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Research Perspective in Enterprise Architecture

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Research Perspective in Enterprise Architecture

Completed Research Paper

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Abstract

The challenges of aligning IT with business triggered the attention towards Enterprise Architecture (EA). Despite the increase interest of academic scholars in EA, there is scarcity of studies that provide an up to date comprehensive research perspective view. The purpose of this study is to examine the research methodologies and theories utilized in EA studies from 2010 to 2016. The study employed Systematic Literature Review (SLR) as method to explore and analyze the literature of EA. The study revealed the research approaches and data collection methods utilized in EA. It shows that case study approach and interviews are the highly used compared to other research approaches and data collection instruments. Furthermore, it pointed out the low employment of theories in EA studies. The study is contributing to the body of knowledge by providing a foundation for novice researchers in the area of EA through detailed discussions of research methodologies and theories which are expected to support them in designing future studies.

Keywords: Enterprise Architecture, Systematic Literature Review, Research Methodology, Theory

Background

The high turnover of IT solutions and the increased reliance of business on IT created a challenge to align business strategy with IT investment (Ask & Hedström 2011; Birkmeier et al. 2013). According to a survey conducted in 2010 by Society for Information Management, among 172 organizations in USA, IT and business alignment ranked as one of the top five key issues facing IT executives (Luftman & Ben-Zvi 2010). Hence, Enterprise Architecture (EA) is suggested as an approach to improve business IT alignment (Iyamu & Mphahlele 2014), manage organizational complexity (Drews & Schirmer 2014), and support organization transformation (Agievich & Skripkin 2014). Lankhorst (2009, p.149) defines EA as “a coherent whole of principals, methods, and models that are used in the design and realization of an enterprise's organizational structure, business processes, information systems and infrastructure”.

The employment of Systematic Literature Review (SLR) in the Information Systems (IS) literature received an increase attention since the publication of Webster & Watson (2002) who addressed the concerns of few published review articles and the lack of theoretical progress in IS field. Later, several SLR guidelines had been produced to guide the IS researchers (e.g., Kitchenham (2004); Levy & Ellis (2006); Bandara et al. (2011); Okoli (2015)).

In the context of EA, recently there are few EA publications that employed SLR which are Lange et al. (2012), Petrikina et al. (2014), Rouhani et al. (2015a), Stelzer (2010), Tambouris et al. (2014) and Al-Kharusi et al. (2016). Lange et al (2012) conducted SLR to describe EA success factors and benefits while Petrikina et al. (2014) investigated the relationship between EA and business models. Furthermore, Rouhani et al. (2015a) conducted SLR to identify the factors and practices influencing EA implementation management. Using structured literature review, Stelzer (2010) uncovered publications that discussed EA principles. Tambouris et al. (2014) used SLR to discuss the requirements of e-government public service provision for EA development. Furthermore, Al-Kharusi et al. (2016) used SLR as an approach to identify the key aspects of factors characterizing the engagement between the enterprise architects and stakeholders in EA development. None of these SLR studies discussed research methodologies or theories in the area of EA which is essential to support the researchers in the future EA research design (Fielt et al. 2014). The effective literature review facilitates theory development in IS domain and establishes a groundwork to the selection of the research methodology for knowledge advancement (Webster & Watson 2002; Levy & Ellis 2006).

Hence, this paper is aiming to explore the literature research methodologies and theories to build a foundation for future EA studies. Specifically, the paper intends to answer the following questions:

Question 1: What are the research methodologies used in EA literature studies?

Question 2: What are the theories used in EA literature studies?

The knowledge on the research approaches trend for a particular phenomenon gives an indication for the researchers on the maturity of that particular field. For example, Yin (2009) pointed out that case study approach is commonly used in the early stages of emerging field to understand its core concepts. Therefore, when case study approach is widely used in a particular field that indicates the field being investigated is still at its early stages. Furthermore, the awareness on the common data collection instruments for a particular field helps the novice researchers to employ the widely used instruments which will provide them some guidance in the research design. Hence, question 1 is aiming to discuss the recent research approaches and data collection instruments utilized in the area of EA.

Despite the emphasis of the top IS journals that IS researchers need to ground their work on theories, IS literatures are still under-theorized (Lim et al. 2009). As a contribution towards addressing this gap, question 2 is intending to discuss the current status of theory usage in the field of EA and build a descriptive overview on how each theory is employed in each study. As discussed by Fielt et al. (2014), such theories analysis can help to guide the expansion of a field's knowledge base.

