

An integrated model for formulation, alignment, execution and evaluation of business and IT strategies

Sarandis Mitropoulos

Department of Regional Development,
Ionian University,
Filosofon & Tzeveleki Str., Lefkada 31100, Greece
Email: smitropoulos@ionio.gr

Abstract: New global markets operation strongly depends on information technologies which radically influence the business strategies of enterprises and organisations. Towards this direction, this paper proposes an effective integrated architectural model and framework for the purpose of formulating, aligning, executing and evaluating in a combined way both business strategy and information technology strategy. In order to achieve this goal, key concepts and respective frameworks, such as the strategic alignment, the balanced scorecard, the strategic architecture, and the business architecture are thoroughly investigated. Then, we progressively integrate all of them in one model in order to eliminate the weaknesses of the previous models and provide the enterprises and the organisations with an innovative, useful and applicable tool. The proposed model can lead to high business performance, agility and consistency in decision making, improved resource control, refinement capability via feedback mechanisms, increased coordination, quality of service, and positive financial results.

Keywords: business strategy; strategic alignment; balanced scorecard; BSC; IT strategy; strategic architecture; business architecture; systems/technology.

Reference to this paper should be made as follows: Mitropoulos, S. (2021) 'An integrated model for formulation, alignment, execution and evaluation of business and IT strategies', *Int. J. Business and Systems Research*, Vol. 15, No. 1, pp.90–111.

Biographical notes: Sarandis Mitropoulos is an Associate Professor of MIS in the Regional Development Department at Ionian University. He has been a Senior Researcher in the Informatics Department at University of Piraeus since 2004. From 2002 to early 2018, he had been a special scientist in Informatics in a bank supervised by the Greek Ministry of Finance. He holds a PhD from NTUA in Integrated Distributed System Management. He holds an MBA for Executives from AUEB. He has worked as a Technical and Project Manager, as well as Business Development Manager in projects of integrated solutions in the areas of IS, technology management, advanced telematic services and security.

1 Introduction

Modern enterprises and organisations due to the strong competition in the operation of global markets need to formulate a flexible and adaptive business strategy in order to respond quickly to market changes. Furthermore, in the new digital era, as *information technologies (ITs)* play an important role in many business tasks such as in product innovation, customer-supplier relationships, strategic alliances, product customisation, continuous business process improvement, etc., more efficient synchronisation between IT strategy and business strategy with continuous evaluation is required (Lerner, 2015). In this paper, we explore this problem in order to provide a framework and a methodology for an integrated IT strategy and business strategy formulation, alignment, execution and evaluation.

In this paper, the formulation of an IT-enabled business strategy which must consider the technology potentiality and dynamic development, as well as the new market operations that are technology-driven, are first discussed. The main business strategy principles that must be abided by all the enterprises and organisations, although they are technology-driven, are also presented (Section 2).

Next, the key issues for the formulation of an effective IT strategy which must promote the overall business strategy are presented. For this purpose, the role of IT within a corporate or organisational environment is clearly defined (Section 3).

In practice, bad decisions on formulation of business and IT strategies usually lead to misalignments and conflicts between them. The remedy of such problematic situations requires appropriate alignment methods and feedback mechanisms from various organisational and business perspectives (Coltman et al., 2015).

After presenting the concept of strategic alignment (SA) which concerns the joint governance of business and IT strategies, the intent and the scope of SA per enterprise type, as well as the respective architectural models per alignment perspective are presented (Section 4).

In fact, nothing can be achieved without evaluation of the strategic management decisions. Towards to this direction, a framework is required for both strategy mapping and strategy evaluation. This mapping is needed in order to localise gaps and misalignments within a strategy, while the evaluation is needed for measuring the efficiency of strategic decisions. Balanced scorecard (BSC) has been proved a very successful framework towards this direction (Kaplan and Norton, 2000a, 2000b). Thus, the BSC of Kaplan and Norton (2000a, 2000b) is thoroughly presented (Section 5). Both SA and BSC are combinedly used in the development of our integrated model.

Afterwards, towards to the direction of building-up the proposed integrated model, we go one step beyond by investigating and presenting two other very useful frameworks, the 'strategic architecture' and the 'business architecture (BA)' (Section 6). The strategic architecture (Littler et al., 2000) formulates a strategic direction within an organisation in relation to the main business components. However, it lacks the concepts of implementation and alignment. In order to fill this gap, the BA (Versteeg and Bouwman, 2006) is suitable for supporting the implementation of strategic business decisions and focuses on specify this in a very structured way. In addition, the BA framework can include performance measurements for the evaluation of strategy implementation (Shen et al., 2016).

The problem with all these models is that they provide only a viewpoint of the overall problem solution which is the joined formulation, alignment, execution and evaluation of business strategy and IT strategy. Top management executives need a framework which will provide them with a global and integrated view helping them to make efficiently all the required decisions. Thus, a new integrated architectural model is proposed based on ideas taken from all the above presented approaches – but not restricted to – trying to keep it as simpler and functional as possible in order to be useful to the managers who would like to use it in practice (Section 7).

Finally, we examine the expected results from the usage of the proposed integrated model from enterprises and organisations (Section 8), while future work is discussed (Section 9).

2 IT-enabled business strategy

Although IT plays an important role in modern enterprises, it still fails to provide the expected return on investment (ROI). The reason is that many IT-enabled companies violate nearly every principle of a well-defined business strategy. In fact, many enterprises perceive IT as a tool that provides operational advantages, such as speed, low cost, agility, as well as new ways of conducting business, believing that in this way, they will stay one step beyond of the competition, especially in IT-enabled environments (Rathod et al., 2019). But ignoring the main strategy formulation principles, the competition comes into convergence. In order to avoid such a situation, enterprises must succeed a distinctive strategic positioning in modern globalised free markets. Porter (1996, 2001) proposes for these IT-enabled enterprises a few principles that must be satisfied, and that are the following:

- 1 Superior long-term ROI must be succeeded because only sustained profitability characterises the successive strategies.
- 2 A distinctive value proposition must be articulated and conformed to a distinctive value chain.
- 3 Trade-offs in choosing what not to do, must take place, in order to be truly unique in market.
- 4 How all the business elements fit together.
- 5 Continuity of direction must be kept improving distinctive strategic positioning.

