A Systematic Review of Business and Information Technology Alignment

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Business organizations have become heavily dependent on information technology (IT) services. The process of alignment is defined as the mutual synchronization of business goals and IT services. However, achieving mature alignment between business and IT is difficult due to the rapid changes in the business and IT environments. This article provides a systematic review of studies on the alignment of business and IT. The research articles reviewed are based on topics of alignment, the definition of alignment, history, alignment challenges, phases of alignment, alignment measurement approaches, the importance of alignment in business industries, how software engineering helps in better alignment, and the role of the business environment in aligning business with IT. It aims to present a thorough understanding of business-IT alignment and to provide a list of future research directions regarding alignment. To perform the systematic review, we used the guidelines developed by Kitchenham for reviewing the available research papers relevant to our topic.

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1. INTRODUCTION

Alignment between business and information technology (IT) refers to the optimized synchronization between dynamic business objectives/processes and respective technological services provided by IT. Achieving alignment between business and IT has been a critical issue for many years; researchers, business and IT executives, and consultants have seriously considered and worked on this issue from the early 1970s [Luftman et al. 1993; McKeen and Smith 2003]. However, bridging the gap between business and IT has been regarded as difficult by all of these stakeholders for several reasons: a lack of descriptive and prescriptive methodologies to address it (until recently), differences in objectives, rigid organizational structure and culture, and a communication gap, among others [Shan and Kumar 2012]. More specifically, it is exigent for IT to provide services to business organizations when they are rapidly moving towards new goals and objectives [Luftman et al. 1993, 1999; Reich and Benbasat 1996;

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Sauer and Yetton 1997]. As a result, this issue has become a top level concern among business and IT professionals over the past thirty years [Chen 2010; Gartlan and Shanks 2007; Silvius 2007].

In the context of Business/IT alignment, both the fields of business and IT are interrelated, with IT providing services at all levels of the business to enable it to effectively achieve its goals and objectives. To heighten alignment in any business organization, the following aspects need to be addressed: the business strategy must be understood by both business and IT [King 1978]; a strong cultural relationship between business and IT needs to be fostered [Luftman et al. 1999; Pyburn 1983]; a level of successful communication between both groups needs to be sustained [Van and Jong 1999]; IT and business strategies must be understood by both groups [Lederer and Mendelow 1989]; business and IT strategies must be in agreement [Kearns and Lederer 2000]; IT must provide support for the business strategy and vice versa [Haki and Forte 2010]; and last, the people belonging to each group must trust each other [Broadbent and Weill 1993; Kashanchi and Toland 2008]. The literature on alignment suggests that some researchers believe that earlier alignment methodologies failed to capture the real benefits of alignment, due to an unknown or unclear business strategy, rapid changes in the business organization, and poor support from IT [Ciborra 1997; Vitale et al. 1986]. Most researchers regarded these failures as a challenge and undertook invaluable research on alignment through tackling different organizational factors.

The process of alignment has been defined in various ways and it is important to agree on one definition. In this survey article, we adopt the definition of Henderson and Venkatraman [1993] on alignment between business and IT strategies: "Alignment between business and IT is the degree of fit and integration between business strategy, IT strategy, business infrastructure, and IT infrastructure." This definition of alignment is apt because it highlights all the factors involved with alignment, representing what is included in alignment. More precisely, alignment is the degree to which business and IT depend on each other, and share their domain knowledge to achieve a common goal; hence, this definition covers all these aspects.

In this article, we present a systematic review of Business/IT alignment with the aim of providing pointers to future research work. To perform the review, we use the guidelines developed by Kitchenham [2004] to review all available research relevant to our topics.

It differs from the two related papers, Silvius [2009] and Chan and Reich [2007], which are of survey nature, in the following way: we study the Business/IT alignment systematically, including (1) the background of alignment; (2) what business alignment is about; (3) the definition of alignment; (4) alignment motivations; (5) current challenges of alignment; (6) alignment phases/angles; (7) classification of alignment; discussion of alignment measurement approaches; (8) the role of the business environment in alignment, including a discussion of business and business process modeling; (9) successful IT alignment in business sectors; (10) what IT can do to facilitate successful alignment and the reasons why IT might fail in this. We cover software engineering, software product line engineering, component-based technology, business process management, and business modeling tools. These are followed by a summary of the findings and a list of future research directions regarding alignment.

2. THE PROCESS OF REVIEW PLANNING

The proposed systematic review was designed by going through the Kitchenham [2004] systematic guidelines. In this section, we define the overall article review plan, including the research aims and objectives, questions related to this study, research keywords, and a plan of how to search the relevant material on alignment.

2.1. Study Aims and Objectives

As we mentioned, the objective of this article is to thoroughly study the process of alignment between business and IT. A total of ten research questions on alignment have been addressed in order to fulfill the article's aim. Alignment questions are based on the following topics: the definitions of alignment [Broadbent and Weill 1993; Campbell 2005; Henderson and Venkatraman 1993; Luftman et al. 1999; Silvius 2007; Xiang et al. 2008]; the background of alignment [Lederer and Mendelow 1989]; alignment challenges and motivations [Earl and Feeny 1994; Gartlan and Shanks 2007; Luftman et al. 2009; McLean and Soden 1977], phases or levels of alignment [Henderson and Venkatraman 1992]; alignment directions [Broadbent and Weill 1993; Feeny et al. 1992; Kantrow 1980; Kearns and Lederer 2000; King 1978]; alignment measurement approaches [Kearns and Lederer 2000; Luftman et al 1993]; the role of the business environment in alignment; and the success of alignment in different industries. We examine what IT can do to facilitate successful alignment and reasons why IT might fail in this [Elvesæter et al. 2010; Lamsweerde 2001; Tomoyuki et al. 2005; Ullah and Lai 2011a, 2013]; followed by our future research directions regarding alignment. The questions that guided this systematic review article are presented in Table I in Appendix A.

2.2. Search Method and Data Analysis

Once the study questions are defined, it is important to describe the search method and the way the proposed research questions were analyzed. The search method consists of search materials and keywords that are selected to implement the systematic review. Selected sources are as follows: IEEE Xplore, ACM digital library, Science Direct (Elsevier), JSTOR, and others (e.g. Google scholar, Scandinavian Journal of Information Systems, Strategy & Leadership Journal, Sloan Management Review, Journal of Management Information Systems, California Management Review, Oxford University Press, Harvard Business Review, Communications of the Association for Information Systems, JIT, MISQE, MISQ, JCIS etc.). The data was collected by using the following alignment keywords: business and IT alignment; IT and business alignment; alignment level and types; alignment models; link between business and IT; fit between business and IT; synchronization between business and IT; business (roles and issues, organization structure and culture) in alignment; IT (structure and culture, relationship, IT issues) in alignment; software engineering for alignment between business and IT; alignment maturity.

This systematic review was carried out between May 2009 and February 2011. It starts by searching the relevant research papers on alignment using the previously mentioned keywords relating to alignment between business and IT. Different search engines and databases were used to collect the relevant material. Once the data was collected we analyzed it. This process was divided into two phases: first, preselection, which was based on the papers' abstracts and conclusions (a total of 151 papers were selected from a possible 350); second, in-depth analyses were performed on the preselected papers, and as a result, only 116 were selected for this proposed study. A total of 21 papers were selected from ACM Digital Library; 19 papers from IEEE Xplore; 15 from JSTOR; 17 from Science Direct (Elsevier) and 44 were selected from "others."

3. RESULTS

3.1. RQ 1

Before the concept of alignment, the terms *information technology* and *information systems* referred to the employment of hardware and software applications to cope with customer data. Computer software and hardware developers and testers only created

applications for scientific and mathematical calculations. However, with the passage of time, information technology usage evolved into the fields of business and data management, including data retrieval, data analysis and manipulation, and applications that were needed to process business data and nonscientific data. A field of study was needed to establish the link between computer programmers/developers and the business world so that information-based applications could be developed for business and networks.

The concept of alignment between business and IT first emerged early in the 1970s [Luftman et al. 1993; McKeen and Smith 2003]. Since then, this harmony between business and IT has increased over time as IT started impacting every level of the business organization such as the project level, strategy level, planning level, and so on. Today, the alignment concept is one of the most often studied concepts in both industry and academic sectors. However, organizations that were based on traditional business strategies failed to take full advantage of IT. They used IT only to support the back office, or considered it an expenditure rather than a business value enabler [Alter 1995; Brynjolfsson 1993; Henderson and Venkatraman 1993]. To overcome these problems, the idea of alignment was discussed with different terminology being used, including alignment, synchronization, fit, linkage, harmony, integration, and bridge [Gartlan and Shanks 2007; Reich and Benbasat 1996; Teo and King 1996].

