussed the data collection and the data analyses. Data will be analyzed with SmartPLS. In continues, the hypotheses of this study will be examined. The relationship among the significant factors, SOA adoption and the performance of organizations will be evaluated at the end of this chapter.

In chapter six the achievements and the contribution of this study will be explained shortly. Then few recommendations will be discussed based on SOA experts' experiences. Moreover, some limitations and direction for future work will be described at the end of this study.

REFERENCES

Abdi, Herve. (2007). Multiple correlation coefficient. *The University of Texas at Dallas*.

Abdul Manan, Mahshitah, & Hyland, Peter. (2011). Enterprise SOA Implementation Readiness: a Case Study in Malaysia. *ACIS 2011 Proceedings*.

Aier, Stephan, Bucher, Tobias, & Winter, Robert. (2011). Critical Success Factors of Service Orientation in Information Systems Engineering. *Business & Information Systems Engineering, 3*(2), 77-88.

Akter, Shahriar, D'Ambra, John, & Ray, Pradeep. (2010). Service quality of mHealth platforms: development and validation of a hierarchical model using PLS. *Electronic Markets, 20*(3-4), 209-227.

Antikainen, Jari, & Pekkola, Samuli. (2009). Factors influencing the alignment of SOA development with business objectives.

Austin, Peter C, &Tu, Jack V. (2004). Bootstrap methods for developing predictive models. *The American Statistician, 58*(2), 131-137.

Baker, Jeff. (2012). The technology–organization–environment framework *Information Systems Theory* (pp. 231-245): Springer.

Barclay, Donald, Higgins, Christopher, & Thompson, Ronald. (1995). The partial least squares (PLS) approach to causal modeling: personal computer adoption and use as an illustration. *Technology studies, 2*(2), 285-309.

Barry, Douglas K. (2003). *Web services and service-oriented architectures: the savvy manager's guide*: Morgan Kaufmann.

Basias, Nikolaos, Themistocleous, Marinos, &Morabito, Vicenzo. (2013). SOA adoption in e-banking. *Journal of Enterprise Information Management, 26*(6), 719-739.

Basias, Nikolaos, Themistocleous, Marinos, &Morabito, Vincenzo. (2012). Influential Factors of SOA Adoption in E-Banking. *European, Mediterranean & Middle Eastern Conference on Information Systems*.

Bastida, Leire, Berreteaga, Alberto, &Canadas, Inigo. (2008). Adopting service oriented architectures made simple *Enterprise Interoperability III* (pp. 221-232): Springer.

Becker, Dipl Wi-Ing Alexander, Widjaja, Dipl-Wirtsch-Inform Thomas, &Buxmann, Peter. (2011). Value potentials and challenges of service-oriented architectures. *Business & Information Systems Engineering, 3*(4), 199-210.

Beimborn, D. , & Joachim, N. (2009). Proposing the Relationship between IT Business Alignment and the Business Value of Service-Oriented Architectures in Financial Firms. *Springer*.

Bertram, Dane. (2006). Likert Scales.

Bhallamudi, Pushparani, & Tilley, Scott. (2011). *SOA migration case studies and lessons learned.* Paper presented at the Systems Conference (SysCon), 2011 IEEE International.

Bharti, Nitin. (2005). Voices from the Web: SOA - Top down or bottom up approach? Retrieved 10 October 2013, from http://searchsoa.techtarget.com/news/1070656/Voices-from-the-Web-SOA-Top-down-or-bottom-up-approach

Bieberstein, Norbert, Bose, Sanjay, Walker, Lance, & Lynch, Angela. (2005). Impact of service-oriented architecture on enterprise systems, organizational structures, and individuals. *IBM systems journal, 44*(4), 691-708.

Bih, Joseph. (2006). Service oriented architecture (SOA) a new paradigm to implement dynamic e-business solutions. *ubiquity, 2006*(August), 4.

Booth, D., Haas, H., McCabe, F., Newcomer, E., Champion, M., Ferris, C. and Orchard, D. (2007). Web Services Architecture W3C Working Group Note 11 February 2004.   Retrieved 20 November 2012, from http://www.w3.org/TR/ws-arch/

Castillo, Joan Joseph. (2009). Non-Probability Sampling.   Retrieved Oct 26, 2013, from http://explorable.com/non-probability-sampling

Chang, Hsin-Lu, &Lue, Chia-Pei. (2009). An exploratory study of risk factors for implementing service-oriented IS projects *Designing E-Business Systems. Markets, Services, and Networks* (pp. 83-95): Springer.