In Kim et al. (2004), three main business strategies for an IT-enabled company are discriminated, the ‘cost leadership’ strategy, the ‘differentiation’ strategy and the ‘focus’ strategy.

Cost leadership seems to be an obvious strategic choice for many IT-enabled companies at least in the early stages of their development. There are many factors that push companies to cost leadership, e.g., when selling over the internet due to easy price scanning and adjustment, increased bargaining power of buyers due to low switching costs, etc. (Phau and Poon, 2000; Lee and Gosain, 2002; Pilinkien et al., 2013).

On the other hand, lower switching costs pushes companies to pursue a strategy of differentiation, ensuring in this way increased customer loyalty. Nowadays, customer loyalty has become of high interest in modern companies even more than getting new

customers (Chaudhary and Uprety, 2016). This can be proved very beneficial in retaining, as well as increasing the profit margins. Successive differentiation strategies usually lead to improved profit margins. Sources of differentiation could be convenience in ordering, fast delivery, increased trust in transactions and personal information use, quality of information, quality of service, customisation, buyer-seller interactivity, customer excitement, look and feel of a website, support services, etc. (Amit and Zott, 2001; Augusto et al., 2012; Hsu et al., 2015).

But there are enterprises that want to focus on specific buyer target groups, market segments, geographic areas or products. A basic reason for this business practice could be the fact that the new entrants – due to lack of reputation or customer-base – focus on a market niche. Another reason is that internet provides the enterprises with the opportunity to differentiate on specific market segments, while the higher customisation offered by websites increases the possibility to meet needs of specific consumer segments. Segmentation makes easier to estimate demand (Yelkur and DaCosta, 2001). For such enterprises, focusing is a must.

However, since the industry presents rapid and unpredictable changes, the business strategy must not be monolithic. Adaptive business models must be adopted for sustained competitive advantage (Tucker, 2001; Reeves and Deimler, 2011). Due to the continuous flow of advantages, the company's unique competencies require ability to understand and to adapt. In other words, it is an imperative that a business strategy must migrate from creating a vision and exploiting competencies to keep time-pace and shape semi-coherent strategic direction. The success of such a company is far beyond from profits but near to continual re-invention which brings sustainable market precedence and thus profits in a fluctuating industry structure and strategic position (Brown, 1998; Yoo et al., 2012). The globalisation of economy and the structural changes of the global markets drive the need for integrated approaches and continuous innovation activities (Sautter and Clar, 2017). These innovation activities must be both technical and non-technical. It is well-known that the non-technical innovation can significantly leverage companies' performance and their overall competitive advantage (Som and Diekmann, 2017).

3 IT strategy

According to Feld and Stoddard (2004), "there are three interdependent, interrelated and universally applicable principles for formulating and executing IT effectively." These principles concern the development of a long-term IT renovation plan linked to business strategy. The development of a unifying, homogenised, distributed IT platform that replaces a wide variety of vertically oriented data silos that serve individual business units, such as accounting, production, marketing, etc. with a horizontally oriented architecture designed to serve the company, and the development of a highly functional and efficient IT organisation.

These three principles must be concurrently abided. The success of one principle reinforces the success of the two others. On the contrary, if one principle is disengaged or malfunctioned, this may cause total IT implementation failure or significant performance downgrade. The IT solutions used by the competitors must be considered in our decision making process, while the effects of the strategic use of IT must be clearly understood and measured (Bergeron et al., 2004). For example, an enterprise currently should focus

on an IT renovation plan replacing its old legacy systems with more service oriented architectures (SOAs) systems, for providing its customers with more functionality and capabilities over the internet, and its suppliers with more bridged B2B systems, e.g., by adopting the enterprise service bus (ESB), a unified, homogenised and distributed platform, which can lead to a highly functional and efficient IT organisation.

An IT-enabled enterprise or organisation increasing its digitalisation of products and services, adopting internet-based B2B or B2C activities, can improve its business performance and relationships (Pagani, 2013).

In addition, it is very important for the enterprises in order to cope with the competition and to consider ways of their IT strategy adaptation by using modern IT means, e.g., social media, cloud and mobile computing, etc. (Whittington, 2014). Indeed, new IT technologies and practices may significantly affect the way with which the companies conduct business. Social networking provides them with new means of marketing and massive or personalised communication with their potential and existing customers. Cloud computing provide the companies with the opportunity to access their data from everywhere, while the mobile computing can provide with strong competitive advantage, as their services and products could be accessible from everywhere, incorporating in this way ubiquitous computing practices in their business activities.

4 Strategic alignment

4.1 The role of SA

Investing in IT is sometimes like investing in a powerful car which, due to bad roads it cannot perform according to its capabilities. In other words, there is a mismatch between the deployed IT capabilities and the ‘avenues’ upon which IT ‘runs’. The nature of these ‘avenues’ must be related to the adopted business strategy. Towards this direction, the SA of IT and business strategies have been proved an emergency. By SA, we mean the synchronisation between the overall business strategy and the choices made on IT solutions and its governance, needed to gain the maximum benefits from IT (Aversano et al., 2012; Gomez, 2015). Of course, SA is not a panacea. It can be proved sometimes too strict leading to inflexibilities and inefficiencies on implementations, especially when radical changes are required. Thus, trade-offs between SA and the degree of business flexibility must take place. In general, studies have shown that greater levels of SA are preferable to lower ones.

SA is like a snapshot of the links between the business strategy and the IT strategy. Mappings between the two strategies are necessary for exploring the internal relationships between them. These mappings could be based on business mission and objectives, business plans, implementation and operational plans, etc. (Kearns, 1997; Tallon and Kraemer, 2003; Silva and Chaix, 2008).