Some early alignment methodologies such as Reich and Benbasat [2000] present four factors related to alignment: shared domain knowledge, IT implementation, communication between business executives and IT people, and connection between business and IT strategy planning in order to improve the organization's culture. Furthermore, they cited three factors that influence short-term alignment; but only shared domain knowledge influences long-term alignment between business and IT. Baker [2004] recommends strong leadership to achieve alignment between both groups. In his study, he suggests business executives must confirm whether their firms are aligned with IT or not. After analyzing the results, he found that firms aligned with their IT departments are more successful, compared to those that are not. Luftman provides a descriptive/prescriptive alignment maturity assessment that currently has over one-third of the Globlal 1000 companies reviewed. It comprises six components: communications, value, governance, partnership, technology/infrastructure, and human resources. This research also found a strong correlation between alignment maturity and company performance [Luftman and Kempaiah 2007].

In addition to this, most early alignment approaches found that several organizational factors affect the alignment process. For example, early on in most business organizations, formal business strategies are devised by senior management, which often results in middle and lower level management misunderstanding or being unclear about the company's business plan [Kaplan and Norton 1996; Reich and Benbasat 2000; Wang and Tai 2003]. Informal or clear business strategies are often the result of strong alignment between business and IT. Lederer and Mendelow [1989] recommend that the association between business plans and IT plans can be achieved in three different dimensions namely, plan content, plan timing, and personal involvement. Proper planning in business processes leads to an increase in shared domain knowledge and ultimate alignment. There are a number of other factors that also negatively influence the process of alignment [Choe 2003; Kaplan and Norton 1996; Luftman and Brier 1999; Pollalis 2003] as follows:

— limited involvement of the CEO and CIO in strategy development;
— weak relationship between business and IT;
— communication gap between business and IT;
— short-term planning between business and IT;

— lack of business and IT skills;
— complex organizational structure;
— organizational culture;
— IT used as an organizational tool;
— formal and informal business planning;
— lack of IT belief.

In summary, in this section, the background of Business-IT alignment research has been discussed, including the reasons why researchers study business-IT alignment and the different terminologies used in research on alignment. The literature shows that researchers have drawn attention to the importance of alignment between business and IT for many years, finding that improving the relationship between business and IT departments enhances the value and profitability of the organization. As most early organizations were based on traditional business planning, which resulted in nonalignment between business and IT departments, organizations failed to take full advantage of IT.

3.2. RQ 2

It is widely accepted that the process of alignment is important to organizations for several reasons. The primary advantage is to simplify the overall organizational goals and objectives and to effectively identify the role of IT to better support the organization to achieve its goals and objectives. The secondary benefit is that alignment enables organizations to not only improve their business scope, but their infrastructure as well, by improving their relationship with IT. For several decades, researchers and practitioners have drawn attention to the importance of the alignment process, yet still, in this advanced technological world, the problem remains one of the top concerns of business executives and IT departments [McLean and Soden 1977]. In early work, alignment was studied from several perspectives, such as linking the organization's business plan with the IT plan, ensuring similarities between business and IT strategies, and the fit between business needs and IT priorities.

But the early approaches were ad hoc, given the level of dissatisfaction in organizations regarding their IT departments. These theories have expanded over time and nowadays, researchers point out many points of alignment between business and IT. Early motivation for alignment emerged from a perspective of business and IT strategic planning and long term IT planning. From the perspective of business, it was only divided into top-down and bottom-up processes, for example, on the business side, planning was subdivided into different departments such as HRM, finance, marketing, IT and so on, and from the perspective of IT, the structure of IT was characterized in two parts: hardware and software, to establish a link between business and IT [Earl and Feeny 1994; McLean and Soden 1977]. This structural issue negatively influenced the overall organizational performance, whereas the process of successful Business-IT alignment boosts the economic aspect of organizational performance. Therefore, future plans of the business organizational unit were a practical essential.

Moreover, the business and IT performance implications of alignment have been discussed through case studies, mathematically, and empirically. Several studies have appeared in the literature and their results indicate that organizations that successfully align their business strategy with IT strategy are more successful compared to those that do not [Chan et al. 2006; Choe 2003; Kearns and Lederer 2003; Leede et al. 2002].

In addition, some researchers believe that existing alignment techniques have failed to capture the real benefits of alignment; unknown and in-process business and IT strategies affect the alignment process negatively; business is not a constant entity

as it always changes, which affects the alignment process negatively; IT should drive the business, not follow it and existing alignment methodologies theoretically fail to capture the relationship between business and IT [Ciborra 1997; Vitale et al. 1986]. However, most researchers regard these issues to be alignment challenges and believe that business and IT alignment is possible. The existing alignment techniques and models are mostly business-driven rather than IT-driven; therefore, more attention should be paid to IT in order to determine how IT can better support the organization [Ullah and Lai 2011a]. These problems have motivated alignment researchers and practitioners to study alignment from the IT side rather than the business side; or on both sides. Still, today's researchers point out many alignment challenges, these being: unknown or unclear business strategy [Kearns and Lederer 2000; Khanfar and Zualkernan 2010; Lederer and Mendelow 1989; Palmer and Markus 2000; Saat et al. 2010; Schwarz et al. 2010; Yetton and Johnston 2001], lack of business and IT skills [Chen 2010; Hunt 1993; Pyburn 1983], business and IT authority-based challenges [Van and Jong 1999]; and rapid changes in organizational structure [Bergeron et al. 2004; Broadbent and Weill 1993; Chan 2001, 2002]. Table II in Appendix A summarizes the alignment challenges currently being faced, and their descriptions.

In summary, this section presents a review of the literature related to alignment research motivation and challenges, showing that alignment research emerged early in the 1970s and its challenges varied from time-to-time, as shown in Table II in Appendix A. As a result of these challenges, researchers have been motivated to study business-IT alignment.

3.3. RQ 3

As previously mentioned, the issue of alignment is not new, having been documented over several decades, yet this problem is still the top concern among CEOs and CIOs today. Surveys conducted in 2007, 2008, 2009, and 2010 in different business organizations show that the problem of alignment is real and organizations are heavily dependent on IT services so without aligning business with IT, business success is not possible [Chen 2010; Gartlan and Shanks 2007]. Moreover, in early 2003, the Indian Network Magazine (an Indian Express Group Publication) and the Indian Market Research Bureau (IMRB) conducted a survey on IT strategy issues, finding that almost 80% of Indian CIOs believed that their business objectives and IT were closely aligned [Network Magazine 2003]. The Society for Information Management (SIM) conducted a survey based on data received from 291 organizations on the top concerns of business organizations, finding that Business and IT alignment concerns ranked number one for five consecutive years, 2003, 2004, 2005, 2006, 2007; number two in 1985, 2008; number seven in 1983, 1990; and was ranked as number nine in 1980, 1994 [Luftman et al. 2009]. Table III in Appendix A, summarizes the top management concerns from 2005–2010, showing that the alignment problem was ranked number one each year over this six-year period.

In summary, this section presents a review of the literature related to alignment surveys, where researchers and agencies conducted surveys on different organizational factors among business and IT executives and found that the issue remains one of the top concerns of CEOs and CIOs.

3.4. RQ 4

Business organizations are dynamic systems, in which all components need to be aligned to get results. The term *alignment* has been conceptualized in the literature in several ways: Ullah and Lai [2010] argue that is a dynamic state in which an organization is able to use IT effectively to attain business goals and objectives so that organizational performance can be improved and the organization can compete with

its competitors. Sauer and Yetton [1997] state that the basic principle is that IT should manage in a way that reflects the management of the business. In short, alignment is a process that involves optimizing communication among organizational executives who make the business decisions and IT managers who oversee the technical operations. In other words, alignment is a process where both fields of business and IT are interrelated, where IT tries to provide services at all levels of a business organization to achieve its goals and objectives effectively. Moreover, alignment is not a single entity; rather, it has several phases and each phase represents a specific part of the business organization, such as internal and external phases of alignment [Henderson and Venkatraman 1993].

The process of alignment has been defined in various ways. These definitions are summarized in Table IV in Appendix A with the author's name, the year in which they published their work, their proposed definition, and our comments on each definition as to whether or not it is a complete definition of alignment. However, it is very important to agree on one definition. In this survey article, we espouse the definition of alignment of business and IT strategy provided by Henderson and Venkatraman [1993]: "Alignment between business and IT is the degree of fit and integration between business strategy, IT strategy, business infrastructure, and IT infrastructure." This definition of alignment is attractive for a number of reasons. First, it highlights all alignment factors, including the what and why. Second, it refers to the purpose of the included business factors, their aims, and objectives.