Methodology

Following the guidelines of Kitchenham (2007) and Bandara et al. (2011), this study used five-phase method to extract, analyze and interpret the existing EA literature. This includes the phase of Planning, Search, Pre-analysis, Analysis and Write-up as shown in Figure 1. The first two phases (planning and search) are highly influenced by Kitchenham (2007). The following three phases (pre-analysis, analysis and write-up) are guided by Bandara et al. (2011).

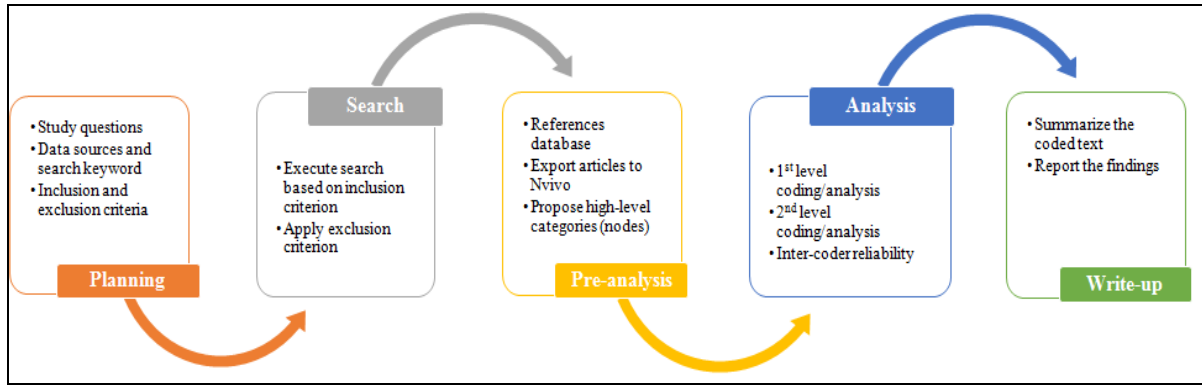


Figure 1: SLR Main Phases and Activities

In the **planning** phase, the study is aiming to answer the following questions: 1) What are the research methodologies used in EA literature studies?; and 2) What are the theories used in EA literature studies?. In doing this, the institution online database was used as a main source for data while “enterprise architecture” was used as a keyword. Due to the popularity of EA topic, there is a need for inclusion criterion to limit the results to the most relevant to study questions. The inclusion criterion used for this study illustrated in Table 1.

<ul style="list-style-type: none"> • From January 2010 to present (October 2016) • Journal article and conference proceedings only • Peer-reviewed articles 	<ul style="list-style-type: none"> • Keyword in Title or abstract • Full text articles • English Articles
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Table 1: Inclusion Criterion

The exclusion criterion has to be applied for the search outcome resulted from the inclusion criterion to extract the primary studies that will be analyzed to answer the review study’s questions. Hence, the exclusion criterion is concluded that comprises the following elimination conditions:

- 1) Papers in which the keyword exists but with different meaning from the study context
- 2) Duplicate papers
- 3) Papers that lack research methodology
- 4) Conceptual or None-empirical papers.

In the **search** phase, the inclusion criterion is used to identify the initial set of primary studies. Then, the exclusion criterion is applied based on the conditions discussed in previous phase to conclude the primary papers. This is in line with Kitchenham (2007) who explained that the search process should be driven by the aim of identifying the primary studies that answer the review questions.

To ensure high quality and relevant primary studies, a number of validation actions were considered as part of planning and search phases. Specifically, the study employed Database of Abstracts of Reviews of Effects (DARE) criteria that consist of four assessment questions (Sheikhali et al. 2016) which were utilized by Kitchenham et al. (2009):

QA 1: Are the review’s inclusion and exclusion criteria described and appropriate?

QA 2: Is the literature search likely to have covered all relevant studies?

QA 3: Did the reviewers assess the quality/validity of the included studies?

QA 4: Were the basic data/studies adequately described?

