ORGANIZATIONAL FACTORS AFFECTED BY SOA ADOPTION: A CRITICAL OVERVIEW (2008-2013)

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ABSTRACT

Service-Oriented Architecture (SOA) adoption is known as an evolutionary process. In this process of adoption, a number of areas in an organization are affected. However, there are a limited number of researches that focus on the effects of SOA adoption in an organization. This study investigated the significant organizational factors affected by SOA adoption during the last six years. The study focused on factors such as governance, strategy, complexity, Return on Investment (ROI), business and IT alignment etc. The findings of this study show SOA governance and cost issues are known as critical success factors in the most studies.

Keywords: *Service Oriented Architecture, SOA Adoption, Potential Factors, Influential Factors, Organizational Factors, Survey. Review*

1. INTRODUCTION

Service Oriented Architecture (SOA) is one of the most remarkable technologies in the domain of information systems' design and architecture in the modern world of technology. SOA is an approach to look at the world. With a service oriented observation, everything seems like a service. The service is a fundamental construction unit of SOA. It is a technique of accessing repeatable business capabilities [1]. According to Erl [2], systems are separated into sub-systems based on group functionality in the business process of an organization. Each sub-system managing individual tasks and all the functionalities are grouped as an interoperable service finally.

The acceptance of service oriented standards is not a simple process with the reason of creating service oriented architecture. It contains of a lot of projects and has a scale of many years. Once adopting SOA, dissimilar areas in a company are affected [3]: organizational construction, people, workflow processes, and technologies. Bieberstein, Bose, Walker & Lynch [4] consequently state that the necessary organizational redesigning - as well as culture and individual performance - must be well-organized.

SOA adoption needs an important transform in a business process philosophy and technology infrastructure. This attempt is determined by the promise of important benefits[2]. In spite of a large number of educational cases connected to SOA, it is being discussed that academic background and related literature are 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 [5]. The purpose of this study was to investigate the most challenging factors affected by organizations through SOA adoption based on previous studies in recent years. One of the significance of this paper is to help organizations which are starting to think about adopting SOA. Moreover, to recognize what aspect of the organizations would be influenced during the journey to adopt SOA in their organization.

2. LITERATURE REVIEW

"Service-oriented" is used as a term of IT/IS for some time. It is used in many various areas. Regardless of the diverse use of this term, there is a general viewpoint. Service-oriented represents a special advance to split tasks as a way to solve problems. It is a standard that helps the mandatory reasoning answer the problem. Service-oriented is splitting the problems into entity and related

smaller parts of logic or service. Service orientation standard proposes that organization needs to re-explain businesses tasks, entity, or process into well grained service granularity from the perspective of IT/IS. A well grained service guarantees their individuality. It makes them be easier to compose and orchestrate with all other services [6].

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 [2]. 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 [7].

Often organizations get in SOA projects with no proper up-front analysis of all the implications of their decisions [8]. IBM presented some of their experience with a number of organizations which adopting SOA and recommended four areas of adoption challenges: program management, organization, technology, and governance. The most difficult of these challenges are organization and governance, as they need the entire organization to *"change their methods, modes of communication, means of cooperating, and methods of reporting relationships."* [9]

The CA Wily [10] SOA adoption study results show that diverse countries get a different level of SOA adoption. A major number of organizations in Australia (32.9 %) and the USA (40.6 %) had used a business unit SOA application in IT control, while some of the organizations in the UK (40.6 %) had used an SOA application as a part of an enterprise-wide initiative. The main number of the organizations in Germany (30.6 %) and France (45.2 %) had their SOA applications in the pilot level.

2.1 Factors Influencing SOA Adoption

As it was mentioned before, this study focused on the vital and challenging criteria in the journey of SOA adoption in organizations since 2008. To gain this goal, the research team extracted influential factors from previous studies in the following section.

In his thesis Gupta (2008) attempted to identify the potential factors which influence the adoption of SOA in the professional healthcare industry in Norway. This thesis was conducted based on multiple case studies using an empirical research strategy. The author suggested a conceptual framework that identified the following factors as potential factors affecting SOA adoption in the professional healthcare industry in Norway: (1) process management (2) information management (3) IS portfolio management as an integrated SOA governance discipline (4) competence (5) stakeholder support (6) organization (7) information security (8) the adoption of the Web Services Architecture (9) healthcare vendors and (10) standards compliance [11].