Chen, Minder. (2003). Factors affecting the adoption and diffusion of XML and Web services standards for E-business systems. *International Journal of Human-Computer Studies, 58*(3), 259-279.

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

Cherbakov, L, Ibrahim, M, &Ang, J. (2005). SOA Antipatterns: The Obstacles to the Adoption and Successful Realization of Service-Oriented Architecture. Retrieved 10 January 2013, from http://www.ibm.com/developerworks/webservices/library/ws-antipatterns/

Cherbakov, Luba, Galambos, George, Harishankar, Ray, Kalyana, Shankar, & Rackham, Guy. (2005). Impact of service orientation at the business level. *IBM systems journal, 44*(4), 653-668.

Choi, Jae, Nazareth, Derek L, & Jain, Hemant K. (2013). The Impact of SOA Implementation on IT-Business Alignment: A System Dynamics Approach. *ACM Transactions on Management Information Systems (TMIS), 4*(1), 3.

Chong, Alain Yee-Loong, Ooi, Keng-Boon, Lin, Binshan, & Raman, Murali. (2009). Factors affecting the adoption level of c-commerce: an empirical study. *Journal of Computer Information Systems, 50*(2), 13.

Ciganek, Andrew P, Haines, Marc N, &Haseman, W. (2006). *Horizontal and vertical factors influencing the adoption of Web services.* Paper presented at the System Sciences, 2006. HICSS'06. Proceedings of the 39th Annual Hawaii International Conference on.

Ciganek, Andrew P, Haines, Marc N, &Haseman, WILLIAM D. (2009). Service-Oriented Architecture Adoption: Key Factors and Approaches. *Journal of Information Technology Management, 203*, 42-54.

Ciganek, Andrew P, Haines, Mark N, &Haseman, W. (2005). *Challenges of adopting Web services: experiences from the financial industry.* Paper presented at the System Sciences, 2005. HICSS'05. Proceedings of the 38th Annual Hawaii International Conference on.

Curbera, Francisco, Duftler, Matthew, Khalaf, Rania, Nagy, William, Mukhi, Nirmal, &Weerawarana, Sanjiva. (2002). Unraveling the Web services web: an introduction to SOAP, WSDL, and UDDI. *Internet Computing, IEEE, 6*(2), 86-93.

Daclin, Nicolas, Chen, David, &Vallespir, Bruno. (2006). Enterprise interoperability measurement-Basic concepts. *Proceedings of the EMOI, 6*.

Demirkan, Haluk, Kauffman, Robert J, Vayghan, Jamshid A, Fill, Hans-Georg, Karagiannis, Dimitris, &Maglio, Paul P. (2009). Service-oriented technology and management: Perspectives on research and practice for the coming decade. *Electronic Commerce Research and Applications, 7*(4), 356-376.

DiMare, Jay. (2006). Service oriented architecture A practical guide to measuring return on that investment: IBM Global Business Services.

Emadi, Sima, & Hanza, RaziyeHatami. (2013). Critical Factors in the Effective of Service-Oriented Architecture. *Advances in Computer Science: an International Journal, 2*(3), 26-30.

enterprise presentation at SOA summit 2009, Scottsdale, AZ, USA. Retrieved 7 April 2013, from http://softwareag.s3.amazonaws.com/presentations/game.pdf

Erl, T. (2005). *Service-Oriented Architecture Concept, Technology and Design. Upper Saddle River:PearsonInc*

Erl, T. (2008). *Soa: principles of service design* (Vol. 1): Prentice Hall Upper Saddle River.

experience with SOA. Retrieved 5 April 2013, from http://blogs.zdnet.com/service-oriented/?p=2053

Findikoglu, Melike. (2011). Web Services Adoption Process: A Roadmap to Manage Organizational Change. *Available at SSRN 1873723*.

Flowers, K. (2009). Changing the game: how coca cola enterprises is leveraging SOA to transform their

Fricker, RDJ. (2008). Sampling methods for web and e-mail surveys. *N. Fielding*, 195-216.

