The Alignment Factors of Business-IT on Enterprise Architecture : a Systematic Literature Review

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***Abstract* — One of the enterprise architecture (EA) role in organization is the function of aligning business–information technology (IT). The alignment is done to support IT achievement of organizational business goals. The purpose of this study is to determine the factors that influence to the achievement of alignment between business-IT in the organization. To search for IT-business alignment factors, a review literature was conducted and produced eighteen selected papers. From the literature review conducted on eighteen selected papers, there were twenty factors identified as alignment factors. Furthermore, these factors are categorized into two perspectives of alignment factors that are business perspective and IT perspective. Once classified then there are only 5 alignment business-IT factors: Business Process, Methodology, Modeling, Technology that support the application, and Network Collaboration.**

Keywords—EA; Alignment Factors; Business-IT; Systemic Literature Review.

I. INTRODUCTION

Global IT Shopping Based on Reports presented by Gartner on the 2015 webinar, IT spending forecasts from 2017 to 2018 show an upward trend. IT spending forecast in 2017 amounted to 3.7 trillion dollars US and in 2018 amounted to 3.8 trillion dollars US. The average percentage of IT spending in the industrial sector in 2014 was 3.1%[1].

Increase IT spending demands an increase in the benefits that IT provides to organizations. Therefore, organizations need to maximize the benefits of information technology to support the achievement of organizational goals. How IT supports the achievement of business objectives, known as alignment business-IT. One of the enterprise architecture (EA) functions is to align between business and IT.

The Alignment of Business - IT is defined as the IT support to achieve organizational strategy goals. Business-IT alignment aims to ensure the necessary IT requirements in accordance with business strategy and support management in developing and deploying EA [2]. The Alignment of business - IT is a matter of strategy [3]. How business strategies and IT strategies support each other to achieve organizational goals.

In order to make alignment it is important to know what factors that support the occurrence of alignment business-IT. The alignment business-IT factor is defined as the benefits the organization derives from the results of IT implementation. The search for factors of alignment business-IT is done through the literature review. Furthermore, the alignment business-IT factors, can be used to improve the organization's benefits resulting from IT implementation.

II. METHODOLOGY

This study uses the review literature to obtain the alignment business-IT factors. Furthermore, the factors found are discussed in order to continue the next research. The literature review steps undertaken are: identification of the need of review and research question, search strategy, documenting search, and data extraction.

A. Identification of the need of review and research question

This literature review aims to discover the factors of business-IT alignment on EA. Business alignment - IT factors need to be reviewed and implemented as part of the role of EA. The identification of the business-IT alignment factor is useful to complement the perspective for the EA framework that has not redirected its architectural functionality to the alignment.

The research question is: "What are the factors of business-IT alignment on EA?"

B. Search strategy

The literature search is the activity of selecting the literature and entering the keywords according to the research question. The selected literature sources are:

- Sciencedirect (www.sciencedirect.com),
- Scopus (http://www.scopus.com),
- IEEE Xplore (http://ieeexplore.ieee.org)

The keywords enter into the advanced search facility are "align " AND "factors" AND "enterprise architecture". To get the appropriate literature then add search criteria:

- Word searching of "aligning business-IT" should be in abstract or keyword of studies found.
- Word searching of "factors" should be in abstract or keyword of studies found.
- Word searching of "enterprise architecture" should be in all fields of studies found.
- Searching of publication in between 2012 – 2016.

The steps taken for the filtering of the studies are: (1) Choose both title and keywords of studies that have the words "alignment of business-IT" or "aligning business-IT" or "to align business-IT", which have no removed, (2) Choose abstract of studies that has the word "factors", which has no removed, (3) Read the entire studies contents selected at point (2).Stages of filtering the studies are shown in the following figure 1.

After finding the factors of business-IT alignment in the paper the next step is classify the factors. The classification of factors is done by combining close or similar meanings. The classification of alignment factors is done because almost all selected papers do not express explicitly about alignment factors. Furthermore, the purpose of alignment factors classification is to obtain factors that influence the achievement of business-IT alignment significantly.

C. Documenting search

The literature search results based on the search strategy in section II.B need to be filtered to get the alignment business-IT factors. Three filters were applied to get the selected paper. (1) The selected papers must be related to the keyword, then the paper is placed on the Studies Found. (2) The title and abstract of the paper on the Studies Found should be related to the research question, then the selected paper is placed on Candidate Studies. (3) Papers on Candidates Studies are read to get the substance associated with the research question, then the selected paper placed on the Selected Studies.