IBM academy of Technology conducted a research to extract factors influence SOA structure. A vast number of IT top technologists were involved in this study. The team recognized the following factors as significant factors affected SOA success by reviewing more than 200 case studies: (1) developing architecture with a vision for the future, (2) foreseen linkages from IT to business processes, (3) creating organizational culture and skills to support SOA, (4) building a scalable infrastructure, (5) enabling operational visibility through governance and service management, (6) data management and (7) security [12].

As Basias et al. cited in a study HP as a supplier in SOA technology conducted a survey and emphasized the following significant factors for adopting SOA: (1) business impact, (2) alignment, (3) reduced system downtime, (4) reduced new service time to market, (5) customer service improvement, (6) IT cost reduction, and (7) return on investment [13].

According to Jenny Franzen the most critical success factor to adopt SOA in organizations is strong governance. Based on this study other important factors are: (1) establishing a central governance function, (2) describing principles, standards, contracts, and guidelines, (3) approving suitable financial models, (4) allotting ownership of services, (5) communicating the SOA vision, and (6) exercising strong leadership [14].

In a research, Lawler et al. [15] analyzed technical, procedural and business factors that contribute effective management of SOA. More important factors derived from an undergraduate research project survey and professional case studies of three technology firms. The other more important factors in business was distributed from (1) agility, (2) efficiency and flexibility benefits, (3) financial benefits, (4) competitive, (5) market and

regulatory differentials, (6) customer demand and (7) executive technology leadership. The most important factors in procedural analysis were distributed from (1) education and training, (2) knowledge exchange, (3) naming conventions and (4) procurement of technology. The technical factors were distributed from (1) external process domain on projects, (2) external SOA domain on projects, (3) business process management software, (4) XML standard, and (5) Web services best practices.

In another research in 2009, Luthria & Rabhi explained the different aspect of SOA adoption from the technical and business vision. In this study the factors influencing the organizational adoption of SOA mention as follow: (1) perceived value to the organization, (2) organizational strategy, (3) organizational structure, (4) organizational Culture, (5) potential implementation challenges, and (6) governance [16].

Ciganek et al. [17] determine the key factors that are challenging in the adoption of SOA using Web services by investigating eight cases in four various industries based on TOE framework. This framework categorized by technology, organizational, and environmental sector. Factors extracted from this study are: (1) industry leadership, (2) industry fragmentation and inertia, (3) business partner demand, (4) availability of expertise, (5) justification and ROI, (6) management awareness and support, (7) performance of services-based applications, (8) vendor support for SOA, and (9) security.

Antikainen & Pekkola [18] discovered factors influencing successful SOA implementation in an exploratory study by interviewing IT and business people from nine organizations which are pioneers in implementing SOA in Finland. This study identified four themes, containing eleven various factors that are relevant to business-IT alignment of SOA development. The themes and factors are: 1- Organization culture and human resources (a) organizational maturity, (b) competences and (c) SOA team, 2- Processes and methodologies (a) business driven development, (b) governance and (c) business stakeholder participation 3- Communication and artifact (a) common language, (b) strategy and (c) Enterprise Architecture framework 4- Technology (a) rapid development tools and (b) process automation.

Chang and Lue [19] in an exploratory study itemized the risky factors affecting the adoption of service oriented systems based on the order of strength of effect as follow: (1) insufficient technology planning, (2) lack of expertise, (3) ineffective project governance, and (4) organizational misalignment. Moreover, the result of this study demonstrated that these two factors are not critical risk factors to the adoption of service oriented systems, but they both are highly valued as risky factors: (5) technology newness, and (6) resource insufficiency

Vegter [20] examined critical success factors for SOA implementation in a study. The researcher selected the following three critical success factors according to previous studies: (1) complexity of SOA, (2) reusability of services, and (3) governing the adoption of SOA process. This study illustrated that service reusability is not as critical as it is indicated in some literatures. Moreover, the author clarified that SOA adoption will increase: (4) interoperability, (5) federation, (6) Vendor diversification options, (7) business and technology alignment, (8) ROI, (9) organizational agility, and (10) reduce IT burden.