Hence, these quality assessment questions were answered and discussed among the authors. For QA 1, the inclusion criterion used in the SLR is aligned with the inclusion criterion suggested by Kitchenham et al. (2009), Kitchenham (2007) and Bandara et al. (2011). For QA 2, the researchers used the online institution database, which is linked to a well-known vendor databases (e.g., IEEE Xplore, ProQuest, ScienceDirect, Emerald, SpringerLink, ACM Digital Library, etc.). Furthermore, since the focus of the study is to identify the research methodologies and theories in EA studies, the term “Enterprise Architecture” is used as a keyword to search through the databases to ensure wider coverage of results. Previous published EA’s SLR studies used “Enterprise Architecture” as keyword, example Al-Kharusi et al. (2016), Lange et al. (2012) and Stelzer (2010). For QA 3, the authors limited the search to the peer-reviewed papers to enhance the quality of included papers. For QA 4, papers

with full text only were included. Additionally, these included papers were further reviewed and filtered out papers based on the discussed exclusion criterion. These quality assessment questions were reviewed and discussed by a group of three authors.

The **pre-analysis** phase includes all preparation activities required for the analysis, which are building references database for the primary studies, exporting primary studies to NVivo 11 and proposing high-level categories to be used as main nodes in NVivo 11. References database for primary studies was created using EndNote and primary studies were exported to NVivo 11 as pdf format files. As part of pre-coding, high-level nodes were suggested (research methodology and theories). These nodes were suggested to answer the review questions. The pre-coding and coding process followed the guidelines of Bandara et al. (2011).

The **analysis** phase covers the coding process in which the authors are skimming through each paper and copy/drag the relevant text to one of the two nodes suggested in the previous phase and this process is called 1st level coding. The coded text under each node is analyzed based on similarities into sub-categories (child nodes) and it is called 2nd level coding. To ensure rigor inter-coder reliability, sample of five papers were selected from the primary studies and coded by two coders to test the coding categories and coding approach following Fielt et al. (2014).

The **write-up** phase is the last phase in which the coded text under the nodes are analyzed to draw conclusion of findings. The functionalities of NVivo 11 can assist the researchers in the content analysis; for example it shows the distribution of text and references among the nodes.

These SLR phases were utilized by the authors to design the review protocol as depicted in Figure 2. As explained by Kitchenham (2004), designing a review protocol is essential for any systematic review to reduce researcher’s bias, increase reliability and improve study validity.

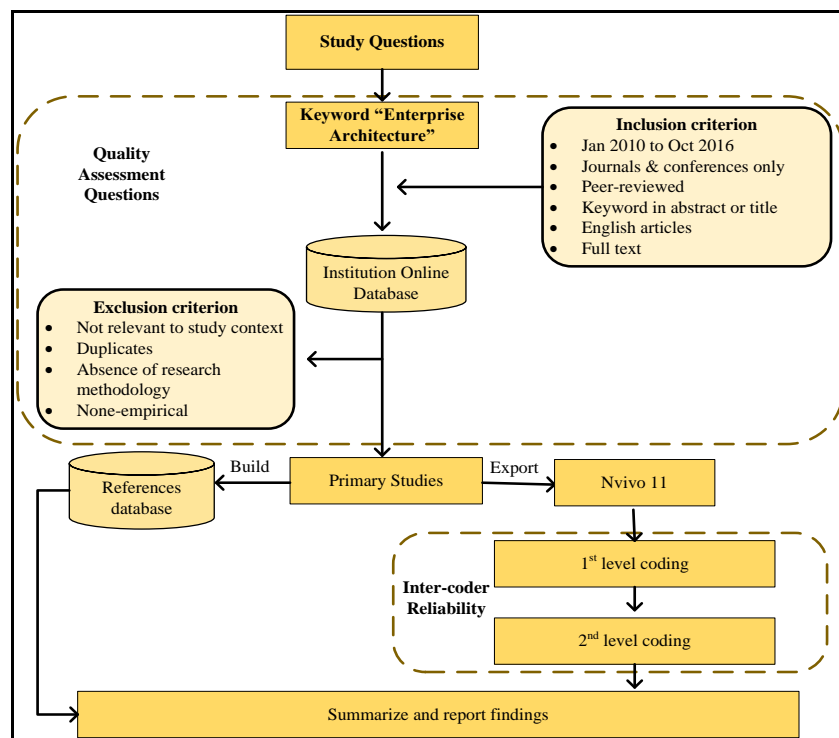


Figure 2: SLR Study Protocol

Results and Discussion

By applying the inclusion criterion using the institution search engine filters, the search revealed 289 journal and conference proceedings articles. The authors applied the exclusion criterion through manual full skimming for all articles that resulted in 55 primary empirical articles (all papers listed in Table 2) for data extraction and analysis. Figure 3 shows the distribution of the primary papers in the inclusion duration period from January of 2010 to October 2016. The highest number of publication was in 2014 and the lowest was in 2012 with no clear reason associated with this drop. The annual average number of empirical EA studies publication was 8 papers in the inclusion period. Apart from 2012 in which only two empirical papers were obtained as part of the review, it can be noticed that the