Galinium, Maulahikmah, & Shahbaz, Negar. (2009). *Factors affecting success in migration of legacy systems to service-oriented architecture (SOA).* Master Thesis, Department of Informatics, Lund University, Sweden. Submitted.

Gelade, Garry A, &Ivery, Mark. (2003). The impact of human resource management and work climate on organizational performance. *Personnel Psychology, 56*(2), 383-404.

Grigoriu, Adrian. (2007). SOA, BPM, EA, and Service Oriented Enterprise Architecture. *BPTrends, www. bptrends. com*.

Gupta, Jon. (2008). *Potential factors influencing adoption of a Service Oriented Architecture: Experiences from specialist healthcare in Norway.* Master Thesis, University of Agder.

Haines, Marc N. (2007). *The impact of service-oriented application development on software development methodology.* Paper presented at the System Sciences, 2007. HICSS 2007. 40th Annual Hawaii International Conference on.

Hempel, Jessi. (2013). LinkedIn: How It's Changing Business (AND HOW TO MAKE IT WORK FOR YOU). *FORTUNE, 168*(1), 68-74.

Hiel, Marcel, Weigand, Hans, & Van Den Heuvel, Willem-Jan. (2008). An adaptive service-oriented architecture *Enterprise Interoperability III* (pp. 197-208): Springer.

Holley, Kerrie, Palistrant, Jim, & Graham, Steve. (2006). effective SOA governance. *IBM White Paper, IBM Corporation (March 2006).*

Hu, Caimei. (2011). Main Factors Affecting the Adoption and Diffusion of Web Service Technology Standards *Computing and Intelligent Systems* (pp. 81-87): Springer.

Jayashetty, Shireesh, & Kumar, Pradeep. (2006). adoption of service-oriented architecture increase the flexibility of your enterprise. *Infosys*.

Jeff. (2007). Budgeting for SOA. Retrieved 20 September 2013, from http://schneider.blogspot.com/2007/09/budgeting-for-soa.html

Joachim, N., Beimborn, D., &Weitzel, T. (2010). Investigating Adoption Determinants of Service-Oriented Architectures (SOA). *Sprouts: Working Papers on Information Systems*.

Joachim, N., Beimborn, D., Hoberg, P., & Schlosser, F. (2009). Examining the Organizational Decision to Adopt Service-Oriented Architecture (SOA)-Development of a Research Model.

Joachim, Nils. (*2012). Service-Oriented Architecture (Soa): An Empirical Evaluation Of Characteristics, Adoption Determinants, Governance Mechanisms, And Business Impact In The German Service Industry ,*University of Bamberg.

Kalin, Sari. (2002). Return on investment, Calculating ROI. *CIO magazine, 15*.

Kanchanavipu, Kingkarn. (2008). An Integrated Model for SOA Governance. *rapport nr.: Report/IT University of Göteborg 2008: 002*.

Kontogiannis, Kostas, Lewis, Grace, & Smith, Dennis. (2007a). *The landscape of service-oriented systems: a research perspective for maintenance and*

reengineering. Paper presented at the Proceedings of the workshop on service-oriented architecture maintenance, Amsterdam.

Kontogiannis, Kostas, Lewis, Grace, & Smith, Dennis. (2007b). *The landscape of service-oriented systems: a research perspective for maintenance and reengineering.* Paper presented at the Proceedings of the 11th European Conference on Software Maintenance and Reengineering.

Koumaditis, Konstantinos, Themistocleous, Marinos, & Da Cunha, Paulo Rupino. (2013). SOA implementation critical success factors in healthcare. *Journal of Enterprise Information Management, 26*(4), 2-2.

Krafzig, Dirk, Banke, Karl, &Slama, Dirk. (2005). *Enterprise SOA: service-oriented architecture best practices*: Prentice Hall PTR.

Kreger, Heather. (2001). Web services conceptual architecture (WSCA 1.0). *IBM Software Group, 5*, 6-7.

Kumar, Sanjeev, Dakshinamoorthy, Vijay, & Krishnan, MS. (2007). *Does SOA improve the supply chain? An empirical analysis of the impact of SOA adoption on electronic supply chain performance.* Paper presented at the System Sciences, 2007. HICSS 2007. 40th Annual Hawaii International Conference on.