Alignment consists of several basic concepts: on the business side, it includes business planning, business strategy, and the tactical and business operational level; on the IT side, it includes IT planning, IT strategy, and the tactical and IT operational level. Successful alignment between business and IT can bring the following benefits to the business organization: developing strong working relationships [Alice and Lederer 2010; Kearns and Lederer 2000; Kim and Park 2007; Reich and Benbasat 2000], bridging the communication gap between organizational staff [Luftman et al. 1999; Pyburn 1983], aligning structure [Broadbent and Weill 1993; Chan 2002; Pollalis 2003], developing IT governance [Saat et al. 2010], aligning business and IT strategies [Byrd et al. 2006; Campbell 2005; Kearns and Lederer 2000], managing organizational culture-related issues [Campbell 2005; Luftman et al. 1999; Silvius 2009] and improving IT belief within an organization, which has become an increasingly important priority for CIOs and CEOs [Hunt 1993].

The concept of business-IT alignment has been conceptualized in the literature in various ways, where almost all alignment researchers are agreed that the business mission, objectives, and plans that are contained in the organizational strategy must be shared and supported by the IT strategy. This section presented the basic concept of alignment, important definitions of alignment, and provided insightful comments on them.

3.5. RQ 5

This systematic review of alignment between business and IT suggests that the process of alignment can be studied from various directions. These directions are characterized with respect to an organization's strategy, structure, culture, and social direction. Tables V, VI, VII, and VIII below present all possible alignment directions. The tables also contain the names of the authors who defined the directions, the factors that were considered in their study, and a description of the factor.

3.5.1. Strategic Angle of Alignment. Today, companies are heavily reliant on information technology services to improve their business competency in almost all areas of the organization, and to do this, they spend a large amount of the company budget on

IT infrastructure and services. Organizations are continually facing rapid changes in the business environment, particularly in relation to changes in consumer services, technologies and product lifecycles. Rapid innovation and strong market competition has forced organizations to update their business strategies in a speedy manner. For instance, in the 60s, the predominant organizational strategy was to produce quantity, in the 70s to produce low cost products, in the 80s to produce quality products, in the 90s to produce products in less time, and in the 21st century, the strategy has changed towards offering more services [Ullah and Lai 2010, 2013]. The enormous company investment in IT and the rapid updating of business strategies has resulted in top management paying more attention to IT systems and merging IT planning at the strategic level of the business organization.

The concept of business strategy has been widely studied in the areas of business and information technology. According to Mintzberg et al. [2003], strategy can be defined in five different ways: (1) a strategy is a plan used to set guidelines in order to complete an intended course of action; (2) a strategy is a plan used to addresses competition from others; (3) a strategy is a plan that refers to levels of action in organizations; (4) a strategy is a position referring to where and when, and needs to be applied to business actions that could be either internal or external actions of the organization; and (5) a strategy is a perspective that refers to the differing viewpoints of managers when implementing the strategy [Mintzberg et al. 2003]. In short, strategic alignment is the degree to which the IT objectives, mission statement and plans support and are supported by the business organizational objectives, mission statement, and plans. The literature that describes how alignment scholars tackle the issue of strategic alignment is presented in Table V in Appendix A.

3.5.2. Structural Angle of Alignment. It is costly for any enterprise to have a large number of administrative personnel, and managerial controls etc. Therefore, it is important to eliminate unnecessary managerial work within an enterprise. A business structure is a method within which organizations, departments, functions, and people are linked and interact with each other in order to achieve common business goals. In relation to business performance, choosing the right structure for the business is important and requires homework, because not all types of structures are suited to all businesses or people. There are four basic structures: a sole proprietorship, a partnership, a limited liability company, and a corporation. A sole proprietorship is the simplest type of structure, which represents small organizations owned by one person. A partnership is similar to a sole proprietorship, but with more than one individual as the owner. A limited liability company is a legal form of business organization that provides limited liability to its partners or stakeholders. A corporation is the most complicated type of structure to set up and is regulated by the states in which they are registered [Feeny and Ives 1990].

Several methodologies relating to alignment from a structural perspective that have appeared in the literature are presented in Table VI in Appendix A, where scholars have addressed three major issues: (1) rapid changes in business structure—businesses often cause changes within the organization in order to expand business boundaries and boost performance (Business structure is the first thing that needs to be changed when business grows.) (2) business structure is complex—IT is more flexible in a smaller organizational business structures; (3) lack of IT support—business structure needs to be decentralized to align with the organization's units and the organization's projects.

3.5.3. Cultural Angle of Alignment. The concept of business culture became popular in the early 1980s and was derived from the early human relationships view of organizations that arose in the 1940s. Three major elements: shared values, beliefs, and behavioral

norms, are required in order to sustain a strong organizational culture. Moreover, it is widely accepted that companies with strong cultural relationships can achieve better business performance. Culture is made up of a variety of different individuals, where every individual uses specific emotional drives to achieve goals and objectives through work. But everybody's goals are different, objectives are different, emotional drives are different. This mixture of people with different emotions may affect the overall performance of the business organization, therefore it is important for organizations to have strong leadership that aligns all of these individuals in a way to achieve business goals and objectives effectively. After having undertaken a detailed survey of business-IT alignment, the published work on the cultural direction of alignment is presented in Table VII in Appendix A.

3.5.4. Social Angle of Alignment. The social dimension in the business environment consists of several components, such as customs, organizational lifestyles, and the values that describe the society in which the organization operates. This dimension influences the ability of the business organization to obtain resources, services, and functions that boost organizational performance. However, in the context of business-IT alignment, the social direction of the organization relates to the degree to which executives understand and are committed to the business and IT missions, the objectives/goals, and plans [Reich and Benbasat 2000]. There are many social alignment methodologies in the existing literature, as detailed in Table VIII in Appendix A, in which researchers address the following organizational factors: the relationship between the CEO and CIO, shared domain knowledge, communication between business and IT staff, the connection between business and IT planning, IT implementation success, organizational long term focus, and so on.

In summary, the alignment literature clearly indicates several directions of alignment: strategic, structural, social, and cultural. In an organization's strategic directions, researchers normally consider a formal strategy and an informal strategy in order to measure alignment. On the structural side, researchers focus on structure complexity, and rapid changes in organizational structure. On the organizational culture side, researchers investigate the lack of communication between business and IT, weak relationships between business and IT, and low IT belief within the organization. Finally, in relation to the social direction of the organization, factors such as a lack of shared domain knowledge, a lack of business knowledge of IT, and a lack of IT knowledge in the business, are considered. Moreover, the literature shows that significantly more attention is given to strategic and structural alignment compared to social and cultural directions.

3.6. RQ 6

Alignment can be undertaken in several phases, each phase representing a specific part of the business organization, for example, the internal or external phase, department phase, project phase, etc. Figure 1 in Appendix B, details almost all the phases of alignment in any business organization. In the external phase, the business organization is aligned with the business partner or with other similar business organizations including clients, dealers, competitors etc. In the internal phase of alignment, business aligns all its internal departments with each other. This kind of alignment could be organization phase alignment, department phase alignment, upper and lower phase alignment, project phase alignment, system phase alignment, etc. Henderson and Venkatraman [1992] consider both internal and external alignment in their study and argue that both the internal and external phases are important in order to achieve successful alignment. In the external phase of this process, they suggest that the organization must be aligned with other related business organizations, and keep updating

their IT department with advanced technologies, while in the internal phase, the business organization must be aligned with all their related departments.

Galliers [2004] argues that alignment not only deals with internal problems, it must also reflect the company's relationship with its partner organizations, such as customers, competitors, and suppliers. Floyd and Woolridge [1990] said that misalignment between business and IT causes difficulties at the system phase. Formal business strategies are often only executed at the top phase of business management, but business strategy should be implemented at the system phase. Campbell [2005] argues that the implementation of alignment at a lower management phase translates business goals and objectives into individual goals. To overcome this problem, Steven et al. [2006] present a requirement-engineering-based model, where they try to connect the organization's higher level strategy with the lower level. The model helps to identify the organization's goals and objectives at a very early stage by dividing the goals into subgoals. When business and IT work together to achieve a common goal, it is known as project phase alignment, person-to-person association is called individual phase alignment, which is the most important phase of alignment upon which all remaining phases are based, for example the association between CEOs and CIOs. Jenkin and Chan [2006] developed a technique to investigative alignment at the project phase. They explained that project phase alignment is where the project outcome matches with the organization's IT strategy and the project objective. Tan and Gallupe [2006] examined alignment at a very low phase of the organization, finding that the participation of top phase management at a low phase or the sharing of knowledge of higher business management at a lower phase developed strong cultural relationships between the business executives and team management.