topics of EA value and EA development are continuously discussed in the publications from 2010 till 2016. EA value here refers to studies that examined EA impact, role, use and benefits in the organization. EA development refers to studies that discussed EA modeling, development process, coordination and frameworks. Furthermore, there are topics that start gaining scholars' interest from 2014 to 2016 which are EA implementation, institution and maturity (or evolution).

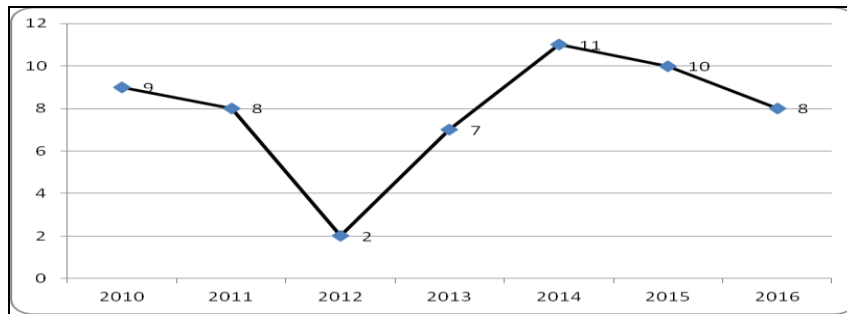


Figure 3: Distribution of Empirical Primary Studies from 2010 to Oct 2016

The researcher extracted the data from the primary articles by using the high-level categories (pre-codification themes) as guidance. This approach is called deductive approach in which the coding themes are predetermined to some extent from the phenomenon being investigated (Bandara et al., 2015). Hence, by considering the review study's questions, the high-level pre-codification themes consist of two main nodes namely; research methodology and theories. Specifically, the researcher navigated through all concluded primary papers and coded the relevant text under each of the two nodes by adhering to following extraction rules to ensure consistency during the coding process:

- **Research methodology:** includes the research approach and collection instrument used in the paper. Two sub-nodes (child nodes) namely **research approach** and **data collection methods** were created. Research approach node includes texts related to paper research approach and data collection methods capture the employed instruments
- **Theory:** includes the used theory in each paper whenever available and its application

Next, the authors inductively analyzed the coded text under each node to identify similarities that constitute second level of themes called child nodes and as part of second level coding the relevant text dragged from parent node to relevant child nodes. The overall process is automated by employing NVivo 11 as a tool to code the text and drag it to the relevant node.

EA Research Methodologies

This section is aiming to examine the research approaches and data collection methods used in the primary studies. All coded texts under research approach node and research data collection methods were analyzed inductively and further subcategorized. The inductive analysis of research approach node coded text revealed sub-nodes which are case study, survey, action research, grounded theory, experiment, design science and other. Similar classification was used in the systematic review of Fiel et al. (2014) except for grounded theory that is added as research approach following Creswell (2013). The coded text under data collection methods node classified based on the used instruments into documentations review, focus group, interviews, observation, workshops and questionnaire.

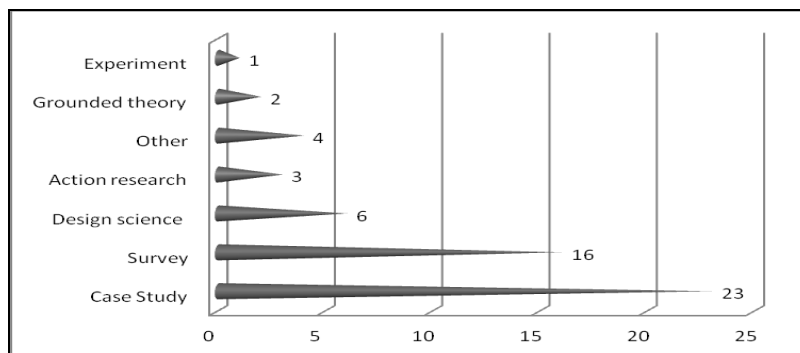


Figure 4: Research Approach Distribution Percentage for Overall Primary Studies

The case study approach dominated the research approach used in primary studies in which 23 studies utilized it. The case study approach is popular when rich data about the context of the