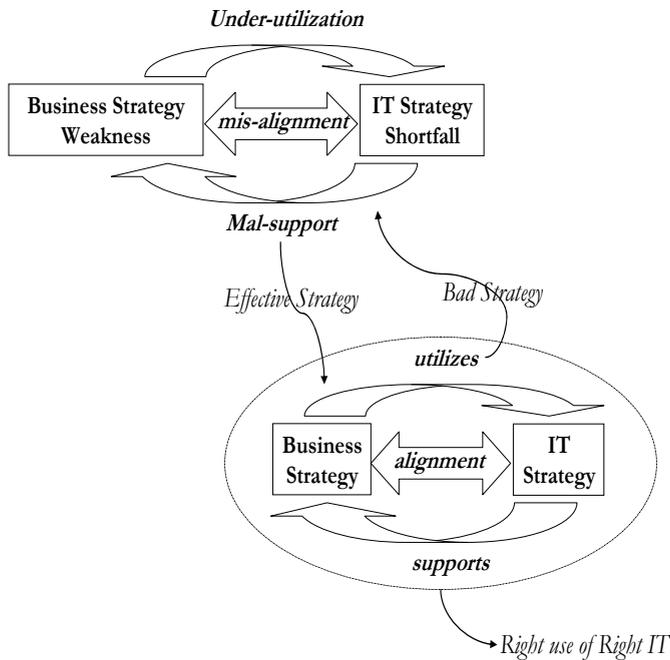
The impact of SA can be evaluated through several specific metrics – such as net profit, market share, revenue growth, ROI, cash flow, net margin, etc., that are required by the shareholders and the top management.

Towards this direction, all the corporate activities, such as relationship management, after sales support, marketing, distribution channels, production, logistics, human resource management, research and development, etc., must be investigated regarding how much influence these specific metrics. IT is incorporated in these activities, and if IT

fails to provide the expected value, then we say that an IT shortfall happens. Furthermore, if a business strategy which must utilise at a maximum level the IT capabilities, especially when IT provides new business opportunities, fails to succeed that, we say that an IT under-utilisation takes place (Tallon and Kraemer, 2003). In both cases, appropriate synchronisation between business strategy and IT strategy must be established.

Figure 1 depicts these concepts for the right use of right IT. By the term ‘right IT’, the IT-related choices that create the expected business value are imposed. The ‘right use of IT’ means that the business strategy exploits all the benefits arisen by the provided IT solutions. In case of an IT shortfall where business strategy execution is suspended by inadequate IT use, intensive IT leadership, new IT initiatives, increased IT funding, reallocation of IT resources could provide an essential help. In case of IT under-utilisation, more business effort must be put on IT use improvement, while new business activities and plans that incorporate or increase IT capabilities must be provided.

Figure 1 Bi-directional nature of SA



Source: Tallon and Kraemer (2003)

Greater IT importance for a company means greater need for SA. Greater SA means greater IT-enabled business value creation. Thus, dimensioning and understanding effectively the role of IT, leads to the right decisions on SA (Mitropoulos, 2012). In other words, there is a corporate or organisational strategic intent for IT which depends on the preset business objectives (Tallon and Kraemer, 2003). For example, a company which focuses on operational effectiveness has a different strategic intent from a company which focuses on strategic positioning. Companies that focus on operational effectiveness, try to perform similar activities better than their rivals, eliminating wasted activities, employing more advanced IT, motivating employees better and having

greater focus on management. Operational effectiveness uses IT to increase flexibility, responsiveness, productivity, and to reduce operating costs. In contrast, companies which focus on strategic positioning, namely on performing similar activities but in very different ways, use IT to achieve greater ROI, market share, revenue, etc. or to identify entirely new market opportunities, e.g., by introducing new e-business models (Tallon and Kraemer, 2003).

4.2 *Achieving SA*

Gaps in SA can create serious problems both in IT strategy and business strategy (Pralhad and Krishnan, 2002; Rathnam et al., 2005; Gerow et al., 2015). The main goals of alignment are to ensure that:

- companies really take business value from IT
- IT plays an effective and efficient role in business
- IT strategic development effects strategic change on the business
- IT is defined as a factor of the future readiness.

Venkatraman et al. (1993) present a SA model which consists of two areas: the business and the IT. Each of these areas is further divided into two sub-areas. Thus, four dominant organisational business sub-areas are defined towards the analytic alignment of business and IT strategies. Each sub-area consists of three components. Namely, there are 12 main components that inter-work in various combinations determining the SA at a full extent. According to Henderson and Venkatraman (1990, 1996), Venkatraman et al. (1993) and Coleman and Papp (2006), we have the following areas and the respective components per area.

4.2.1 *Business strategy area*

The two sub-areas, here, are the business strategy and the organisational infrastructure.

The ‘business strategy’ components that make up a business strategy are:

- The business scope which refers to those things that affect the business environment, like markets, products and services, customers, suppliers, rivals, etc.
- The distinctive competencies component that refers to those things that make the business to succeed in markets, like core competencies, brand name, research and development, product development, pricing, channels, after-sales support, etc.
- The business governance component which refers to the relationships between the shareholders and the senior management. Any governmental regulations and relationships with other strategic business partners are also included.

The main ‘organisational (business) infrastructure’ components are:

- The administrative structure which refers to how the company runs its business, mainly concerning its organisational type, like centralised, vertical, matrix, functional, etc.

- The ‘business process’ component which refers to the corporate activities, how well they operate and how well they are performed.
- The ‘human resource skills’ component which refers to the considerations made for how to hire, motivate, train, and develop their employees.

4.2.2 *IT area*

The two sub-areas, here, are the IT strategy and the IT infrastructure.

The *IT strategy* consists of the:

- The IT scope which refers to the information applications and technologies that the business uses.
- The ‘systematic competencies’ component which refers to all the capabilities that set the IT services apart from the rest, such as how much access to business strategy sensitive information is possible.
- The ‘IT governance’ component which refers to the authority behind the IT and how the IT resources, risks and responsibilities are spread over the business partners, IT service management and provision. Selection and prioritisation of IT projects is subject to this component.

The *IT infrastructure* consists of:

- The architecture component which refers to the technology priorities, as well as to the policies applied on applications, systems, networks and data management.
- The processes component which refers to IT oriented activities that the personnel must do to develop, maintain and manage applications and IT infrastructure.
- The skills component which refers to the human resource skills required for the completion of IT activities.