In an empirical study Sutawijaya & Chiok [21] investigate the impact of SOA adoption from previous studies and interviews from a business value perspective. They clarified the impact of SOA adoption on organizations from two different perspectives: business agility and costs. Business agility factors contain: (1) system integration, (2) alignment between IT and business goals, (3) response to market changes & customer demands, (4) data flow, and (5) customer services; Cost factors include: (7) application development cost and time, (8) reuse of existing applications, and (9) operation costs. The following factors verified throughout the empirical research: (10) increase human-resource productivity, and (11) increase in application reliability.

Lee et al. [22] took the form of an exploratory study based on a review of 34 SOA literatures and 22 interviews, identifying 20 critical success factors for the successful adoption of SOA. Critical factors from the viewpoint of this research are: (1) deepening of enterprise wide perception of SOA, (2) strengthening perceptions of SOA by sharing success story, (3) building strong support for enterprise wide core human resources, (4) clear goal-setting, (5) step by step evolution planning with consideration of current capacity, (6) framing an organizational model for SOA management, (7) fostering a partnership culture between business and IT, (8) developing training planning, (9) generating standard definitions of SOA technology, (10) defining scope of technology application/

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security foundation, (11) standardization of business process, (12) putting in place of enterprise wide architecture management system, (13) definition of SOA based development methodology, (14) project team organization for SOA, (15) strengthening business service oriented design process, (16) strengthening communication within a project, (17) managing SOA policy processes, (18) establishing a service development/ operation management process, (19) assessing performance of service processes, and (20) building an industry wide foundation for SOA. Clear goal-setting based on business value is the most important critical success factor in implementing SOA as both literature and interviews ranked in this study.

Joachim et al. [23] developed a multi-dimensional SOA adoption construct based on TOE framework, which allows the authors to make the degree of SOA adoption measureable and comparable among different organizations. By evaluating the research model, the following results disclosed. In the technological view, compatibility and relative advantage are significant factors in SOA adoption, while the costs in adopting SOA prevent the adoption. SOA-related expertise of IT employees, organizational size, and support from top management are all important determinants in the organizational context, while experience is the single most significant influencing factor in the whole model. The results show that in fact competition is not a significant factor in the degree of SOA adoption in the environment context. Anyway, management fad is another factor that affects the degree of SOA adoption. It shows that an organization is also effected by the adoption results of competitors.

In a study, Nasr et al. [24] demonstrated an explanatory case study including the development of SOA adoption in industry. One of the objectives of this study is to identify the factors which complicate the implementation and transitions of adopting SOA in practice. Factors specified in this research are: (1) resistance to change, (2) training personnel in all parts of business and technical units, (3) immature systems to reveal the business functions as services, and (4) testing challenges.

The survey provided by Antlova in 2010 exposed that five critical success factors which affect ICT adoption from a service oriented view point are: (1) business strategy, (2) information strategy, (3) people, (4) information technology, and (5) processes in organizations. According to this study it is important to give notice to (6) adequate IT

planning, (7) adequate skilled project (8) teams, (9) effective project governance, and (10) organizational alignment [25].

Boh & Yellin (2010) conducted a survey among 108 organizations to analyze the important managerial factors which are influenced on the implementation of SOA. The authors concentrated on two relevant organizational factors as important factors for being success in implementing SOA: (1) top management support, and (2) centralization of IT decision-making. Results showed that top management support is a significant factor while centralization of IT decision-making, despite being to some extent effective, is not identified as a significant factor for implementing SOA in organization [26].

Findikoglu [27] in a research proposed a conceptual model to show the success of adopting Web Services as a technological innovation. The researcher declared some important factors that effect SOA migration in his study as follow: (1) security, (2) reliability, (3) agility, (4) efficiency and flexibility, (5) deployability, (6) organizations' size and scope, (7) centralization, (8) formalization, (9) interconnectedness, (10) complexity, 11) alignment IT and business, (12) governance, (13) technological knowledge, (14) quality and availability of human resources, (15) competitive pressure, (16) regulatory influence, (17) dependent partner readiness, and (18) trust in Web Services .