phenomenon and its real settings are required (Yin 2009). Also, it is commonly used in the early stages of emerging field to understand its core concepts (Yin 2009). As explained by Alwadain et al. (2015), EA as a phenomenon is poorly understood and how it evolve. Furthermore, it has been discussed that EA is suggested as an approach to manage organization complexity and enables organization transformation; hence in-depth understanding of natural settings surround the phenomenon is essential. In addition, EA is developed and evolved within a socio-technical system, so investigating its impact and development requires an interpretive approach especially to understand the social context (Al-Kharusi et al. 2016). Thus, there is a high employment of case study approach in the field of EA as shown in Figure 4. Though the results shows the use of survey as an approach is less compared case study but it is still widely used and utilized by 16 studies. Mainly it was used to test hypothesis (models) related to EA and building measuring matrices e.g. Foorthuis et al. (2015), Abraham et al. (2015) and Aier (2014). Other research approaches; action research, design science, experiment and grounded theory are less utilized in EA studies. Table 2 shows the list of all analyzed primary studies and the research approach employed in each empirical study. In summary, the expectation is the continuous growing of case study researches in the area of EA and this is supported as discussed by the nature of EA as a socio-technical system that interconnects different organization elements. Also, there will be an increase in the utilization of survey researches to address the need of building measuring models especially in the quantification of EA benefits and its impact.

Primary Study	Research Approach							Instrument					
	Action Research	Case Study	Design Science	Experiment	Grounded Theory	Survey	Other	Documentation review	Focus group	Interviews	Observation	Questionnaire	Workshops
(Abraham et al. 2015)						✓			✓	✓		✓	
(Aier et al. 2016)		✓						✓		✓			
(Aier 2014)						✓						✓	
(Aier & Gleichauf 2010)			✓							✓			✓
(Aier & Schelp 2010)		✓								✓			✓
(Alaeddini & Salekfard 2013)						✓				✓			
(Alwadain, et al. 2015)		✓						✓		✓			
(Ask & Hedström 2011)		✓						✓		✓	✓		
(Bakar et al. 2016)		✓							✓			✓	
(Bernaert et al. 2015)	✓									✓			
(Bui 2015)		✓						✓		✓			
(Chuang & van Loggerenberg 2010)							✓			✓			
(Drews & Schirmer 2014)		✓								✓			
(Du Preez et al. 2014)						✓						✓	
(Espinosa et al. 2010)					✓					✓			
(Espinosa et al. 2011)					✓					✓			
(Espinosa et al. 2013) b		✓								✓			
(Fallmyr & Bygstad 2014)		✓						✓		✓			
(Farwick et al. 2013)						✓						✓	
(Foorthuis et al. 2015)						✓						✓	
(Franke et al. 2016)				✓								✓	
(Hauder et al. 2013)		✓										✓	
(Hauder et al. 2014)			✓							✓			
(Hazen et al. 2014)						✓						✓	
(Hotti et al. 2014)						✓						✓	
(Iyamu & Mphahlele 2014)		✓								✓			
(Jahani et al. 2010)	✓											✓	
(Lagerstrom et al. 2011)						✓						✓	
(Lange et al. 2015)						✓				✓		✓	
(Lange et al. 2012)							✓			✓			