In summary, ideally the concept of Business-IT alignment is present at all levels of business organizations, as shown in Figure 1 in Appendix B. The literature shows that most of the early research on alignment approaches focused on upper level alignment, which includes: alignment at the strategic level, planning level alignment, relationship alignment at executive levels, and so on.

3.7. RQ 7

Measurement is an important part of alignment; if alignment can be measured, it is more effective in achieving business goals and objectives, and the more it helps business executives and IT managers identify the reasons for nonalignment. A number of different alignment measurement techniques and models are outlined in the literature, for example, survey-based approaches, quality-based approaches, fit models, and several other models are presented. Going beyond just a descriptive measurement to providing a prescriptive roadmap, however, is fundamental.

Different survey-based approaches to measure alignment are presented in this systematic review. The approaches are based on different questions related to the business organization, their related departments, and information technology. In these kinds of measurement approaches, researchers posed similar questions on the different nature of business organizations and each question was ranked, which can be helpful to measure overall alignment. More detailed surveys provide greater reliability and validity. Burn and Colonel [2000] and Burn [1993] proposed a survey-based framework to align business and IT culture. Their framework was based on a review of the following factors: the culture of the organization, business and IT external strategy, business and IT internal strategy, ongoing business planning both internally and externally, and the relationships that were created between these factors. He argues that measuring culture in any organization is very important and most successful business companies review this process every year, resulting in better alignment. Kearns and Lederer [2000] proposed a questionnaire approach to measure alignment by differentiating an

Information System Plan with a Business Plan (ISP-BP) from a Business Plan with an Information System Plan (BP-ISP). The approach was divided into two parts; each part containing different questions with possible answers on a 6-point Likert scale: strongly disagree, disagree, mildly disagree, neutral, mildly agree, and strongly agree. Both parts of the questionnaire were given to the business executives who completed the first part and directed the second part to the related department, or the relevant person in their organization. The analysis of the responses shows that both groups, business executives and the related departments, have different understandings and don't share their knowledge. They argued that this lack of shared understanding may prevent the business from achieving an advantage.

Bergeron et al. [2004] measured alignment by conducting a survey of 110 medium- and small-sized firms and targeted the following factors in each organization: business strategies and structure, and IT strategies and structure. After receiving the answers to their questions, they ranked the level of alignment of each firm from high to low. If the number of organizations ranked as having high alignment is greater than those ranked low, they considered that overall alignment is nonconflictual, however, if the number of organizations ranked as having low alignment is greater than those ranked high, then they considered overall alignment is in conflict. If the number of organizations ranked as having high alignment is the same as those ranked low, then alignment is considered to be neutral. Moreover, they argued that there was a better impact on organizational effectiveness by providing an exact measurement of alignment, a correct description, and a good explanation of the proposed process. Gartlan and Shanks [2007] explored alignment between business and IT strategy in different business organizations by conducting a questionnaire survey. Ten different factors were considered in their study: relationship, long-term focus, meeting of minds, clarity and consistency, structure, culture, communication, skills, process, and IT as a tool. After examining the survey, they proved the importance of alignment and believe that alignment can bring considerable benefits to any kind of business organization by focusing on the aforementioned factors. Other survey-based alignment techniques [Bergeron et al. 2004; Day 1996; Kantrow 1980; Kearns and Lederer 2003] have also been presented, where mostly researchers measure alignment by comparing IT activities with business activities.

The culture of any business organization is one of the key factors in successful alignment. Reich and Benbasat [2000] conducted work on organizational factors that influence the social dimension of alignment and technology objectives. Four different factors of social dimensions were considered: shared knowledge between business and IT executives, IT implementation, communication between business and IT executives, and the connection between the business and IT planning processes, as shown in Figure 2 in Appendix B. They investigated these four factors of alignment within ten different business units and found that three factors out of four influence short-term alignment. Only shared knowledge influences long-term alignment. Several others studies [Grant 1991] consider the top management factors to measure alignment. Luftman [2000] proposed an approach for assessing Business-IT alignment maturity by considering the following factors: communications, competency/value, measurements, governance, partnership scope and architecture, and skills. The author found that if alignment maturity is understood, the relationship between business and IT can be increased.

This review suggests that most commonly, alignment researchers and practitioners have conducted their investigations on the business side to measure alignment rather than the IT side, virtually ignoring the importance of requirements engineering. Very few requirements engineering frameworks and approaches have been proposed to measure alignment within an enterprise. Bluestein et al. [2004] introduced

a strategy-oriented alignment approach in requirements engineering called SOARE to support the alignment of e-business systems. The approach incorporates the business strategy and low-level business goals in the context of requirements engineering and links high level planning with low level. Moreover, the technique contributes the following benefits for e-businesses: it analyzes the business strategy, introduces the business strategy in the context of requirements engineering, identifies the benefits and limitations of the systems, and helps to evaluate the overall system achievements. Luftman's alignment maturity assessment provides a descriptive/prescriptive tool, which includes both IT and business perspectives.

The concept of alignment has also been discussed through different models. Scott [1990] proposed the very first model to measure the role and position of IT in business at MIT. The model considers the following factors to measure alignment: organizational strategy, structure, and technology, with the author arguing that more investment in IT will increase the revenue of the organization. Venkatraman [1989] proposed an alignment framework for the concept of fit, where he examines six different perceptions of business strategy: moderation, mediation, matching, covariation, profile deviation, and gestalts. The framework describes each perception in the following three areas: how to fit the proposed function, how many variables were used, and the evaluation of included variables. The research only defines and clarifies the concept of fit. Chan et al. [1997] developed a strategic-oriented information system technique based on Venkatraman's alignment approach. The approach supports the moderation model rather than the matching models, and the system approach instead of a bivalent approach. Cragg et al. [2002] collected data from 250 small organizations to measure alignment. For this, they used the matching and moderation approach and argued that the moderation approach is more suitable for measuring IT alignment compared to the others, and the results indicated that small firms with perfect alignment achieved better organizational performance than those that had not. Researchers were motivated by the results found at MIT and continued to pursue research in this area. Henderson and Venkatraman [1992] developed a model called the strategic alignment model (SAM), which is the most widely accepted model in the field of alignment. The model is based on four different strategic domains: the business strategy, organizational infrastructure and process, IT strategy, and IT infrastructure and process, as shown in Figure 3 in Appendix B. This model received support from industry and practitioners. But it also has several limitations, for example, to what extent does business support the IT department. In response, several researchers addressed the limitations of SAM and developed an extended SAM.

Silva et al. [2006] proposed an alignment measurement theory called Strategic Business and IT Alignment (SBITA). This approach validates the alignment framework called SAM, theoretically and practically, in the field of business and IT alignment. Baets [1992] also presented an alignment framework, based on SAM. His framework links different strategy components, namely business strategy, organization infrastructure and process, IT strategy, and IT infrastructure and process. Moreover, he challenges SAM and argues that in the main, business organizations do not have widely accepted strategies and people in organizations are unaware of the business strategy. However, his model is similar to SAM and he measures alignment in similar ways. In addition, the proposed techniques and models are more business-driven than IT-driven, which is the reason why most of the techniques have drawbacks and limitations and alignment still faces problems and challenges. Table IX in Appendix A presents several other alignment measurement models and techniques and their strengths.

In summary, the literature shows that the measurement of alignment is important for several reasons. First, for academics, reliable and valid measures of business-IT

alignment are important if alignment is to be investigated. Second, for practitioners, if alignment can be measured, it can be managed more readily.

3.8. RQ 8

An organization is "a consciously coordinated social unit composed of two or more people that functions on a relatively continuous basis to achieve a common goal or set of goals [Robbins and Judge 2009]." A business organization may have multiple branches over the world and each branch may have multiple departments, for example, finance, marketing, HRM, IT and so on. Establishing links between each business department or providing IT services at all levels of a business organization is critical for several reasons; these reasons are considered to be organizational issues in the literature. Our aim in this section is first to identify the business executive role in aligning business with IT and second, to describe the success rate of IT alignment in different business organizations so that the importance of alignment can be ranked.

Business organizations can play a pivotal role in attaining strong alignment by addressing the following issues: (1) a formal business strategy—in most organizations, upper level management tends to define their business strategy in a very formal way, making it difficult for middle managers and IT to understand, which may cause internal and external communication problems in the company; (2) bridging the communication gap between business and IT—this problem is due to the lack of IT knowledge among business employees, which may result in their gaining only a small benefit from IT; and (3) a lack of IT belief—many business executives and managers may neglect IT's position at the time of business decision-making [Hunt 1993; Tan and Gallupe 2006].