4.3 *Detailed SA implementation models*

The relationships between the components of the various business areas define the paths of SA that express the perspectives of the functional integration of the business area components towards a specific alignment direction (Venkatraman et al., 1993). According to Coleman and Papp (2006), to achieve SA, a strongest area (determinant or driving force) of the sub-areas described above, drives the changes that business is to undergo. In fact, the components of the strongest area push the changes in the components of another area (called weak area). The changes in this area directly affect at least the components of another area which is called the resulting area of impact. Thus, each alignment perspective involves three business areas of which their combination defines various types of SA. There are the following eight SA perspectives that make sense in a business context (Coleman and Papp, 2006; Henderson and Venkatraman, 1990; Papp, 2004):

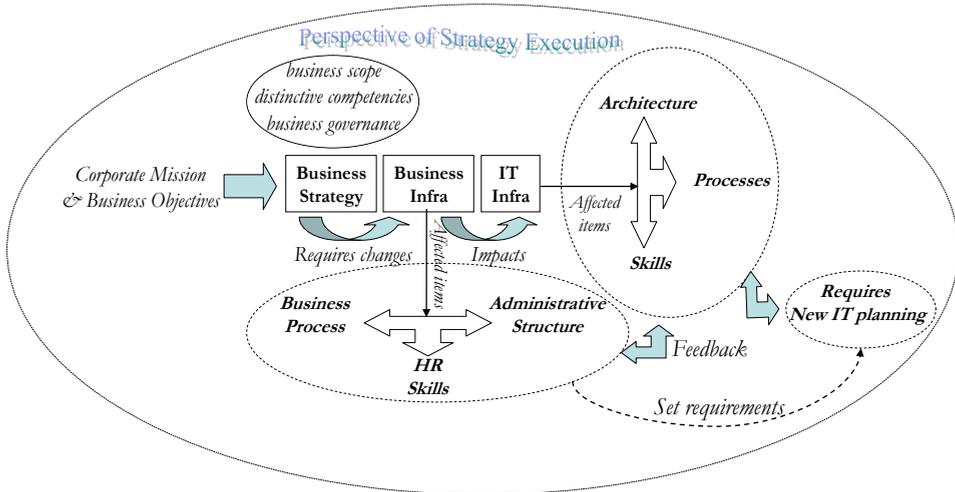
- *Strategy execution perspective* where the business strategy is the determinant and the business infrastructure is the weak area which needs refinement and changes through the alignment process. The IT infrastructure is the resulting area of impact. Namely,

IT infrastructure is going to be affected through the changes in the business infrastructure that means changes in processes, skills and structure. The meaning of this SA perspective is the transformation of the business, as well as of the IT planning for the purpose of mitigating problems, improve services and increase overall performance.

- *Technology potential perspective* where the business strategy is the determinant and the IT strategy is weak area that needs refinement and changes. The IT infrastructure is the resulting area of impact. The meaning of this perspective is to ensure that the IT effectively contributes to the company's final product. Thus, the articulation of IT strategy must support the chosen business strategy, impacting the IT infrastructure architecture, processes and the personnel IT skills.
- *Competitive potential perspective* where the IT strategy is the determinant and the business strategy is the weak area which needs refinement and changes. The organisation (business) infrastructure is the resulting area of impact. The meaning of this SA perspective is to show how new emerging IT technologies and solutions can affect or enable new business strategies in order to bring company's competitive advantage in markets.
- *Service level perspective* where the IT strategy is the determinant, the IT infrastructure is the weak area which needs refinement and changes. The organisational (business) infrastructure is the resulting area of impact. The meaning of this perspective is to show how IT can improve the delivery of products and services, as well as the business processes, the administrative structure and skills.
- *Organisation IT infrastructure perspective* where the organisational (business) infrastructure is the determinant while the IT infrastructure is the weak area which needs refinement and changes. The IT strategy is the resulting area of impact. The meaning of this perspective is to show how process improvements from IT, as well as the value from IT applications on the various business processes can be achieved.
- *IT infrastructure strategy perspective* where the IT infrastructure is the determinant while the IT strategy is the weak area which needs refinement and changes. The business strategy is the resulting area of impact. The meaning of this perspective is to show how the improvement of IT strategy based on the implementation of emerging and existing IT infrastructures can affect positively the business strategy.
- *IT organisation infrastructure perspective* where the IT infrastructure is also here the determinant, while the organisational (business) infrastructure is the area of weakness needing refinement and changes. The business strategy is the resulting area of impact. The meaning of this perspective is that IT infrastructure (emerging new technologies) is the factor which drives the changes in business processes, structures and skills.
- *Organisation infrastructure strategy perspective* where the organisational (business) infrastructure is the determinant, while the business strategy is the weak area which needs refinement and changes. The IT strategy is the resulting area of impact. The meaning of this perspective is to show how the existing capabilities can be exploited to improve or to develop new products and services, influence business strategy, and create new relationships.

Indicatively, we provide in Figure 2 the architectural model for the ‘strategy execution’ perspective which includes all the involved in the SA areas, as well as the respective components. Such visualisation can be proved very useful in practice to the executives.

Figure 2 Visualisation of strategy execution perspective (see online version for colours)