(Larsson et al. 2011)		✓						✓			
(Lemmetti 2016)						✓		✓			
(Löhe & Legner 2014)			✓						✓		✓
(Nakakawa & Bommel 2010)			✓							✓	
(Nakakawa et al. 2013)			✓							✓	
(Närman et al. 2012)					✓					✓	
(Niemi & Pekkola 2013)		✓						✓			
(Malta & Sousa 2016)		✓				✓		✓	✓		
(Olsen & Trelsgård 2016)		✓				✓		✓			
(Penttinen & Isomäki 2010)		✓						✓			
(Rajabi et al. 2013)						✓		✓			
(Rijo et al. 2015)	✓									✓	
(Rouhaniet al. 2015)					✓					✓	
(Saarelainen & Hotti 2011)		✓					✓				
(Saat et al. 2010)					✓					✓	
(Simon et al. 2014)			✓					✓			
(Simonsson et al. 2011)		✓						✓		✓	
(Smith & Watson 2015)		✓				✓		✓			
(Tamm et al. 2015)		✓				✓		✓			
(Toppenberg et al. 2015)		✓				✓					
(van den Berg & van Vliet 2016)		✓				✓	✓	✓			
(van der Raadt et al. 2010)		✓						✓			
(van Steenberg et al. 2011)					✓					✓	
(Winter & Aier 2011)					✓					✓	
(Zijl & Belle 2014)					✓					✓	

Table 2: Research Approach and Instruments used in each Primary Study

The discussion of the research methodology cannot be considered without shedding the light on data collection methods because these methods are the main source of data and designed to capture specific type of data based on the choice of the instrument. Table 2 demonstrates the various data collection methods used in EA primary studies which are documentations review, focus group, interview, observation, questionnaire and workshop. It can be noticed that interview is the most utilized technique and employed by 33 studies. This is aligned with the previous findings that show the domination use of case study approach that is usually employs interviews as main source of data (Darke et al. 1998). Similarly with the questionnaire, it is ranked second after interviews and employed by 23 studies. The documentations review is ranked third and normally used for triangulation purpose when conducting case study (Yin 2009). Focus group, observation and workshops are the least utilized instruments in the primary studies that might be rooted to the researchers need to interact directly with the actors and obtain unbiased view.

EA Theories

This section is investigating the theories used in the primary studies. One of the main findings of SLR is the lack of theory utilization in EA studies. Out of 55 empirical studies, only 15 studies employed theories as listed in Table 3. Foorthis et al. (2015) clarified that there is a lack of explanatory theory in the area of EA. There is no preference or popularity of using specific theory in the area of EA except for DeLone and McLean (D&M) IS Success Model , which is utilized in three papers; Espinosa et al. (2011b), Lange et al. (2012) and Lange et al. (2015). Hence, there is a potential for academic researchers to get advantage of using theories to enhance the understanding of phenomena investigated under EA discipline.

Theory Name	Primary Paper’s Scholar	No. of papers
Analytic Hierarchy Process	(Bakar, et al. 2016)	1
Chain model	(Hauder et al. 2013)	1
Coordination theory	(Espinosa et al. 2010)	1
DeLone and McLean IS Success Model	(Espinosa et al. 2011b),(Lange et al. 2012),(Lange et al. 2015)	3
eGovernment Economics Project model and Gottschalk’s model	(Larsson 2011)	1
Enterprise Transformation	(Chuang & van Loggerenberg	1

	2010)	
Knowledge Acquisition in Automated Specification model	(Bernaert et al. 2015)	1
Morphogenetic theory	(Alwadain et al. 2015)	1
Negotiation theory	(Nakakawa & Bommel 2010)	1
Structuration theory	(Iyamu & Mphahlele 2014)	1
Technology Acceptance Model and Task-Technology Fit	(Närman et al. 2012)	1
Unified Theory of Acceptance and Use of Technology	(Hazen et al. 2014)	1

Table 3: List of used Theories in Primary Studies

Table 3 shows the theory used in each primary study with a brief description on its application. Below is a detailed discussion for each theory and how it is employed to achieve the objective of the study.

Analytic Hierarchy Process (AHP) is a decision analysis technique proposed by Saaty aimed to provide quantifiable measures in subjective judgment situation (Bakar et al. 2016). Bakar et al. (2016) employed AHP importance scale to develop an assessment model for EA implementation process. The developed model tested in three public Malaysian organizations and produced reliable results.

The chain model uses both characteristics of task and technology to derive the task-technology fit (Hauder et al. 2013). Using the model, Hauder et al. (2013) obtained the core EA processes that represent the task characteristics from a German organization. Furthermore, they derived generic technology characteristics by evaluating enterprise wikis and EA management tools. These findings will be utilized to integrate EA management specialized tools with enterprise wikis to increase the availability of EA products.