Today, information systems have penetrated almost all aspects of our lives in a wide variety of ways. After having undertaken a detailed survey of the proposed domain, we believe the issue of alignment between business and IT is important to virtually every type of business, for example, banking, medicine, engineering, the education sector, the automobile industry, the garment industry, the technology, industry, and so on [Padmanabhan et al. 2011; Robinson et al. 2012]. Research question 3 of this article presents the ranking of importance of several organizational factors according to surveys conducted in 2007, 2008, 2009, and 2010 and found that the problem of alignment is real, being ranked as the number one concern of organizations [Chen 2010; Gartlan and Shanks 2007; Luftman et al. 2009; Silvius 2007]. As we could not find any existing survey that had been conducted in 2010, we conducted a survey on the same organizational factors in order to rank the issue of alignment for the year 2010.

CEOs and CIOs in ten different industry sectors were approached in relation to participation in the 2010 survey. The industry sectors were: banking and finance, consulting, telecommunication, healthcare, advertising, pharmaceuticals, manufacturing, technology, construction, and education. The questionnaire covered different organizational issues as shown in Table X in Appendix A. The respondents were asked to rate each issue on a five-point Likert scale, where 1 meant *Not at all important*, 2 meant *Slightly important*, 3 meant *Important*, 4 meant *Very important*, and 5 meant *Extremely important*. After collecting the responses, we ranked the issues according to their statistical means; the higher the mean value, the higher the rank of the organizational issue. The ranking of the organizational issues is given in Table X in Appendix A, showing that the alignment issue is the number one issue of concern, according to eight industrial CEOs and CIOs who ranked this issue as *extremely important*, while the CEOs and CIOs in the construction industry and the education sector ranked the issue of alignment as *Very important*.

In summary, in this section, we provided details of a survey conducted on business organizations in order to first, examine the role of top business levels in business-IT alignment; and second, to measure the success rate of business-IT alignment. The survey results show the following: (1) business executives and managers need to contribute equally in order to manage the alignment process; (2) according to the CEOs and CIOs of ten business organizations, real and successful alignment could boost business performance.

3.9. RQ 9

It is widely accepted that organizations frequently face rapid changes in the business environment, particularly in relation to changes in consumer services, technologies, and product lifecycles. In this context of rapid innovation and strong market competition, organizations need an IT system that meets the needs of the business according to the business' expectations, which alternately affects the process of business-IT alignment. The development of a successful IT system not only needs an understanding of system requirements, business activities must also be taken into account before commencing the development phase of the system, therefore goal modeling and business process modeling is required before system implementation, which influences IT to align with business. In this section, we discuss how business goals and business processes can help to develop information systems in context with business-IT alignment.

3.9.1. Business Goals and Goal Modeling. A goal is an organizational action or a set of actions that needs to be achieved and can be defined in terms of various concepts [Lamsweerde 2001]: *goal as maintenance* refers to those organizational goals that are usually high level and must be complied with. These kinds of goals generally map to nonfunctional system requirements; *goal as achievement* represents the objectives of an enterprise or system; *goal as belief* describes the design rationale and enables firms to consider domain characteristics that reflect the decision-making process in the firm or system development phase; *goal as soft* refers to soft goals for which there are no straightforward criteria to determine whether the condition is fulfilled; and the *goal as constraint* are introduced to place a condition on the achievement of a goal.

Time is an important notion that needs to be kept in mind during the development of the system in context with business-IT alignment, because the system needs to be developed in a certain time period (deadline). Therefore, business goal modeling is required before deriving the system requirements. Modeling is a method to explore the goal in depth, as one business goal can carry more than one subgoal and all subgoals are linked to each other, as shown in Figure 4 in Appendix B. Therefore, goals should be prioritized. The prioritization of goals focuses on the status of the goal, for example, which goal is currently perceived to be less important and which is beyond the scope of the business organization and so on. In the context of information system development in the business-IT alignment process, there are differing viewpoints on the concept of business goals and goal modeling, as shown in Table XI in Appendix A.

3.9.2. Business Process Modeling. To accomplish business goals and objectives, employees need to work together. Today, most businesses operate in an ad hoc and chaotic manner and work is completed with no real high-level understanding of how. Therefore, in order to improve business performance, organizations must document their work flow, for example, how work is conducted in the departments. Processes in business are stable key elements that need to be well managed and fit optimally with the business strategy and other related organizational activities. However, managing business processes in context with business-IT alignment research is a difficult task, due to its complexity. It consists of several components: model, business strategy, operations, and so on. The model is used to represent how to capture the company's goals,

objectives, and so on. Business strategies contain organizational rules and guidelines in order to complete the business model. Finally, operations consist of three further components, which include: people, processes, and technology. The lessons learned from the business-IT alignment research are that process supports IT analysts in the derivation of systems requirements, are shown in Table XII in Appendix A.

In summary, the alignment literature shows that researchers have extensively studied the business environment in order to align business with IT. For example, the business environment including goals, goals modeling, business strategy, business process, and business structure has been studied from a system, requirements engineering point of view, which helps IT departments in developing systems according to the business expectations and system, which also helps business organizations in achieving their business goals/objectives effectively.

3.10. RQ 10

One way of achieving alignment is the development of an information system that meets business expectations and helps the organizational actors to effectively meet business goals and objectives. However, the literature shows that information system engineers/developers face challenges in implementing systems that meet modern business expectations in a continuously changing environment; this may result in organizations being misaligned. On the other hand, the analysis of alignment methodologies shows that some companies fail to align with IT due to the following issues.

— Many IT decisions are driven by business executives who have little knowledge of IT, which may result in the company being misaligned.
— In many firms, IT executives who know very little about the business and often don't understand the real needs of the business make the business decisions.
— Business and IT executives are often not in agreement and they do not trust each other, which influences their relationship; consequently, the business organization suffers.

Being software engineering and alignment researchers, in this section, we introduce five different fields: system requirements engineering, component-based system development (CBSD), software product line engineering, business process management, and business process modeling tools for the development of a system in the context of business-IT alignment to address these issues.

3.10.1. Requirements Engineering for Business-IT Alignment. Requirements engineering occurs at a very early phase of the software development life cycle and it produces and fashions a broad range of product-related requirements as a priority in order to develop the product. The main concern of requirements engineering is to identify system and stakeholder requirements. Its process consists of five activities namely [Kotonya and Sommerville 1997]: elicitation, which helps to explore business and user needs, for example, clients, developers, software applications, and so on; requirements analysis, which describes whether the collected requirements are complete or not, as well as checking the feasibility of the requirements; documentation, which manages the stakeholder requirements in document format, a very formal process between the system manager and the customer; validation, which helps the system developers and engineers determine whether the proposed requirements are acceptable or not; and finally, the process of requirements management, which is used to capture the overall system, for example, changes in requirements, tracing, and controlling requirements.

In relation to the requirements engineering concept in the business-IT alignment domain, it is widely accepted that business goals can play a pivotal role in capturing the details of business and system requirements engineering. In relation to this, we

recently proposed requirements engineering-based methodologies for alignment [Ullah and Lai 2010, 2011a]. The methodologies derive the system requirements from the business environment and describe the following aspects of the system requirements engineering process: requirements elicitation, which is used to clarify the organizational goals that the system under consideration aims to develop and the goals that describe the needs and constraints regarding the system under implementation; requirements negotiation, which is used to explore the business goals belonging to stakeholders and helps to define agreement between stakeholders on system requirements; requirements specification, which is used to provide a wider description of the system behavior that needs to be implemented and describes the context of the organization that uses that system; and requirements validation, which aims to ensure the final requirements meet the stakeholders' needs in regard to verification and final approval.

3.10.2. Component-Based System Development for Business-IT Alignment . Developing an IT system in a rapidly changing business environment is a difficult task. Component-based development technology supports fast and reliable development processes. The concept of component-based development is not new. A traditional development of complex systems has always begun with the requirements analysis phase, which includes procedures, methods, classes, functions, blocks, and so on. More specifically, the procedure of reducing complexity and reusability has been used for several years. However, recent changes in component-based development techniques boost the information system development process. It provides support for reusing components, maintaining and uploading components, as well as replacing components [Heineman and Councill 2001].

3.10.3. Software Product Line Engineering for Business-IT Alignment (SPLE). SPLE technology demonstrates the process of developing a variety of IT products for a low cost in a very short period of time and with excellent quality. In the context of IT alignment with business, the features of SPLE can play a pivotal role. As most business organizations spend an enormous amount of money enhancing their IT department's performance, their expectations of IT also increase. On the other hand, expenditure on IT affects the company's revenue, which is the reason business executives constantly look for cheap technology. The main reason for introducing SPLE in the field of alignment is the reduction of cost. When product line members were reused in several different kinds of tasks, for example providing support to business organizations in current projects, in process projects, and in new projects, this implies cost reductions for each task [Berenbach 2006; Donohoe 2006; Knauber et al. 2005; Linda and Jones 2005; Schmid et al. 2006; Scott and Dager 2007].