Lawler, James P, Benedict, Virginia, Howell-Barber, Hortense, & Joseph, Anthony. (2009). Critical success factors in the planning of a service-oriented architecture (SOA) strategy for educators and managers. *Information Systems Education Journal, 7*(94), 1-30.

Lawrence, C. (2007). Adapting legacy systems for SOA. *Online, Jun.* Retrieved 19 November 2012, from http://www.ibm.com/developerworks/library/ws-soa-adaptleg/index.html?S_TACT=105AGX20&S_CMP=EDU

Lee, Jung Hoon, Shim, Hye-Jung, & Kim, Kyung Kyu. (2010). Critical success factors in SOA implementation: an exploratory study. *Information Systems Management, 27*(2), 123-145.

Lennan, Elizaveta Mac. (2011). *Factors affecting adoption of service-oriented architecture (SOA) at an enterprise level.* (Master), University of Cape Town.

Lewis, Grace A, Morris, Edwin, Simanta, Soumya, &Wrage, Lutz. (2007). *Common misconceptions about service-oriented architecture.* Paper presented at the Commercial-off-the-Shelf (COTS)-Based Software Systems, 2007. ICCBSS'07. Sixth International IEEE Conference on.

Limayem, Moez, Khalifa, Mohamed, & Chin, Wynne W. (2004). CASE tools usage and impact on system development performance. *Journal of Organizational Computing and Electronic Commerce, 14*(3), 153-174.

Lippert, Susan K, &Govindarajulu, Chittibabu. (2006). Technological, organizational, and environmental antecedents to web services adoption. *Communications of the IIMA, 6*(1), 146-157.

Löhe, Jan, &Legner, Christine. (2010). SOA adoption in business networks: do service-oriented architectures really advance inter-organizational integration? *Electronic Markets, 20*(3-4), 181-196. Lowry., Keely. On *Investopedia*.

Lublinsky, Boris. (2007). Defining SOA as an architectural style. *EstadosUnidos: IBM Developers, 4*(1), 1.

Luftman, Jerry N. (2003). *Competing in the information age: align in the sand*: Oxford University Press, USA.

Luthria, Haresh , & Rabhi, Fethi. (2009). Using Service Oriented Computing for Competitive Advantage. *AMCIS 2009 Proceedings. Paper 140.*

Luthria, Haresh, & Rabhi, Fethi. (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.

MacLennan, Elzavita, & Van Belle, Jean-Paul. (2012). Factors affecting the organizational adoption of service-oriented architecture (SOA). *Information Systems and e-Business Management*, 1-30.

Manes, Anne Thomas. (2009). SOA is Dead–Long Live Services. *Blogbeitrag [05.01. 2009]. URL: http://apsblog. burtongroup. com/2009/01/soa-is-dead-longlive-services. html [Zugriff: 18.03. 2010].* Retrieved 12 March 2013

Marisoosay, Santhanadass. (2009). *The Role Of Employee Turnover Between Employee Job Satisfaction And Company Performance In The Penang Automation Industry.* USM.

Matsumura, Miko, Brauel, Bjoern, & Shah, Jignesh. (2009). *SOA adoption for dummies*: Wiley.

McGovern, James, Sims, Oliver, & Jain, Ashish. (2006). *Enterprise service oriented architectures: concepts, challenges, recommendations*: Springer.

McKendrick, J. (2009). Service-oriented architecture blog: Forrester: only one percent have negative

Meehan, M. (2008). SOA adoption marked by broad failure and wild success. Retrieved 5 April 2013, from http://searchsoa.techtarget.com/news/article/0,289142,sid26_gci1319609,00.html

Mohammadhossein, Nastaran (2013). *A STUDY ON THE CRM CUSTOMER BENEFITS TOWARDS CUSTOMER SATISFACTION.* (Master), UniversitiTeknologi Malaysia.

Mueller, Benjamin, Viering, Goetz, Legner, Christine, &Riempp, Gerold. (2010). Understanding the economic potential of service-oriented architecture. *Journal of Management Information Systems, 26*(4), 145-180.

Mulik, Shrikant, Ajgaonkar, Sushil, & Sharma, Kavindra. (2008). Where do you want to go in your SOA adoption journey? *IT Professional, 10*(3), 36-39.