Coordination theory is used to get insights on tasks dependencies (Espinosa et al. 2010). Espinosa et al. (2010) utilized it to investigate the coordination challenges facing EA architecting effort in EA layers (business, information, application and technology), EA maturity, EA architecting processes and EA governance. The theory used in findings analysis to develop the initial categories organic, mechanistic and cognitive (Espinosa et al. 2010). The organic coordination is based on feedback through informal feedback from EA stakeholders or formal EA review meetings (Espinosa et al. 2010). The mechanistic coordination eliminates the need for organic coordination by employing governance practices for EA architecting effort (Espinosa et al. 2010). The cognitive coordination is through building shared knowledge of collaborators and their tasks to build shared vision for EA (Espinosa et al. 2010). The findings show the need for both mechanistic and cognitive for any architecting effort.

DeLone and McLean (D&M) IS Success Model suggested set of measures for system success system quality, information quality, service quality, system use, user satisfaction, individual impact and organizational impact (Espinosa et al. 2011b). Under organizational impact measures, the model recommended organizational productivity, cost reduction, sales growth and increased profit (Espinosa et al. 2011b). Espinosa et al. (2011b) adopted some of these measures (productivity, cost reduction and revenue growth) that are expected to be applicable for EA context to develop theoretical framework that measures the organizational impact of EA. The framework will be refined and validated in future work (Espinosa et al. 2011b).

Lange et al. (2012) utilized **D&M IS Success Model** to develop EA benefits realization model. Lange et al. (2012) adjusted three dimensions information quality, system quality, and service quality of D&M IS Success Model. The rest of dimensions were retained, namely use, intention to use, satisfaction and net benefits EA cultural aspects dimension was added due to its importance that reflects the surrounding in which EA operates. The developed EA benefits realization model is planned for empirical validation in the future.

Lange et al. (2015) conducted a survey study (among 133 EA practitioners) to validate the constructs of the model developed by Lange et al. (2012) based on **D&M IS Success Model**. The study confirmed three key EA management (EAM) success factors which are EAM product quality, EAM infrastructure quality and EAM service delivery quality. Furthermore, it confirmed two EA success measures namely intention to use and organizational & projects benefits. The construct of EA satisfaction found to be irrelevant to EA success.

eGovernment Economics Project (eGAP) model provides theory based measurement of e-government through three value drivers 1) Financial and organizational 2) Political and 3) Constituency (Larsson 2011). **Gottschalk's model** is a guide to assess the interoperability level in organization (Larsson 2011). Larsson (2011) utilized both models (eGAP and Gottschalk) to build a matrix of EA perceived benefits and issues in which the value drivers of eGAP represents the perceived benefits and four suggested variables from Gottschalk model which are management issues, organizational culture issues, legal issues and technology issues. The matrix provided deep

understanding on how the difference in motivations and perceived purpose of interoperability causes alignment problematic.

Enterprise transformation theory is looking at aspects related to what, why and how of enterprise transformation change that is driven by value deficiencies (Chuang & van Loggerenberg 2010). The theory also stresses on the role of the problem solver in the change process and the influence of the organization social and cultural aspects on him (Chuang & van Loggerenberg, 2010). These characteristics are similar to the architecting process of EA that architects the current state, future state and migration plan (Chuang & van Loggerenberg 2010). Hence, Chuang & van Loggerenberg (2010) utilized the understanding of enterprise transformation theory to investigate the challenges of non-technical (organization social and cultural) aspects on the enterprise architect.

Knowledge Acquisition in Automated Specification (KAOS) model that developed by University of Oregon and university of Louvain aims to align software systems requirements with business goals (Almisned & Keppens 2010; Bernaert et al. 2015). Bernaert et al. (2015) was aiming to develop an EA framework specific for SME. Hence, they conducted a feasibility test to see the applicability of using KAOS. They found a potential of utilizing it to develop EA framework for SME and called it CHOOSE. Bernaert et al. (2015) adjusted the KAOS to conclude CHOOSE by mapping the viewpoints of KAOS into EA context. The final CHOOSE was applied in five SME organizations.

Morphogenetic theory (or Archer's morphogenetic theory) provides an analytical lens to understand the evolution of complex phenomenon and follows three analytical phases 1) structural conditioning, 2) social interaction and 3) structural elaboration (Alwadain, et al. 2015). Alwadain et al. (2015) used these three phases to investigate the evolution of EA outcomes in a single case study by mapping them into EA context and produced three EA analytical phases 1) architectural conditioning, 2) architectural interaction and 3) architectural elaboration. These three phases provided initial empirical insights on EA evolution.