It is the nature of business to expect excellent service within a demanding timeframe. SPLE technology helps to test every member of a product line on more than one platform, thereby assuring significant quality of every member through detecting faults and correcting them, consequently improving the quality of the overall IT system. It is often difficult for IT to support business organizations on time, because of development time differences between both groups. SPLE technology takes a great deal of time to initially develop the system, but after having completed the first stage, the time to develop or to maintain the service is considerably shortened as many members of SPLE can be reused for each new or existing service. Due to the increasing demands for organization services, the complexity of IT development systems increases, especially for the software part of the IT system, where program code size and complexity sometimes contributes to slowing the overall speed of the system. SPLE technology facilitates the reusability of product members throughout the development of the whole system and helps to reduce complexity significantly. The technology provides a platform that describes which components or members can be reused, and where.

The process of reusing the common components from the platform reduces the error and development time which may help develop a strong relationship between business and IT.

3.10.4. Business Process Management . The business process is a series of business activities within an organization that lead to a specific business output. A business process identifies the needs of the consumers and provides a service that fulfils consumer needs. Overall, the business process is essentially a set of interconnected processes that function in a rational flow to ensure the ultimate business goals and objectives are met [Ullah and Lai 2010]. However, managing the business process in the organization is a complex task, which can negatively affect the alignment process between business and IT. The term *business process management* (BPM) is a systematic approach to managing the organizational process, making it more effective, efficient, and reliable so that changes in the business environment can be managed.

The main goals of BPM are as follows: it reduces human error, reduces the communication gaps among organizational staff, and structures the business workflow in a way that the organizational goals can be achieved effectively. In BPM, two different languages: Business Process Execution Language (BPEL) and Business Process Management Notation (BPMN) can be used to bridge the communication gap between IT and business. Both are standard modeling languages and are easy to work with, therefore business managers can quickly and easily design processes.

3.10.5. Business Process Modeling Tools. Business process modeling in the field of business and information system engineering is an activity to represent organizational processes, so that current process can be managed, analyzed, and improved. Today's literature presents several business process modeling tools, which are very useful in managing business processes in a rapidly changing business environment. The most popular modeling tools are as follows: (1) Six Sigma, which is designed to improve organizational performance through identifying and improving a specific area of strategic business processes; (2) SWOT Analysis, which is a well-accepted process modeling tool for analyzing a business environment and its resources. It is commonly used as a part of business strategic planning by identifying strategic internal strengths and weaknesses, and opportunities and threats in the external business environment; (3) Balanced Scorecard, which translates the organizational strategy into four perspectives: financial, business processes, learning and growth, and customer.

In summary, the literature shows that most of the existing alignment approaches are business driven and little attention has been given to IT-driven solutions for alignment. This section introduced five software engineering and business environment-based techniques: requirements engineering, component-based technology, software product line engineering, business process management, and business process modeling tools in order to improve IT department services so that it better fits with business departments.

4. A SUMMARY OF THE FINDINGS

The process of successful alignment between business and information technology not only helps to establish a strong working relationship between organizational departments, it also helps in increasing overall organizational performance. Our findings of this review are described in the following.

First, it is found that the process of alignment varies with the size of the organization. Implementing alignment methodologies in small-sized business organizations is much easier than in large ones. The results indicate that when smaller sized firms are strongly aligned with their IT departments, there is a more positive influence on their businesses performance, compared to large organisations. However, it is

somewhat debatable how authors differentiate small and large business organizations. Tan and Gallupe [2006] argued that successful alignment is easier to achieve in smaller sized businesses than larger ones due to the fact that communication tends to be more effective in smaller business organizations and every member of a small organization tends to perform their role more efficiently, which results in a good level of alignment. Luftman and Brier [1999] pointed out in their study that the process of alignment differs depending upon the size of an organization. In small business, fewer resources are required to maintain the process of alignment compared to larger companies.

Second, the notion of alignment between business and IT has been widely studied by researchers under different terms, which include: alignment, synchronization, linkage, fit, integration, and bridge. The term *alignment* is the process where business and IT work together to achieve a common business goal [Campbell 2005]. Synchronization refers to the optimized synchronization between dynamic business objectives/processes and respective technological support by IT [Ullah and Lai 2011a]. The term linkage is the degree to which the IT mission, objectives, and plans support, and are supported by, the business mission, objectives, and plans [Reich and Benbasat 1996]. Henderson and Venkatraman [1993] and Venkatraman [1989] define alignment as the degree of fit and integration between business strategy, information technology strategy, business infrastructure, and information technology infrastructure. Finally, Ciborra [1997] defines alignment as a bridge between business strategy and IT infrastructure.

Third, alignment has been studied in relation to short-term and long-term alignment, where short-term alignment refers to the state in which business and IT executives and managers understand and are committed to each other's organizational short-term plans, goals, and objectives. Long-term alignment is defined as the state in which business and IT executives and managers understand and are committed to each other's organizational long-term plans, goals and objectives. Reich and Benbasat [2000] studied five organizational factors, which include shared domain knowledge, IT implementation success, communication between business and IT executives, connections between business and IT planning, and shared domain knowledge. Their study found four factors that influence short-term alignment, but only one factor, shared domain knowledge, was found to influence long-term alignment.

Fourth, organizations are continually facing rapid changes in the business environment, particularly in relation to changes in consumer services, technologies, and product lifecycles. In this context of rapid innovation and strong market competition, organizations need to change their business strategies and processes, which need to be continually improved and evaluated. These rapid improvements to, and evaluation of, business strategies adversely influence the process of alignment. Several alignment scholars believe that earlier alignment approaches failed because they didn't incorporate the main advantages of alignment, due to an unknown or unclear business strategy, rapid changes in the business organization, and poor support and services from IT. Ciborra [1997] suggests that the alignment process is too theoretical and alignment methodologies do not work due to unclear and uncertain business goals. Vitale et al. [1986] point out that the business environment changes quickly and that in such an environment, the process of alignment must occur quickly, which does not allow businesses enough time to adjust to the changed business environment.

Fifth, the process of alignment requires continued evaluation; therefore this issue has been studied by researchers through considering different business organizational factors. The most studied factors are as follows: business and IT strategies, business process and process modeling, information system engineering, social and cultural relationships between business and IT, effective communication, IT investment, business and IT working relationships, structural differences between business and IT,

sharing domain knowledge, governance, business and IT planning, formal and informal business planning, organizational performance measurement, lack of IT belief etc. [Broadbent and Weill 1993; Chan 2001; Choe 2003; Haki and Forte 2010; Kaplan and Norton 1996; Luftman and Brier 1999; Pollalis 2003; Saat et al. 2010; Yan and Tan 2009].

Sixth, the process of alignment has several phases, where each phase represents a specific part of the business organization, for example, the internal or external phase, department phase, project phase, etc. In the external phase, the business organization aligns with the business partner or with other similar business organizations including clients, dealers, competitors etc. In the internal phase of alignment, business aligns all its internal departments with each other. Henderson and Venkatraman [1992] argued in relation to the external phase of alignment that organizations must be aligned with other related organizations, dealers and competitors, while in relation to the internal phase of alignment, the business organization must ensure all its internal departments, such as marketing, human resource management, finance, information technology department are aligned.

Seventh, alignment will be more successful in meeting the organization's goals and objectives if it is measured. The literature shows that alignment can be measured in various ways: in respect to an organization's strategy [Byrd et al. 2006; Campbell 2005; Kearns and Lederer 2000], structure [Chan 2002; Pollalis 2003], culture [Campbell 2005; Luftman et al. 1999; Silvius 2009], and social direction [Reich and Benbasat 2000; Reich and Kaarst 2003]. In relation to the organization's strategic directions, factors such as formal business and IT strategy were considered in terms of alignment. In relation to the organization's structure, scholars considered complex structures, and rapid changes in structure. In relation to the organization's culture, they examined a lack of communication, weak relationships and a lack of IT belief within the organization. In relation to the social aspect of the organization, factors such as a lack of shared domain knowledge, a lack of IT knowledge in the other departments of the organization, and a lack of business knowledge in the IT department were considered.