Aier et al. [28] focus on service orientation as a design paradigm for information systems engineering. This study considers information systems as the integrity of persons, business processes, and information technology that process data and information in an organization. To clearly identify CFS in this research, the body of literature from both the ERP and the EAI viewpoint were analyzed. The critical success factors that are mentioned in the study are: (1) integration strategy, (2) governance, (3) momentum resources and strategic importance, (4) culture and communication, (5) integration architecture and design, (6) characteristics of integration projects, and (7) transparency of design artifacts.

Caimei Hu (2011) in a study introduces the Web Service technology standard system, based on framework of TOE and analyses the main factors affecting the adoption and diffusion of Web Service technology standards. Based on this study factors that influence SOA adoption from the view point of technology are: (1) advantages of web service technology standards, (2) complexity of Web

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Service technology standards, (3) knowledge barriers in the adoption of Web Service technology standards, and (4) standards immaturity. From the view point of organizational, factors which influence SOA adoption are: (1) technological capability of organization, (2) organization philosophy, and (3) organization scale. Environmental factors based on TOE framework that mentioned as influential factors in this study are: (1) industry concentration, (2) stakeholder, and (3) industry technical inertia [29].

According to Bhallamudi and Tilley (2011) adopting SOA would give a new existence to the legacy system while performing a wrong adoption would lead to fiasco. Researchers conducted a study to analyze the existing projects which are on the way to adopt SOA to find out effective factors for migrating to SOA. Well-defined policies and procedures are the most significant result of this study to define, publish and maintain services. Due to this study the following five issues affect SOA migration: 1) strong business case, 2) the significant of services design, 3) appropriate technology to implement SOA projects, 4) SOA governance, and 5) education and training involving staff [30].

Abdul Manan and Hyland provided an SOA framework established based on critical success factors. The framework of this study was examined in two government case studies in Malaysia. Significant factors can be categorized into six parts: (1) SOA awareness, (2) SOA strategy, (3) governance (IT Governance), (4) SOA governance process, (5) SOA infrastructure & technology, and (6) SOA competency. Researchers itemized these sub factors in in their research: 1) awareness of SOA concept, 2) IT awareness of expected service benefits, 3) top management awareness of impact of service benefits on business, 4) strategy align with business strategy, 5) strategy link with business value, 6) clear SOA project roadmap, 7) shared strategy between IT and business users, 8) governance structure, 9) roles, responsibilities and behavioral practice, 10) IT project structure with subject matter expert, 11) shared knowledge between business & IT, 12) enterprise architecture, 13) business reengineering and standardization, 14) performance metrics, 15) documented IT/SOA strategy, 16) service portfolio, 17) policy on service life cycle, 18) policy on service reuse repository, 19) service repository, 20) standard tools or technology, (21) vendor and IT skills, 22) training, 23) evaluation on SOA success outcomes, and 24) expected service benefits [31].

Abdoel Gafoer adopted a qualitative research method in a study to evaluate multi case studies in four firms. The authors illustrated the following factors as CSF in this study: 1) active participation and commitment of business process owners, 2) business client participation, 3) SOA implementation standards and protocols for target operational environment, 4) business value of the systems, 5) incremental process centric approach for design and development, 6) incremental approach for interface migration, 7) SOA principles of design during design and implementation, 8) level of dependency business process on legacy systems, 9) organizational change management, 10) Center of competency, 11) degree of definition of objective, 12) business processes, 13) business continuity, 14) business demand, budget and cost of migration, 15) incremental approach for testing functional and non-functional requirements, 16) incremental approach for application migration, 17) service orientation, 18) agility, efficiency and flexibility benefits, and 19) process centric approach [32].