From the list of papers obtained then filtered (related to the keyword), selected as many as 180 papers. Of the 180 selected papers then filtered (the title and the abstract was appropriate) and obtained 109 papers. Of the 109 selected papers then filtered (the introduction accordingly) and obtained 17 papers. More details are shown in table 1 below.

TABLE I. SELECTED PAPER DETAILS

Literature Sources	Studies		
	Studies Found	Candidate Studies	Selected Studies
Sciencedirect	41	31	4
Scopus	56	33	7
IEEE Xplore	83	45	7
Total	180	109	18

The results of the literature review of 18 selected papers appear 2 perspectives of factors. There are business perspective and IT perspective. Initially, there are 5 business perspective factors using the word: business process, methodology, modeling, using or EA identification, and strategy. After the classification of factors then the identification factor EA is classified into factor methodology and strategic factor is classified into modeling. Meanwhile the factor of IT perspective there are 2 factors using the word: technology and network. So there are 5 identified the alignment business-IT factors, namely business process, methodology, modeling, technology and network.

Five alignment factors are defined as follows:
(1) Business process is defined as how to analysis and manage business process, (2) Methodology is defined as how to optimally utilize the AE framework, (3) Modeling is defined as how to changing the modeling paradigm (from development to adaptation), (4) Network is define as the ability to use shared sources over a network, (5) Technology is defined as technological capabilities to support the purpose of the application.

D. Data extraction

Demographic analysis is conducted on 18 selected papers. Of the 18 selected papers, there are 9 journals and 9 proceedings. Most of the paper are obtained from IEEE publisher, the journal as much as 3 papers [4][5][6] and proceeding as much as 8 papers [7][8][3][9][10][11][12][13].

There are 24 authors from 10 countries. The most prolific author is Knut Hinkelmann from FHNW University of Applied Sciences and Arts Northwestern Switzerland, as many as 2 papers. The authors most come from Indonesia, as many as 9 authors with amount of paper counted 5 papers [8][9][6][6][13]. There are 6 papers involving authors from several different countries. The country's collaborations are: (1) Switzerland, South Africa, Austria [14], (2) Iran, Netherland, United Kingdom [15], (3) Spain, United Kingdom [16], (4) Luxemburg, Belgium [5], (5) Switzerland, Italy [3]. (6) Portugal, Brazil [10]. The most publish country is Indonesia as many as 5 papers.

Identification literature review produced 3 factors of business-IT alignment. From a business perspective, the identification results in 3 factors of business-IT alignment. From 18 selected papers there were 7 papers as methodology factor [7][8][9][6][11][17][13], 5 papers as modeling factor [4][19][10][18][18], and 4 papers as business process factor [4][19][15][16], affecting alignment function. From an IT perspective, there are 2 papers that identify the technological

factors and network factors, each 1 paper [15][16]. There is one paper that addresses two factors' perspectives [15].

III. RESULT

Of the 18 selected papers, each paper conveys an IT-business alignment factor. There are 23 identifiable business-IT alignment factors as shown in table 2. There are several papers identified 1 factor and other papers identified more than one factors. Table 2 describes the paper title, the alignment factors that appear in the paper, the publication year, and the paper type (Journal/Conference). As in table 2 of lines 5, 7, 10, 16, the papers are identified to have the alignment business- IT factors of more than one factors.

TABLE II. ALIGNMENT BUSINESS-IT IDENTIFIED

No	Title	Alignment factor	Year	Type
1	An Impact…[4]	Analysis of business process	2016	J
2	Proposing …[7]	Continuously applied methodology	2015	C
3	A New …[14]	Modeling	2015	J
4	Process …[19]	Business process management	2016	J
5	Leveraging …[15]	Business Process based on business goal and requirements, Technology support the application	2016	J
6	Inter …[16]	Network collaboration	2015	J
7	Alignment …[5]	Model and Method	2015	J
8	Designing …[8]	Design EA framework	2016	C
9	Supporting …[3]	Strategy	2014	C
10	Building …[9]	Capability of EA, Method	2016	C
11	An OMG …[10]	Modelling	2014	C
12	Stakeholder's …[6]	Identify EA	2016	J
13	Designing …[11]	Using framework EA and IS	2016	C
14	Aligning …[12]	Business Process Management Notation	2016	C
15	Enterprise …[18]	Modeling process	2013	J
16	Managing …[17]	Methodology and tools	2015	J
17	Leveraging …[20]	Modeling	2013	J
18	Enterprise …[13]	Define architecture	2013	C

The following demographic IT-business alignment factors are linked to the EA framework. Table 3 shows the relationship between IT-business alignment factor and Zachman (Z) framework, TOGAF (T) framework, FEAF (F) framework, and Gartner (G) framework.