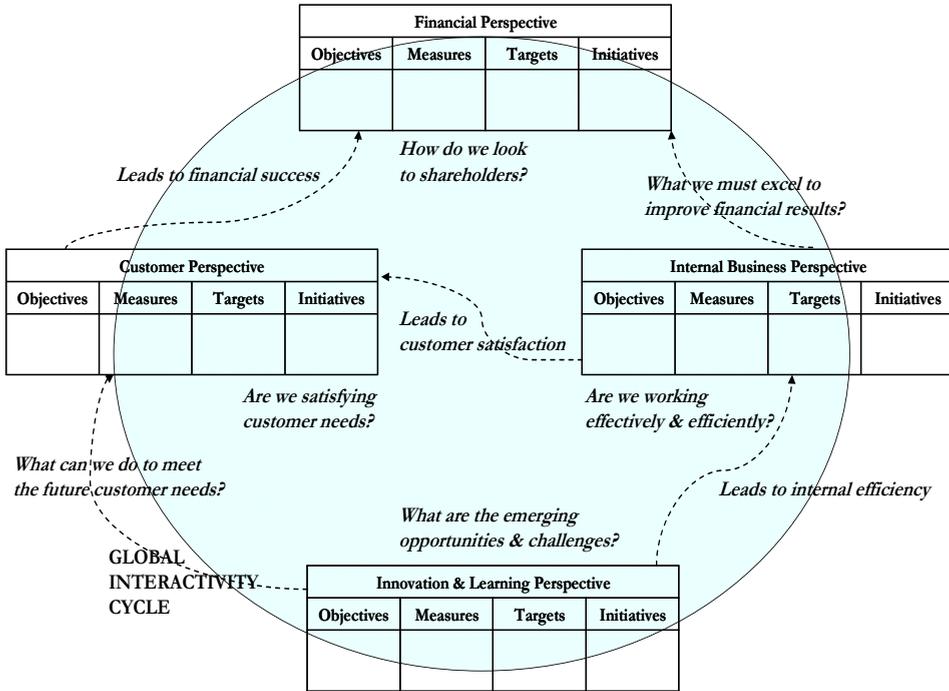
5 Strategy mapping and evaluation

Although Venkatraman et al.’s (1993) model for SA covers both strategic and operational integration, does not include any implementation evaluation. Furthermore, companies and organisations need to know the consequences of their decisions regarding SA. Thus, a framework is needed to evaluate the implementation of business and IT strategies, as well as the influence of their SA decisions on business performance. BSC seems to provide such an effective framework introducing a common language that enables business and IT executives to think together about how IT can support a business strategy (Kaplan, 2002). A BSC must cover all the crucial success factors (CSFs) for the business including IT, too. Using BSC, misfits and time lags between business and IT management processes is possible to be detected. All relevant IT drivers contributing to business goals can be identified in a BSC and measurements per driver can be established. Thus, integration between business and IT is possible. In this way, IT plans can be prioritised in relation to business plans while shared values, visions and actions, between business and IT managers can lead to improved business performance (der Zee and de Jong, 1999).

Kaplan and Norton (2000a, 2000b) developed the BSC model which measures companies’ performance from four major perspectives: the financial perspective, the customer perspective, the internal-business-process perspective and the learning and growth perspective. Linking these perspectives introduce the concept of a strategy map (Kaplan and Norton, 2000c). Of course, a BSC can be characterised as a strategy map if and only if, it is linked to the organisation’s strategy (de Waal, 2003). Namely, a strategy map is a common visualisation framework that embeds the different items on a company’s BSC into a cause-and-effect network and connects desired outcomes with the

drivers of those results. This strategy map provides a common language useful for describing objectives, targets and initiatives – while specific measures are used to assess their performance – as well as the respective linkages that are keystones for a strategic direction, while major gaps in strategy can be detected (Kaplan and Norton, 2000b; Scherer, 2002). In Figure 3, the BSC framework is depicted.

Figure 3 The integrated approach of BSC (see online version for colours)



Source: Mitropoulos (2012) and Kaplan and Norton (2000a)

It is very important that a BSC can capture not only tangible but also all the key intangible assets, like IT capability, customer relationships, and personnel skills, especially since intangible assets offer competitive advantages that can be difficult copied by rivals. Financial and non-financial measures must be represented in all the organisational levels. Measures of each perspective must be aligned with the measures of the others' ones. These measures are expressed using *key performance indicators (KPI)* (Toten, 2005; Parmenter, 2015). Specific, measurable, agreed to, realistic, timely and aligned (SMARTA) principles drive the definition of KPI's that must be business wise reflecting the business strategy success or failure. KPI's must give a clear view towards the direction of performance improvement. Thus, they must be quantifiable to a large extent providing an unambiguous and relevant meaning, while the range of their values must make clear the borders of success. KPI's must be defined within a time frame considering all the environmental parameters of influence (Nikitina, 2010).

6 The strategic and BAs

6.1 Extending the strategy map

An enterprise first defines its business strategy. It must be linked to its mission. The IT strategy is defined in relation to the business strategy. The strategy is followed by the execution and finally by the evaluation. This approach many times fails due to many reasons. In fact, what it is needed is an integrated framework which will include all the necessary components for formulating the strategy, all the perspectives for achieving alignments, all the implementation domains, as well as several evaluation measurements at each management level. In other words, there is not only a need to integrate the use of the frameworks proposed by Kaplan and Norton (2000a, 2000b) and by Henderson and Venkatraman (1990), but also to extend them with additional features and components.

A business environment consists of two main viewpoints, the strategic one and the implementation or execution one. The strategic viewpoint must lead to an effective implementation which of course depends on the business context where the strategy applies. These two corporate viewpoints – strategy formulation and strategy execution – drive the definition of two well-known architectures: the strategic architecture and the BA.

A strategic architecture includes all the main components of a business strategy, such as competencies, capabilities, assets, initiatives, customer value proposition, economic value proposition, etc., placed in the perspectives provided by the framework of BSC (Littler et al., 2000). Some of the concepts of a strategic architecture can be mapped to a BA, which in turn maps its concepts to the organisational architecture and the IT one. Thus, a BA can be considered as the link between a business strategy and the business processes, roles, tasks, and information (Versteeg and Bouwman, 2006).

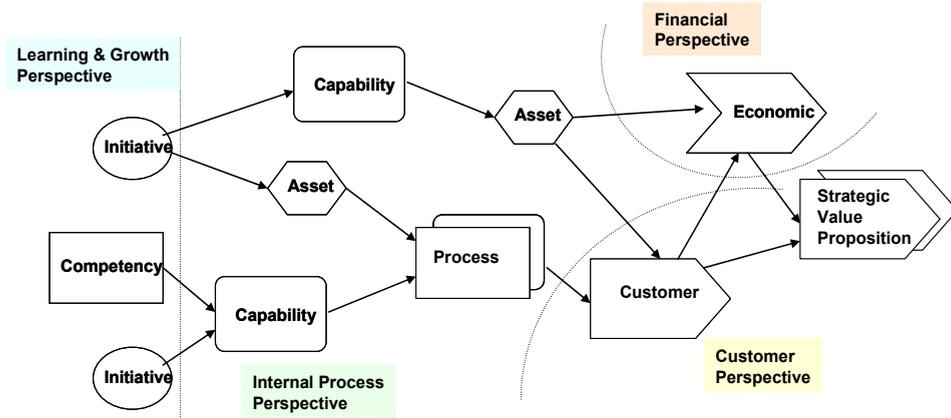
The above analysis drives the idea that having effectively defined and aligned all the strategic components within an integrated framework, which is our utmost goal here, CSF's can be developed per component, while respective KPI's can provide the metrics regarding the success or failure of the strategy execution. Before our integrated architectural model is presented, we present in more detail the strategic and BAs, as they are also used in our model.