Claynor Mazzarolo et al. in a survey analyzed SOA adoption by organizations in Brazil. Organizations which were asked to participate in the survey were classified into two groups, in process and Initial projects. This study illustrated the following factors as significant factors which can be acquired by SOA adopted organizations: (1) agility, (2) reduction of costs, (3) increase of efficiency and of reuse, (4) decrease of redundancy of IT assets, (5) reduction of the burden of information technology and improvement of interoperability, (6) systems consistency, and (7) return of IT investment [33].

Seth et al. [34] in a study reviewed articles and research work related to SOA from 2001 - 2011 and identified the factors related to SOA implementation. Based on this study factors influencing SOA implementation are: (1) governance issues, (2) migration factors, (3) legacy systems integration, (4) change management, (5) adhoc requirements, (6) resource competences, (7) security risk, (8) risk management, (9) challenges in scope understanding, (10) integration business and IT, (11) Return on Investment, (12) BPM and business agility, (13) user involvement and organizational commitment, and (14) training and teaching methodology.

MacLennan & Van Belle [35] emphasized factors significantly influence SOA adoption in

South Africa. The results of this study emphasize that (1) complexity, and (2) cost are only important for SOA project success whereas the following factors are significant factors for SOA adoption and SOA project success: (3) multiple standards and platforms, (4) compatibility with the EA, (5) top management support, (6) good governance, (7) strategy, (8) adequate human and financial resources, (9) vendor support, and (10) development tools.

Galinium & Shahbaz (2012) proposed significant factors effecting successful SOA implementation in various firms of banking, airline, engineering, and furniture enterprises in Europe based on business and technical insights. The success factors are: (1) business process, (2) budgeting and resources, (3) potential of the legacy applications (size and complexity, reusability factors, level of documentation), (4) architecture of the legacy systems, (5) close monitoring, (6) strategy of migration, and (7) governance. The following factors are specified as other factors influencing SOA adoption in these studies: (8) information architecture, (9) dependence on commercial product, (10) testing, and (11) technical skills [36].

Sulong et al. conducted a review study to compare exclusive approach with previous information systems to demonstrate the success factors in implementing SOA. The authors listed these five success factors in their study: (1) management support and strategy focus, (2) information quality management, standards and policies, (3) business relationship and communication, 4) architecture design and implementation, and 5) change management and performance monitoring [37] .

In a research Basias et al. [13] developed an initial conceptual framework in order to categorize and examine procedural, business, technical and human influential factors of SOA adoption in e-banking sector. Researcher identified 125 factors that might influence SOA adoption in their study. After a deeper analysis they limited these factors to 16 significant factors that might influence SOA adoption in e-banking industry for studying in a real e-banking situation. The 16 possible influential factors are: (1) strategy, (2) goal, (3) financial benefits, (4) Return on Investment, (5) IT agility – business alignment, (6) costs, (7) communication, (8) risk, (9) culture, (10) management, (11) resistance to change, (12) security, (13) IT infrastructure, (14) fatigue, (15) stress, and (16) staff (experience and training).

Emadi & Hanza identified factors that lead to successful outcomes in SOA projects in their research. A meta-study was implemented on a number of related publications. According to this research critical success factors in implementation of SOA are: (1) organizational culture and human resources, (2) process and methodologies, (3) technology, (4) SOA registry, (5) SOA governance, (6) Top management support, (7) trust between Business Units, (8) IT infrastructure, (9) Business/IT communication, (10) business processes, and (11) management [38].

In another study in 2013, Koumaditis et al. identified a various number of CSFs influencing SOA implementation by critically reviewing the literature and identifying individual factors that may form CSFs for SOA implementation in healthcare domain. The nineteen CSFs that emphasized in this study are: (1) alignment, (2) clear goals form, (3) complexity, (4) cost, (5) culture, (6) enforce decision, (7) experience, (8) governance, (9) long-term planning, (10) measurement, (11) maturity identification, (12) project identification, (13) resources, (15) roadmap, (16) roles, (17) standards, (18) team, and (19) testing [39].

Khadka et al. [40] provided a systematic literature review that covers the methods and approaches published about evolution of legacy systems to SOA from 2000 till 2011. Numerous technical factors make SOA adoption more complicated due to the objectives of this study such as: (1) complexity, (2) reusability, (3) estimating the cost of transferring from legacy to SOA, (4) economic feasibility to state the profitability of adopting SOA, and (5) evolution planning.