Eighth, as most of the existing alignment methodologies are business driven rather than IT driven, researchers provide alignment solutions from the business environment side. IT staff often have difficulty understanding business goals and objectives and a lack of information on business goals may hinder the development of IT systems that meet the expectations of the business, hence alignment suffers. Ullah and Lai [2010] presented a requirements engineering-based alignment approach for IT to better understand system requirements, where system requirements are automatically generated from business processes. Their study results indicate that providing an alignment solution from the IT side helps IT managers and engineers (1) develop an understanding of business goals and objectives among IT staff; (2) derive accurate system requirements from the business environment that positively influence the process of developing a system according to the business needs; and (3) establish long-term working relationships between business and IT departments, which enables IT to provide quick technology-related services to business.

Ninth, alignment is not a single entity that is fixed with the press of a button. It faces several challenges which include: unclear and formal business strategies, skill differences between business and IT staff, a lack of IT awareness among business staff, a lack of business awareness among IT staff, a lack of IT belief, cultural and social differences between business and IT, structural differences between business and IT, and a lack of shared domain knowledge, etc. A failure to focus on all of these considerations will inevitably end up in lower alignment maturity. Reich and Benbasat [2000] stated in their research that the issue of shared domain knowledge between business and IT executives was the strongest predictor of the social direction of

alignment. When shared domain knowledge is high between business and IT executives, communication between them is strategic and frequent, which results in a high level of alignment.

Tenth, the development of a successful IT system in the context of alignment between business and IT not only needs an understanding of system requirements, business activities must also be taken into account before commencing the development phase of the system, therefore goal and process modeling is required before system implementation. Ullah and Lai [2011a] proposed a business goal modeling approach to improve alignment and recommended that successful business goal modeling helps IT to better understand business requirements. Cardoso et al. [2009] proposed a business process modeling model for alignment and found that modeling business processes is a conventional practice in the area of alignment between business and IT that facilitates problem comprehension, helps customers understand their own business process, and reveals how the system will meet the needs of the process.

Eleventh, in relation to the history of alignment, the concept of alignment first appeared in the early 1970s and since then, researchers have investigated this issue by studying various organizational factors. However, bridging this gap is still regarded as difficult by IT researchers and business executives, because organizations are continually growing in size and becoming more complex, hence continual improvement in alignment between business and IT departments is necessary. Gartlan and Shanks [2007] and Chen [2010] conducted surveys on different business organizational factors, showing that the problem of alignment is real and is ranked as the top concern among business and IT executives. Luftman et al. [2009] conducted a survey based on data collected from 291 business organizations on their top concerns, finding that alignment concerns are ranked number one.

Twelfth, one way of achieving alignment is the development of an information system that meets business needs. Software engineering-based fields such as requirements engineering classifies the system requirements into several phases: requirements elicitation, which explores the customer's needs, requirements analysis, which describes the completeness of requirements, requirements documentation, which organizes customers' requirements in document format, requirements validation, which describes the acceptability of system requirements, and requirements management, which manages the development of the overall system. Moreover, component-based development and software product line engineering technologies are suitable in managing rapid changes in business goals and objectives and enable IT departments to provide quick services to business.

Thirteenth, monitoring an alignment process means gaining enough information about the business goals and objectives to know when deviations to the organizational performance have become serious enough to warrant corrective actions, where corrective actions refer to the realignment of business and objectives. Realignment can be defined as a method of managing the rethinking and redesign of business goals and objectives to achieve a dramatic improvement in organizational performance, product quality, speed in the delivery of organizational services, and improvement in IT support [Marx et al 2011]. Avison at al. [2004] proposed a practical tool designed to direct business and IT management alike towards the most productive utilization of IT resources. This tool helps monitor and track the alignment process, preempts a change in business strategy, and develops a new alignment perception by realigning business and IT resources.

Fourteenth, alignment has been studied in relation to several organizational factors, for instance, Bergeron et al. [2004] proposed an alignment pattern approach based on the Gestalt perspective of fit and theory-based ideal coalignment, where fit between business and IT strategy and fit between business and IT structures was studied. The

results indicate that low performing firms show a conflictual coalignment pattern of business strategy, business structure, IT strategy, and IT structure that distinguished them from firms that achieved high performance. Sabherwal and Chan [2001] also studied the patterns of business strategy, business structure, IT strategy, and IT structure in order to evaluate alignment between information systems and business.

5. CONCLUSIONS AND FUTURE RESEARCH DIRECTIONS

In this article, we have presented a systematic review of Business/IT alignment by finding answers from the research literature to ten review questions. Based on this review, we identified that most of the journal and conference papers we have studied provide alignment solutions from the business perspective and little attention has been given to IT-driven solutions for alignment. Other findings are as follows: (1) alignment is not a single entity that can be fixed easilly, and it varies with the size of an organization; (2) the notion of business-IT alignment has been widely studied by researchers under different terms, which include: alignment, synchronization, linkage, fit, integration and bridge; (3) alignment has been studied as two types, short-term and long-term alignment; (4) researchers studied this topic through considering different business organizational factors; (5) alignment has several phases, where each phase represents a specific part of a business organization, for example, internal or external phase, department phase, project phase, and so on; (7) alignment will be more successful in meeting an organization's goals and objectives if it is measured and alignment can be improved if IT developers are able to develop systems that meet business needs. Last, to fulfill the aim of this article, we provide a list of future research directions.

Modeling the business environment for alignment. First, from Business-IT alignment research, we have learned that rapid changes in business goals negatively affect the process of alignment between business and IT, as businesses require less time to move to another goal but IT requires more time to support the new goal. Modeling is a method to explore the goal in depth, as one business goal can have more than one subgoal and every subgoal is linked to the others. The alignment domain is currently seeking techniques that model business goals in order to clarify and explore the links of each subgoal. Ullah and Lai [2010] presented a requirements engineering-based alignment approach, where business goals are modeled in the context of system requirements engineering. Two main methodologies were utilized. (1) UML sequence diagrams to resolve errors or conflicts among requirements; and (2) UML state diagrams, which represent a true picture of business goals and explain exactly what the system has to do and how it should be done. The authors suggest that business goals should be modeled prior to generating system requirements so that IT departments are able to meet business needs on time. Moreover, Gordijn et al. [2006] pointed out that business goal modeling enables IT analysts to examine the business requirements at an early stage of system development. They found that the challenges of modelling business goals in the context of aligning business with IT are the organizational actors, as actors have their own goals and beliefs and each actor is connected to another, making them hard to explore.

Measurement of alignment. Scholars divide organizational alignment into four phases: strategy, structure, culture, and social. In regard to an organization's strategic directions, researchers normally consider a "formal strategy" and an "informal IT strategy" in order to measure alignment. On the structural side, researchers focus on "structure complexity," and "rapid changes in organizational structure." On the organizational culture side, researchers investigate the "lack of communication between business and IT," "weak relationships between business and IT," and "low IT belief within the organization." Finally, in relation to the social direction of the organization,

factors such as a "lack of shared domain knowledge," a "lack of business knowledge of IT," and a "lack of IT knowledge in the business" are considered. However, some other organizational components need attention such as: business goals, business processes, business requirements, and business projects [Gordijn et al. 2006; Ullah and Lai 2010].

Alignment as fit. Research into the measurable impact of business-IT alignment on business performance has been conducted from the viewpoint of a strategic alignment fit and a structural alignment fit between business and IT. Bergeron et al. [2004] suggest coalignment is a developing process that needs to be changed continually; therefore, future research should be based on the multiple criteria of managing organizational performance and should adopt a dynamic instead of static perspective, and a longitudinal investigation of organizational performance instead of cross-sectional relationships of fit. Yetton and Johnston [2001] direct the attention of researchers to investigate specific forms of management structures and processes, and IT systems, which are required to drive strategic fit. Palmer and Markus [2000] found the following in their empirical approach: (1) there is no match between IT usage and business strategies; (2) there is no link between the firm's performance and strategic alignment; and (3) there is little variation in business and IT strategies. They suggest that alignment researchers should refine their theories. Moreover, research into the impact of business-IT alignment on business performance has been conducted in terms of two types of alignment patterns: strategic fit of alignment between business and IT and structural fit of alignment between business and IT, but so far, there is no published work on the impact of business-IT alignment on business performance that includes strategic fit, structural fit, social fit, and cultural fit between business and IT.

Alignment between the education and organization sector. Existing alignment measurement methodologies and models have been implemented in several different organizational sectors. For example, Broadbent and Weill [1993] studied the banking sector to measure strategic alignment between business and IT. Ullah and Lai [2011a] studied the automobile sector to model business processes and generate system requirements in the context of alignment between business and IT. Yetton and Johnston [2001] studied the health sector and found that IT management dilemmas experienced by numerous health information systems include extremely challenging budgetary pressures and conflicting priorities. However, so far, no consideration has been given to the point of view of higher education. There is a need to measure the issue in the education sector, as the education sector is the front line partner of organizations, being responsible for producing skilled graduates who will one day be future business and IT managers. In this context, it is important that postgraduate students in IT and business develop an understanding of alignment before graduating and joining an organization.