6.2 Strategic architecture

The utmost task for top executives is to define an effective and efficient business strategy with respect to enterprise's mission and vision. A business strategy leads to a strategic architecture and to the respective implementation plan. A strategic architecture can be view from four perspectives, like those of a BSC. Each perspective is supported by several business strategy objects that express the strategy execution per perspective. Business strategy objects refer to the resource objects that provide a company with the ability to operate effectively, and usually concern corporate competencies, corporate capabilities and corporate assets. A competency refers to skills and to the potential learning and growth capacity within the enterprise. A capability concerns the strategic combinations of roles, structures, processes, activities and the undertakings that enable the organisation's strategy. Assets can be tangible, such as a computer, or intangible, such as the brand name, resources of knowledge, etc. Following the above approach

(Littler et al., 2000), we provide in Figure 4 a strategic architecture sketch which also depicts the respective BSC perspectives.

Figure 4 A strategic architecture sketch (see online version for colours)



Further to resource objects, a strategy needs actions which mean initiatives. The initiatives affect the business processes, utilise the strategic assets, and push the capabilities of an enterprise. Initiatives impose actions. Resources and actions must be combined in an orchestrated way in order to provide a unique customer value proposition, as well as, an economic value proposition for the shareholders and other parties of interrelated interests. Of course, the combination of all the above must lead to an overall strategic value proposition which a company must develop in order to differentiate from its competitors (Littler et al., 2000).

The strategic components concern the various business perspectives as those defined by the BSC framework. Putting the various strategic components into the various business perspectives, CSFs can be defined for them, as well as the corresponding KPI's.

6.3 Business architecture

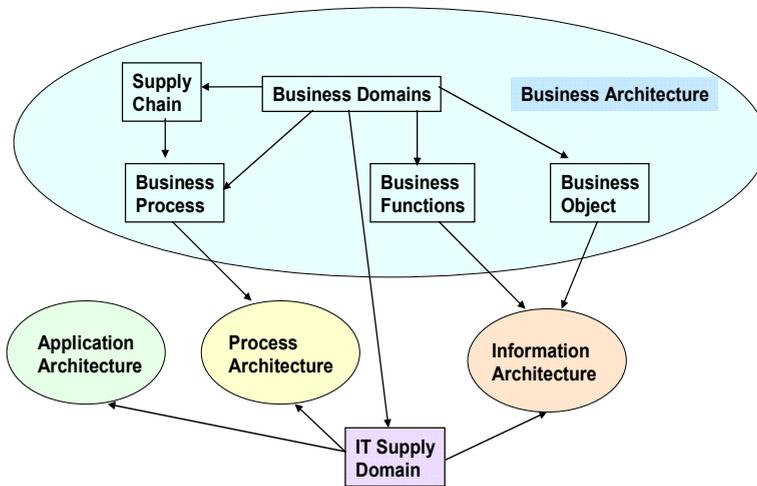
BA is an important business concept. The objective of a BA is to structure responsibility over economic activities. The main elements of a BA are the so-called business domains that define the business areas of responsibility. In fact, business domains are clusters of business objects and functions, over which meaningful responsibility can be undertaken into business processes (Versteeg and Bouwman, 2006). A BA consists of:

- 1 several business domains and their assigned business activities
- 2 several business functions and high-level data descriptions, for which these business domains are responsible for and need to perform their assigned business activities
- 3 several high-level business processes, which show how these domains work together in order to achieve the organisational business strategy and the respective goals.

Only a part of BA is under the responsibility of the IT department and the chief information officer (CIO). In order to specify the BA of an organisation need a lot of elaboration, especially for the large-scale ones. This means that the initial defined

domains that come from the business strategy requirements and objectives are of high level and probably they cannot be directly mapped onto low level processes and functions. For this reason, refinement of domains to sub-domains must first take place. This process of domain refinement must continue recursively until fine-grained business processes are defined and the required functions have become obvious to be setup. Some of the lowest level domains are the machine level domains that concern IT resources and their interactions (Bleistein et al., 2006a, 2006b; Zijl and Belle, 2014; Rouhani et al., 2015). In Figure 5, we provide a sketch of BA including the respective IT architecture linkages (Versteeg and Bouwman, 2006).

Figure 5 A BA sketch (see online version for colours)



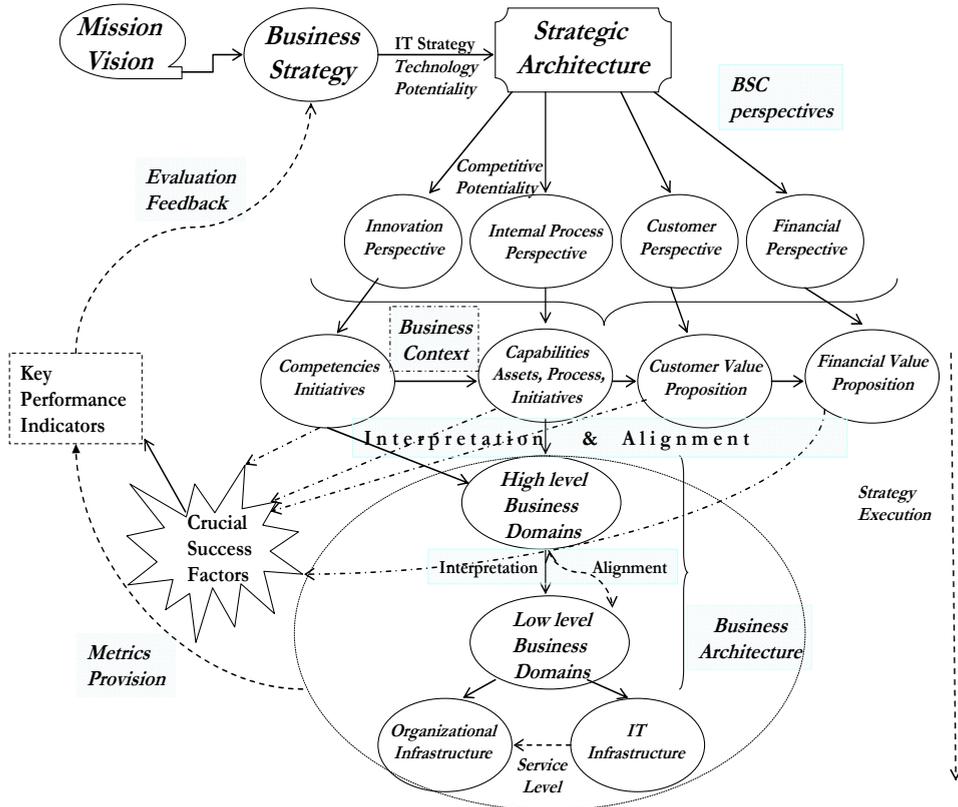
7 The proposed integrated architectural model