In an article recently published, managerial decision problems were studied in an SOA model. Choi et al. concentrated on the SOA implementation and the influence of SOA on these two potential factors: 1) information systems cost, and 2) IT business alignment [41].

Baker et al. investigated critical success factors in the organizations by systematically reviewing SOA adoption articles. Based on the findings of this study CFSs are: (1) technology, (2) governance, (3) organization, (4) human resource, (5) architecture, (6) strategy, (7) financial resources, (8) product, and (9) communication [42].

3. REVIEW METHOD

This study is based on an exploratory research approach and literature reviewed related to SOA.

Factors reviewed in this study were conducted through a vast search on journals, conferences proceeding, books and working papers which have been published since 2008. It is worth mentioning that database search engines such as Google Scholar, IEEE Xplore, Springer, Science Direct, Elsevier, ACM Digital Library, and Citeseerx were used in this study. First, the research team used keywords like: SOA adoption and SOA implementation. About 26,400 papers were found at the first search outcome. In order to narrow the number of papers down and based on the objectives of this study researchers filtered the papers by choosing those which are published since 2008 till 2013. The number of papers resulted in this step reduced to 15,400. Then papers were restricted to those investigated the factors affected SOA adoption and SOA implementation in organizations which used keywords like: influential factors, success factors, critical success factors, factors affected on SOA adoption and some other synonyms and related terms. In the final stage, after removing the duplicated studies 32 papers were selected. Then researchers reviewed the selected papers deeply and the potential factors influenced SOA adoption extracted from previous studies. Figure 1 represents the steps of selecting the studies which are focused in this research.

Table 1: Online Database Sources

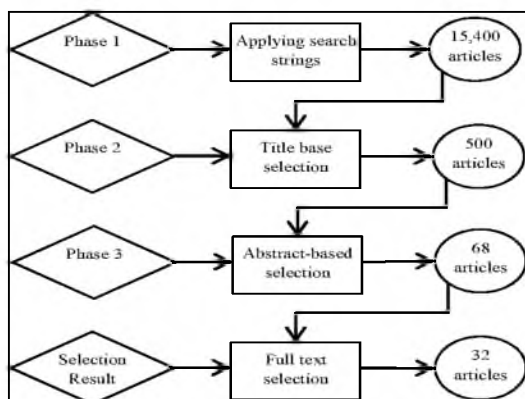| Search engine	URL Address
IEEE Explore	http://ieeexplore.ieee.org
Springer	http://www.springerlink.com
Science Direct	http://www.sciencedirect.com
Elsevier	http://www.elsevier.com/
ACM	http://portal.acm.org
Citeseerx	citeseerx.ist.psu.edu/

Figure 1: The process of Selecting Studies

Table 2 presents the type of studies reviewed in this article.

Table 2: The Distribution of Publications Type

Publication Type	2008	2009	2010	2011	2012	2013	Total	%
Conference Articles	-	2	1	3	1	1	8	25
Journal article	-	3	2	1	1	4	11	34.4
Book Chapter	-	1	1	1	1	-	4	12.5
Theses	2	-	1	1	1	-	5	15.6
Vendors' Publications	2	-	-	-	-	-	2	6.25
Working Paper	-	-	1	1	-	0	2	6.25
Total	4	6	6	7	4	5	32	100

As it is clear in Figure 2 the number of primary studies publications is from 2008 to 2013 and it has a small drop in 2012.
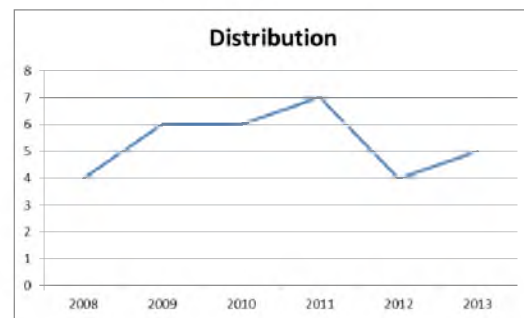