Negotiation theory is referring to the final decision taken within a project through joint decision opportunities (Nakakawa & Bommel 2010). Similarly, EA can be perceived as set of architecture joint decisions through the different phases of EA development (Nakakawa & Bommel 2010). The authors exploited negotiation theory to guide the development of EA collaborative decision-making framework. This is based on the assumptions that the successful negotiation process will results in successful EA development, cooperation between enterprise architects and stakeholders and efficient collaboration between stakeholders and enterprise architects (Nakakawa & Bommel 2010).

Structuration theory focuses on the interactions between the actors and structure within a social environment (Iyamu & Mphahlele 2014). Iyamu & Mphahlele (2014) applied structuration theory to explore the interface between organization structure and EA. Specifically, they used it to in the analysis of interpretive data collected through interviews to investigate the impact of actors and structure on EA deployment and also to investigate the interactions between enterprise architects and top management in the development of EA. The study revealed a set of factors that influence the relation between the organization structure and EA, which are classifications of activities, organization culture, organization policy and top management buy-in (Iyamu & Mphahlele 2014)

Närman et al. (2012) conducted study to develop framework to assess application usage using **Technology Acceptance Model (TAM)** and **Task-Technology Fit (TTF)**. TAM is build around perceived usefulness and perceived ease of use and TTF based on the idea that the good match of functional capabilities and tasks requirements lead to higher utilization (Närman et al. 2012). The authors integrated the variables offered by the two theories into the three domains (business, application and technology) of EA language ArchiMate to develop the framework.

Unified Theory of Acceptance and Use of Technology (UTAUT) normally used to explain the variance of users intention use particular IT solution (Hazen et al. 2014). It has four main constructs namely; *“performance expectancy, effort expectancy, social influence and facilitating conditions”* (Hazen et al. 2014, p. 182). The performance expectancy construct proved by literature to explain the variance on the degree of intention to use (Hazen et al. 2014). Hazen et al. (2014) conducted a study to examine how performance expectancy and training affect the degree to which organizations use EA. When the stakeholders expect higher performance from EA, the probability of buy-in EA is higher and hence the willingness to use it. Based on performance expectancy construct, Hazen et al. (2014) suggested four hypothesis to test the relation between performance expectancy and EA use and EA training as mediator between performance expectancy and EA use. The findings showed a positive correlation between performance expectancy and EA use. Also, it showed partial mediation of EA training in relation between performance expectancy and EA use (Hazen et al. 2014).

Conclusion

This paper is aiming to create a foundation for the EA researchers by exploring EA literature with special focus on research methodologies and theories. The study employed SLR as a main approach to answer the paper questions following the guidelines of Bandara et al. (2011) and Kitchenham (2007). It detailed the research methodology and data collection methods utilized by the EA studies. It showed that case study approach is the most widely used research approach due to the nature of EA which exist in a socio-technical system. Thus, the understanding of the natural settings surrounding the phenomenon is essential. Though the case study approach is dominating in the area of EA but the survey approach is broadly used in testing and measuring matrices to quantify the EA impact. The usage of survey is expected to expand as the SLR findings showed that there is an increase interest in the topics of EA institution and maturity in which quantification measures are required. This is in line with SLR findings that showed interview and questionnaire are the most common data collection instruments which are used in case study and survey approaches respectively. Therefore, we suggest that future research can contribute to understanding EA through the following actions; 1) conduct further case study research, in particular in areas that have not been addressed to date and 2) build and test theories in areas where initial studies have been conducted.

There is a lack of theory utilization in EA studies (15 studies out of 55 studies), which gives an opportunity for future studies to take advantage of theories to enhance their understanding of EA phenomena. This is in alignment with IS journals recommendation of grounding researchers work on theory. Hence, we propose that future studies to expand the usage of theories discussed in this study and also open the door for other IS theories relevant to the study context.

Since this study is aiming to provide the latest knowledge on EA research perspective, the literature-searching period was limited to the period from January 2010 to October 2016. Also, the authors relied on the university access to journals and conferences to extract full papers. Despite these two limitations, the collected data provided a rich knowledge to address the paper questions.

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