It is well-known that companies and organisations must first define their mission. The mission drives the corporate vision. This vision ends up to a business strategy which is linked with several strategic goals that among others, in the new digital era, must incorporate the technology potentially imposed by IT. A respective strategic architecture – as defined above – must satisfy these goals. The strategic architecture, adopting the BSC approach, is divided into four perspectives: the innovation, learning and growth, the internal process, the customer and the financial. Each perspective consists of several strategic components that must be appropriately and clearly specified in the context of an enterprise or organisation. These strategic components provide the means for successful control and monitoring of the strategy execution. A strategic component can be evaluated through one or more CSFs. Each CSF can be evaluated by using appropriate KPI’s.

Furthermore, the combination of components of a strategic architecture provides a fine-grained method for aligning (achieving thus SA) the four BSC perspectives and finding out the gaps in a corporate or organisational strategy. Of course, the business context upon which the strategic architecture is developed plays an important role. Towards this direction, business capabilities, assets, processes, etc. with respect to the

business context drive the composition of the BA as the latter must realise and satisfy the strategy objectives. As mentioned above, BA refers to business domains. Thus, refinement of high-level business domains to lower level ones must take place. Alignment between the domains of different or same level must take place for consistency assurance and conflict prevention. At the finest grain level, low level business processes are defined (technical business processes), business functions and data, as well as the required IT infrastructure (which, in fact, provides the service level potentiality to the organisational infrastructure SA perspective as discussed above). CSFs of the organisational and IT infrastructures must be linked to specific measures (KPI's) for the evaluation of the overall success of the initiatives in internal processes and the growth perspective, that are crucial for the competitive potentiality, as well as for the efficiency of the customer orientation and the financial results. In Figure 6, we present this approach by integrating all the above concepts and frameworks into an innovative and effective architectural model for the purpose of a coherent formulation, alignment, execution and evaluation of business and IT strategies.

Figure 6 The proposed integrated architectural model (see online version for colours)



As we can see in Figure 6, the strategic architecture, the various points of alignment that are referred to the BSC perspectives, the domains refinement in the BA context, and the perspectives imposed by SA model are incorporated among others in the proposed architectural model. An appropriate feedback mechanism is also depicted for the purpose

of refining the business strategy and/or the IT strategy and/or the organisational infrastructure and/or the IT infrastructure depending on the priorities set by the enterprise or the organisation.

8 Evaluation

8.1 Expected usage results

During the conduction of our research for the development of the proposed integrated model, we investigated the expected usage results from its enforcement in business and organisational environments. The top management, the senior executives, as well as the tactical management will much benefit by extensively using this architectural model. Indeed, all these key players can take real competitive advantage by taking the big picture of how the business strategy and IT strategy related things must be defined and implemented. Specifically, the reasons of the success of the proposed architectural model are the following:

- 1 The proposed architectural model includes all the main aspects for an effective strategy definition and execution without leaving almost out any crucial parameter and concept. Thus, the strategic management decisions will not be isolated and unrelated but on the contrary will be progressively made towards the right direction. In addition, enterprises avoid trying to find fragmentary tools that are tailored to their needs in terms of size, nature and weaknesses.
- 2 The proposed architectural model connects the strategy with the operational level and the business processes, which is very important because a strategy evaluation must always be linked to the business processes and their constraints. In other words, our model is directly linked to the implementation of the strategic decisions made by the top management.
- 3 The indicators of our strategy's performance need to be clear as to what they count and agreed with the enterprise's management. The proposed model helps such an agreement, which, apart from achieving a common understanding, is very important because through the provided feedback mechanisms, a basis for discussing agreed goals for continuous improvement and activation of change processes is given.
- 4 Towards the direction of management of change, the proposed architectural model by considering all the strategic viewpoints and aspects, provides the opportunity for consistent changes, increasing this way the adaptability and the flexibility in change in a way agreed by all parties of management involved.
- 5 The big picture given by our model, which involves all multi-level management executives, has the positive that executives cannot ignore reports about their assessment of their decisions or actions because they are tied-up with a complete and a consistent evaluation system. This de facto leads to a virtuous circle of monitoring and fulfilling the business objectives.
- 6 The importance given to detail by the proposed model is particularly needed in large or medium-scale enterprises that need a structured methodology of organising their strategy with greater emphasis on detail.

In short, the proposed architectural model is expected to lead to high business performance, agility and consistency in decision making, improved resource control, refinement capability via feedback mechanisms, increased coordination, quality of service, and finally positive financial results.

8.2 An explanatory example

Hereafter, we provide an indicative example providing a practical scenario for the proposed model. The developed scenario comes from our working experience in modern enterprises and it is based on realistic assumptions. To develop a full scenario based on a real-world organisation needs the establishment of a funding project, something which is in our plans. It is usually very difficult for enterprises to disclose their strategy and the relative data due to reasons of confidentiality.