TABLE III. THE RELATIONSHIP ALIGNMENT BUSINESS- IT FACTORS AND EA FRAMEWORK.

No	Alignment factor	Z	T	F	G
1	Analysis of business process		√		
2	Continuously applied methodology				
3	Modeling	√	√		√
4	Business process management	√	√		√
5	Business Process based on business goal and requirements, Technology support the application	√	√	√	√
6	Network collaboration	√	√		
7	Model, Method		√		
8	Design EA framework	√	√	√	√
9	Strategy	√	√		
10	Capability of EA, Method	√	√	√	√
11	Modelling		√		
12	Identify EA	√	√		
13	Using framework EA and IS		√		
14	Business Process Management Notation				
15	Modeling process		√		
16	Methodology and tools				
17	Modeling	√	√	√	√
18	Define architecture		√		√

There are 9 papers referring to Zachman's framework. There are 15 papers referring to the TOGAF framework. There are 4 papers referring to FEAF. And there are 7 papers referring to the Gartner framework. As explained in section II.C, on the classification of IT-business alignment factors, 20 IT-business alignment factors (table 3, number 5 and number 7 one paper has 2 factors) are classified into 5 factors resulting in Table 4 below.

TABLE IV. THE RELATIONSHIP BETWEEN THE 5 FACTORS CLASSIFIED ALIGNMENT BUSINESS-IT AND THE EA FRAMEWORK

No	Alignment factor	Z	T	F	G
1	Business process		√		
2	Methodology				
3	Modeling	√	√		√
4	Business process	√	√		√
5	Business process	√	√	√	√
6	Technology support the application	√	√	√	√
7	Network collaboration	√	√		
8	Modeling		√		
9	Methodology		√		
10	Methodology	√	√	√	√
11	Methodology	√	√		
12	Methodology	√	√	√	√
13	Modeling		√		
14	Methodology	√	√		
15	Methodology		√		
16	Business Process				
17	Modeling		√		
18	Methodology				
19	Modeling	√	√	√	√
20	Methodology		√		√

Based on table 4 above, the number of each IT-business alignment factor is shown in table 5 below.

TABLE V. PERCENTAGE OF ALIGNMENT FACTORS

Factors	QTY	Percentage of perspective
Methodology	9	45%
Modeling	5	25%
Business process	4	20%
Network	1	5%
Technology	1	5%

Methodology is a factor that dominates the effect of 45% of IT-business alignment. The next is modeling factor affects the alignment of business-IT by 25%, then followed by Business, Network, and Technology factors as big as 20%, 5% and 5% respectively.

IV. IMPLICATON AND CONCLUSION

The results of the literature review look for alignment factor business-IT member give the implications on theory and practice. As theory, an IT-business alignment factors can be used as a reference for research on how to build the EA framework. For the practice, the factors such as business processes, methodology, modeling, network collaboration, technology support the application can be used to optimize IT in support to achieve business objectives.

The largest percentage of factors that influence the achievement of business-IT alignment is a factor of methodology that is 45%. This percentage indicates that EA as a tool is enough to influence the achievement of alignment. Percentage under methodology factor is modeling factor and business process factor. So the goal to achieve the alignment business-IT based on the results of the literature review above, the procedure performed is as follows: choose the correct methodology of the EA, then model it to achieve business-IT alignment. Business process is built after doing methodology and modeling.

V. FUTURE RESEARCH

If categorized the five factors in table 4 above then there are 2 perspectives of business-IT alignment factors. Methodology, modeling, and business processes are included in the business perspective. Meanwhile network and technology are included in the IT perspective. The categorization of business-IT alignment factors is shown in table 5 below.

TABLE VI. PERCENTAGE OF PERSPECTIVE ALIGNMENT

Perspective	QTY	Percentage of perspective
Business	18	90%
IT	2	10%

The business perspective dominates the IT perspective on business-IT alignment. Percentage obtained by business perspective is 90%. Meanwhile the IT perspective is 10%. The acquisition of this percentage gives direction to further research on the perspective of the alignment business-IT factor. Selected papers are more likely to review the elignment business-IT from a business perspective. The dominance of business perspective for business-IT alignment is reasonable because business is the subject of alignment.

The option to conduct further research related to this literature review: (1) Develop research to find the alignment business-IT factors that have been identified from a business perspective (2) The acquisition of a percentage of IT perspective provides a challenge for researchers to explore more in the role of IT to achieve the alignment business-IT.

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