Strategic alignment. Strategy is not a single entity in business; rather, it has several phases, such as strategy at the top business level, strategy at the managerial level, strategy at the business operational level etc. Future research can be conducted on aligning each business strategy level with the IT department strategy level. Henderson and Venkatraman [1992] recommend that IT support for business strategy is a major direction of strategic alignment between business and IT. If the IT department in an organization is flexible enough to accept changes from business, it can support both current and future business strategies. Yujie and Xindi [2010] suggest IT strategic planning is based on business strategic planning, which determines the IT architecture future. Haki and Forte [2010] direct researchers' attentions towards a service-oriented architecture-based solution for strategic alignment. The authors suggest governance should help business to align with IT, as well as provide help in aligning

IT investments with organizational objectives. Sabherwal and Chan [2001] found that information system flexibility can ensure constant support for business strategies and can guarantee reliable organizational performance. Lederer and Mendelow [1989] suggest information business and IT strategies as future research on strategic alignment, because formal business strategy is hard for IT to understand, which may result in the business strategy being unclear to the IT department. Similarly, IT formal strategy is hard for business to understand. Veres et al. [2009] suggest business-driven strategic alignment solutions should become IT driven. The authors present a requirements engineering-based model called B-SCP, which enables the verification and validation of requirements in terms of business-IT alignment and support for business strategy.

Structural alignment. Structural alignment determines the degree of structural fit between business and IT, particularly in the following areas: (1) business and IT decision making; (2) reporting relationships between business and IT; (3) decentralization of IT services and infrastructure; and (4) deployment of IT personnel. Alignment researchers suggest the following future research directions of structural alignment. Broadbent and Weill [1993] found that compatible organizational structure and strong strategy ownership is important for successful alignment. However, the importance of the match between organization and responsibility measures and strategic orientation needs to be further illustrated at the functional level of business and IT structure. Earl [1989] recommends the decentralization of business processes to establish strong alignment between the organization's units and the organization's projects. Pollalis [2003] suggests business executives decentralize the overall business into smaller units, as IT is more flexible with smaller organizational business units compared to large ones. However, alignment researchers should explore IT flexibility in large business units and identify why most of the time, IT fails to provide services in large organizations. However, Pyburn [1983] directs researchers towards a centralized IT structure and found that companies are more successful or achieve a greater degree of alignment if they have a centralized IT structure compared to companies that do not.

Cultural alignment. It is widely accepted that for business organizations to move forward, all the people involved in the business must have a common understanding of the organization's mission, goals, and objectives. If an organization's culture is aligned, it reflects positively on the organization's vision, mission, and values. Alignment researchers suggest the following future research directions regarding cultural alignment between business and IT. Pyburn [1983] draws researchers' attentions towards cultural fit between business and IT at the phase of business strategy planning to achieve successful alignment. Van and Jong [1999] presented a methodology named the Balanced Business Scorecard to integrate business and IT departments and found that a lack of communication or differences in thinking between business and IT staff influence alignment in negative ways. The authors pointed out two limitations of the Balanced Business Scorecard that need to be further investigated: first, the Balanced Business Scorecard does not implement business and IT integration by itself, rather, integration can only occur when there is a high level of cooperation between all organizational staff which enables business managers to share information about business planning with IT managers and for IT managers to share information about IT strategy with business managers. Second, business organizations require skilled staff in order to use an integrated Balanced Business and IT Scorecard. Therefore, future research can be conducted on clarifying the fundamentals for integrating business with IT in terms of culture, skills, and responsibilities.

Social alignment. The social direction of alignment refers to the degree to which executives understand and are committed to the business and IT missions, the

objectives/goals, and plans. Alignment researchers suggest the following future research directions for social alignment. Reich and Benbasat [2000] investigate the influence of four organizational factors on the social dimension of alignment between business and IT. These factors are: shared domain knowledge between business executives and IT executives; IT implementation success within the organization; communication between business executives and IT executives; and connections between business and IT planning. Their study results indicate that all four factors were found to influence short term alignment between business and IT, however, one factor (shared domain knowledge between business executives and IT executives) was found to influence long term alignment. The authors suggest the following research directions: (1) business and IT practitioners and alignment researchers should direct their efforts towards understanding shared domain knowledge between business executives and IT executives, as this factor has a strong influence on the alignment of business and IT executives; (2) alignment researchers should investigate the factors of "trust" and "commitment" in the context of the alignment of business and IT executives; (3) researchers should investigate the creation of an IT vision. Feeny et al. [1992] recommend further investigation into understanding the CEO and CIO relationship in small-sized firms, where relationships exist in the context of cultural alignment.

Maintaining/developing alignment. First, successful alignment can increase organizational performance and enhance an organization's reputation in the marketplace; however achieving strong alignment is a complex task on which researchers have worked for many years, and today we have countless alignment methodologies. However, these methodologies are ad hoc, given the level of dissatisfaction with regards to maintaining strong alignment. Consequently, new alignment methodologies that define a proper link between business and IT are required. Croteau and Bergeron [2001] suggest that future research should incorporate minor and major adjustments to alignment measurement models and approaches. Many other scholars argue that alignment methodologies have failed to capture the real benefits of alignment and recommend further investigation. Their arguments about existing alignment methodologies are as follows: unknown and in process business and IT strategies affect alignment process negatively; business is not a constant entity, rather it constantly changes, which affects the alignment process negatively; IT should drive the business, not follow it; and existing alignment methodologies are theoretical and fail to capture the relationships between business and IT [Ciborra 1997; Vitale et al. 1986]. Second, existing alignment methodologies are for a specific type of organization. For example, methodologies that are developed to align small-sized organizations are not suitable for medium and large-sized business organizations and vice versa. Researchers should consider methodologies that are appropriate to all sizes of business organizations. Third, mathematical alignment measurement models (matching, profile deviation) are used most frequently in the information system literature. We would like to see the concept of fit, which explores alignment measurement using theoretical techniques (covariance and gestalt) that has not, to date, received much attention from researchers [Bergeron et al. 2001].

Realignment. Business environments change rapidly, which also necessitates changes in business goals. If business goals are changed, the alignment process needs to be realigned. So far, alignment has been studied in relation to establishing alignment between business and IT in newly structured firms, measuring the strength and weakness of alignment in already structured firms, and firm performance. However, no work has been published on how to perform realignment, therefore alignment researchers should take immediate action on how to realign business and IT departments. The process of realignment has several stages: (1) define the problem that entails identifying stakeholders, understanding stakeholders' needs and identifying the

required changes; (2) examine alternatives that could be used to identify all possible solutions for implementing change; (3) integrate system requirements by linking the newly developed changes into the existing ones; (4) assess the overall alignment performance; and (5) reevaluate alignment continually.

Information system development in the context of alignment. First, the development of a system according to business expectations requires well-managed system requirements engineering in a shorter time frame. This could be possible if IT researchers are able to automate the process of generating requirements. Second, the development of a successful IT system in the context of the business-IT domain not only needs a well-managed systems requirements engineering process, the business environment (e.g. business strategy, business planning, business goals, business objectives, business process, etc.) also needs to be taken into account before commencing requirements engineering. Therefore, researchers must direct their attention as to how to model business goals and processes in the context of the development of a system that meets the needs of the business. Third, system requirements engineering researchers often study the issue of alignment to better understand several aspects of requirements engineering such as requirements elicitation, requirements modeling, and requirements identification. So, there is an opportunity for the system requirements community to study other aspects of requirements engineering such as requirements documentation, validation, analysis, negotiation, requirements evolution and so on, in the business-IT alignment domain. Fourth, the existing systems do not support change or reengineering, due to poor development techniques. There are software engineering techniques such as components-based development, and software product line engineering that can support change in the system or system reengineering.

Security management in the enterprise. For the last twenty years, managing security-related concerns has increasingly impacted the implementation and deployment of information systems in all sizes and types of business organizations. These issues relating to security negatively affect the alignment process. Ullah et al. [2011b] draw researchers' attention towards managing security-related issues in business organizations to improve the alignment process. They present a requirements engineering-based approach to model and map the issue of information security at an early stage of the system's development life cycle in the context of alignment between business and information systems. Authors suggest further investigation in assessing the approach with one or more industry processes in order to improve the sustainability of the approach and to enlarge the approach in regard to the complete identification of security goals and constraints within the entire business organization. Researchers must take immediate action on this issue, as the number of organizations moving towards e-business is increasing every day and security is an important feature of e-Business.

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