Figure 2: Publications' Distribution

4. CONCLUSION

In spite of the SOA adoption success stories of individual organizations in the trade press [43, 44], it is rather complicated to get an exact and representative depiction of SOA adoption. Organizations should know that adopting SOA cannot be the valid respondent to fulfill their requirements. They should recognize that deploying SOA will not solve all of their problems. This study investigated significant factors that have been more challenging in recent years by reviewing previous related literature. A summary of influential factors which are extracted in this study is available in a table in Appendix A. This table shows factors with frequency of more than 3. It would be useful for organizations to know which aspect of their organizations may pave the way by means of their tendency toward adopting Service Oriented Architecture.

Moreover, the research team narrated an ongoing research on the effect of SOA adoption on the performance of organizations. Since most studies focus on qualitative analysis, so a need for empirical research has been felt; therefore, it is suggested that a quantitative approach through

online resources be used for further research to indicate the effect of extracted factors in this study on the performance of organizations.

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APPENDIX A

Most Potential and Challenging Factors Influencing SOA Adoption in Organizations

No	Factor	2008 Gupta (1)	IBM academy (2)	HP Vendor (3)	Jenny Franzen (4)	2009 Lawler et al. (5)	Luthria & Rabhi (6)	Ciganek et al. (7)	[18]Antikainen & (8)	Chang & Lue (9)	Vegter (10)	2010 Sutawijaya & Chiok (11)	Lee et al. (12)	Ioachim et al. (13)	Nasr et al. (14)	Antlova (15)	Boh & Yellin (16)	2011 Findikoglu (17)	Aier et al. (18)	Caimei Hu (19)	Bhallamudi & Tilley (20)	Abdul Manan & Hyland (21)	Abdoel Gafoer (22)	Claynor Mazzarolo (23)	2012 Seth et al. (24)	MacLennan & Van Belle (25)	Galinium & Shahbaz (26)	Sulong et al. (27)	2013 Basias et al. (28)	Emadi & Hanza (29)	Koumaditis (30)	Khadka et al. (31)	Choi et al. (32)	Bakar eet al. (33)	Frequency
1	Availability of expertise							√		√				√		√											√								5
2	Business and IT alignment/ Organizational alignment		√						√	√		√				√		√							√				√		√		√		10
3	Business /IT/ Organizational Agility				√						√							√				√	√		√				√						7
4	Business Process												√			√						√					√			√					5
5	Business Process Management	√				√																			√										3
6	Centralization and formalization																√	√				√													3
7	Change Management																					√			√			√							3
8	Clear goal-setting											√																	√		√				3
9	Communication			√				√				√							√								√		√	√				√	8
10	Competency	√						√										√					√												4
11	Complexity of SOA										√							√		√					√							√	√		6
12	Competitive pressure					√							√					√																	3
13	Cost and financial Issues			√	√	√							√			√						√	√		√	√			√		√	√	√	√	14
14	Describing principles, standards, contracts, and guidelines	√			√								√							√								√			√				6
15	Education and training					√							√		√						√	√			√				√						7
16	Efficiency and flexibility					√												√					√	√											4
17	Experience											√																	√		√				3
18	Human resource							√				√	√					√							√						√			√	7
19	IT infrastructure		√																		√								√	√					4
20	Organizational culture		√					√											√										√	√	√				6
21	Strategy						√	√							√				√			√			√			√	√		√			√	10
22	Organizational size												√					√		√															3
23	Return on Investment			√				√			√													√	√				√						6
24	Resource sufficiency/ Competences								√																√	√					√				4
25	Security issues		√			√												√							√				√						5
26	SOA governance	√	√	√		√		√	√	√						√		√	√		√	√			√	√						√	√	√	17
27	SOA team							√					√			√															√				4
28	Stakeholder support	√						√											√																3
29	Strong leadership				√	√		√																											3
30	Technology (capability, newness, knowledge and planning, …)					√					√				√			√		√	√		√								√			√	9
31	Top management support							√					√				√					√			√			√	√						7
32	XML Web services standards					√														√			√												3