Natis, Yefim V, &Pezzini, Massimo. (2007). Twelve common SOA mistakes and how to avoid them. *Gartner Research, 26*.

Natis, Yefim V. (2003). Service-oriented architecture scenario: Gartner.

Newcomer, Eric, &Lomow, Greg. (2004). *Understanding SOA with web services (independent technology guides)*: Addison-Wesley Professional.

Ngai, EWT, Cheng, TCE, & Ho, SSM. (2004). Critical success factors of web-based supply-chain management systems: an exploratory study. *Production Planning & Control, 15*(6), 622-630.

Nishar, Deep. (January 2013). 200 Million Members! Retrieved November 2, 2013, from http://blog.linkedin.com/2013/01/09/linkedin-200-million/

O'Sullivan, Ronan, Butler, Tom, & O'Reilly, Philip. (2012). *Realizing the business value of service-oriented architecture: the construction of a theoretical framework.* Paper presented at the Proceedings of the 6th European conference on information management and evaluation.

OASIS. (2005). Web services distributed management: Management of web services (WSDM-MOWS) 1.0. *OASIS-Standard, March.* Retrieved 20 March 2013, from https://www.oasis-open.org/committees/tc_home.php?wg_abbrev=wsdm

OASIS. (2006). Reference Model for Service Oriented Architecture 1.0. OASIS Standard. Retrieved 16 October 2012, from http://docs.oasis-open.org/soa-rm/v1.0/soa-rm.doc

Oates, B. (2006). Researching Information Systems and Computing. 2006: SAGE.

O'Brien, Liam, Merson, Paulo, & Bass, Len. (2007). *Quality attributes for service-oriented architectures.* Paper presented at the Proceedings of the international Workshop on Systems Development in SOA Environments.

Oliveira, Tiago, & Martins, Maria F. (2010). Understanding e-business adoption across industries in European countries. *Industrial Management & Data Systems, 110*(9), 1337-1354.

Oliveira, Tiago, & Martins, Maria Fraga. (2011). Literature review of information technology adoption models at firm level. *The Electronic Journal Information Systems Evaluation, 14*(1), 110-121.

Papazoglou, Michael P, & Van Den Heuvel, Willem-Jan. (2006). Service-oriented design and development methodology. *International Journal of Web Engineering and Technology, 2*(4), 412-442.

Pereira, Carla Marques, & Sousa, Pedro. (2004). *A method to define an Enterprise Architecture using the Zachman Framework.* Paper presented at the Proceedings of the 2004 ACM symposium on Applied computing.

Phillips, Patricia Pulliam. (2002). *Understanding the basics of return on investment in training: assessing the tangible and intangible benefits*: Buy now from Kogan Page.

Ping, R.A. . (2005). What is the average variance extracted for a latent variable interaction (or quadratic)?   , from http://home.att.net/ ~rpingjr/ave1.doc

Pomares, William Martinez. (2010). The Top-Down vs Bottom-Up SOA Debate Revisited. Retrieved October 2, 2013, from http://www.infoq.com/news/2010/07/top-down-bottom-up-soa

Premkumar, G, & Roberts, Margaret. (1999). Adoption of new information technologies in rural small businesses. *Omega, 27*(4), 467-484.

Reich, Blaize Horner, &Benbasat, Izak. (2000). Factors that influence the social dimension of alignment between business and information technology objectives. *MIS quarterly*, 81-113.

Ren, Minglun, &Lyytinen, Kalle J. (2008). Building enterprise architecture agility and sustenance with SOA. *Communications of the Association for Information Systems, 22*(1).

Richard, Pierre J, Devinney, Timothy M, Yip, George S, & Johnson, Gerry. (2009). Measuring organizational performance: Towards methodological best practice. *Journal of management, 35*(3), 718-804.

Rogers, Everett M. (2010). *Diffusion of innovations. Fourth Edition ed., New York,* : Free press.

Roulstone, Brian, & Phillips, Jack JJ. (2012). *ROI for Technology Projects*: Routledge.

Sambamurthy, Vallabh, Bharadwaj, Anandhi, & Grover, Varun. (2003). Shaping agility through digital options: Reconceptualizing the role of information technology in contemporary firms. *MIS quarterly*, 237-263.

Sauro, Jeff. (2010). Should You Use 5 Or 7 Point Scales? Retrieved september 10, 2013, from http://www.measuringusability.com/blog/scale-points.php

Schindler, E. (2008). Service-oriented architecture pays off for synovus financial. Retrieved 6 April 2013, from http://www.cio.com/article/451894

Schmelzer, R, & Bloomberg, J. (2005). Zapthink's service-oriented architecture roadmap poster', Zapthink.

SERVE. (2008). Types of Research Methods. Retrieved 2013 Agust 28, from University of North Carolina at Greensboro www.serve.org

services, IBM Global. (2008). Five best practices for deploying a successful service-oriented architecture.   .   Retrieved   27   November   2012 http://viewer.media.bitpipe.com/1033409397_523/1212083066_235/wp_five-best-practices-for-deploying-successful-soa.pdf

Seth, Ashish, Singla, Ashim Raj, &Aggarwal, Himanshu. (2012). Service Oriented Architecture Adoption Trends: A Critical Survey *Contemporary Computing* (pp. 164-175): Springer.

Skonnard, Aaron. (2003). Understanding soap. Retrieved 27 November 2012 http://msdn.microsoft.com/en-us/library/ms995800.aspx

Söderström, Eva, & Meier, Fabian. (2007). Combined SOA Maturity Model (CSOAMM): Towards a Guide for SOA Adoption *Enterprise Interoperability II* (pp. 389-400): Springer.

Starkweather, Dr. Jon. (2011). An alternative modeling strategy: Partial Least Squares.

Strassmann, Paul A. (1998). What is Alignment? Alignment is The Delivery of the Required   Results.   Retrieved   4   September   2013,   from http://www.strassmann.com/pubs/alignment/

Sutawijaya, Ida Bagus , &Chiok, Silvia (2010). *Impact of SOA Adoption with regard to Business Value: A study from South East Asia Bank.* (Master Thesis), School of Economics and Management.

Tehrani, ShimaRamezani. (2013). Factors Influencing the Adoption of Cloud Computing by Small and Medium-Sized Enterprises (SMEs).

Tilley, S, Gerdes, J, Hamilton, T, Huang, S, Müller, H, Smith, D, & Wong, K. (2004). On the business value and technical challenges of adopting web services. *Journal of Software Maintenance and Evolution: Research and Practice, 16*(1-2), 31-50.

Tornatzky, Louis G, Fleischer, Mitchell, &Chakrabarti, Alok K. (1990). *The processes of technological innovation* (Vol. 273): Lexington Books Lexington, MA.

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), 473-488.

Veger, M. (2008). *A Stage Maturity Model for the adoption of an enterprisewide Service-Oriented Architecture (SMM-SOA): a multicase study research.* (Master Dissertation), University of Twente.

Vegter, W. (2009). *Critical success factors for a SOA implementation.* Paper presented at the 11th Twente Student Conference on IT, Enschede, June 29th.

Walker, Lance. (2007). IBM business transformation enabled by service-oriented architecture. *IBM systems journal, 46*(4), 651-667.

Weiss, Petr. (2010). Modeling of Service-Oriented Architecture: Integration of Business Process and Service Modeling. *STU Press, Vazovova, 5*(811), 07.

Wily, CA. (2008). CA Wily TechWeb study results. Retrieved 1 April 2013, from http://www.ca.com/files/SupportingPieces/cmp-global-survey_196383.pdf

Wixom, B. H., & Todd, P. A. (2005). A theorectical integration of user satisfaction andtechnology acceptance. *Information Systems Research, 16*, 85-102.

Woolf, Bobby. (2006). Introduction to SOA governance. Retrieved September, 2013, from http://www.ibm.com/developerworks/library/ar-servgov/

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

Yoon, Tom, & Carter, Pamela. (2007). Investigating the antecedents and benefits of SOA implementation: a multi-case study approach.

Yoon, Tom. (2009). An Empirical Investigation of Factors Affecting Organizational Adoption of Virtual Worlds.

Zhu, Kevin, Dong, Shutao, Xu, Sean Xin, & Kraemer, Kenneth L. (2006). Innovation diffusion in global contexts: determinants of post-adoption digital transformation of European companies. *European Journal of Information Systems, 15*(6), 601-616.