Let us assume an enterprise which needs urgently improvement of its business performance with respect to its internal processes and responsiveness to their customers' demands by using new IT solutions and services. It is expected that this improvement will cause increased financial results due to lower costs and quick to market's demand response. For this purpose, a new strategic value proposition must be articulated based on new high-tech solutions.

From the strategic architecture viewpoint, some initiatives that will arise new business competencies and capabilities are urgently needed. In our example, these high-tech initiatives concern the introduction of SOA-based IT solutions that will integrate enterprise's internal systems, promote secure interoperability with its external partner systems, and make available enterprise's services to its customers everywhere via cloud and mobile computing (Katsikogiannis et al., 2018). This growth and future readiness action is expected to improve the overall business processes, assets and capabilities, such the cost of operations, the personnel talent, the business intelligence, the information availability, the marketing activities, etc. Towards this direction, the top executives must design a strategy map based on BSC which helps both SA and evaluation.

Thus, an IT strategy must be formulated following the *technology potential perspective of SA*, where the business strategy is the determinant and the IT strategy is the weak area that needs refinement and changes. The IT infrastructure is the resulting area of impact (Coleman and Papp, 2006). The IT infrastructure supports the business processes according to several performance and quality criteria. These criteria are expressed in terms of corresponding service level agreements (SLA's). From the BA point-of-view, business process domains must be mapped to IT infrastructure domains in such a way that there will be convergence, as well as consistency between them according to the defined SLA's. These convergence and consistency require effective interpretation and alignment of business domain processes to IT domain processes according to the BA requirements. The effective interpretation drives the design of an effective BA, something which can be evaluated through the definition of CSFs and the respective measures (KPI's). If the business domain KPI's have the expected range of values for the corresponding IT KPI's values, then we can say that SA is achieved at this level, otherwise refinements must take place in the IT infrastructure and/or the internal business processes.

To avoid implementation backtrackings which usually causes increased costs, it is a good practice to conduct process simulation scenarios. The process simulation takes place for the *initial* process and the *new* process. The initial process needs improvement, while the new one is going to be deployed in the business environment.

Hereafter, we provide a short example which is based on a previous conducted research (Mitropoulos, 2012). Let us assume a ‘customer billing’ activity (initial business sub-process), for which, hypothetically, the arrival of 40 cases follows normal distribution with mean time 20 minutes and standard deviation ten minutes. This billing sub-process is not optimised due to the adoption of traditional practices, like the manual data entry, credit card checking via fax, enforcement of a discount policy from a human being supervisor, and manual preparation of the final invoice. Running the corresponding simulation, let us assume that the average case time was about 30 min. This is not acceptable at all from a business performance point of view. The managers set a business goal for the average case time to be less than 9 min, something which requires emergency improvements in the billing sub-process and the IT infrastructure. Towards to this direction, the enterprise implemented IT solutions for credit card checking by using interoperability with inter-banking systems, automated discount policy enforcement, automated data import, fully automated preparation of the final invoice, etc. After, the implementation of these IT-enabled changes, let us assume that the average case time fall to 8 min. This value satisfies the business operation goal set by the managers for the new IT-enabled billing sub-process, and the *respective alignment* at this level is achieved. Furthermore, at the IT service level, SLA’s such as that “the automated discount policy must not exceed 10 seconds delay” and “the automated credit card checking must not exceed 50 seconds delay” have been defined as a prerequisite to achieve the business goal. To achieve specific business process performance results in simulation runs, it usually needs adaption of the input parameter values. In fact, the *alignment of IT system goals to the respective business goals* is an iterative process.

The efficiency of the ‘customer billing’ activity is crucial from the operational point-of-view. To extend a bit more the above scenario, assuming a CSF ‘customer convenience in order/billing’, which is influenced by measures like ‘order making time’ and ‘customer billing time’, after the introduction of IT-enabled changes, the corresponding *KPI of ‘customer convenience in order/billing’*, hypothetically, is expected to improve by 70%, something which consequently is expected to increase the measure ‘customer retention’ which positively affects the measure ‘increased revenue’ (Mitropoulos, 2012).

9 Conclusions and future work

In this paper, we proposed an integrated architectural model for coping with all the main issues of SA, of strategy formulation by presenting Porter’s (2001) principles, as well as the strategic architecture, of strategy execution within an organisational infrastructure by using the BA, and of strategy evaluation by using the BSC approach and KPI’s. In fact, what we addressed is a framework where performance measurement and multi-dimensional SA is possible.

As the proposed model is based on well-known models and in fact is an effective combination of them, it is an objective outcome that top executives can take the advantages of these models within one integrated framework. Towards this direction, we provided an explanatory example which depicts the high applicability of our model, involving its various architectural parts, although the respective scenario was restricted in few functionalities due to paper's space limitations. For instance, we depicted how strategic architecture components are incorporated into the BSC and how the CSFs of it are related to the BA and directly linked to the business processes and the IT systems.

Our future work includes among others, the validation of the proposed integrated architectural model through its application in several real business environment case studies. However, it is reasonable its success as it is based on well tested frameworks and models, while their integration took place in a progressive way which was driven by the needs and the gaps arisen from each one model separately. In addition, we have already worked on simulation models that can provide us with useful information and results on the applicability of our integrated approach.

References

- Amit, R. and Zott, C. (2001) 'Value creation in e-business', *Strategic Management Journal*, Vol. 22, Nos. 6/7, pp.493–520.
- Augusto, R.H., Lima, N.C., Penedo, A.S.T., Oliveira, B.B.B. and Oliveire, S.V.W.B. (2012) 'Competitive advantages: the e-commerce as a strategy for competitiveness in the retail market', *International Journal of Engineering Research and Development*, Vol. 5, No. 1, pp.60–66.
- Aversano, L., Grasso, C. and Tortorella, M. (2012) 'A literature review of business/IT alignment strategies', *Procedia Technology*, Vol. 5, pp.462–474.
- Bergeron, F., Raymond, L. and Rivard, S. (2004) 'Ideal patterns for strategic alignment and business performance', *Information and Management*, Vol. 41, No. 8, pp.1003–1020.
- Bleistein, J.S., Cox, K., Verner, J. and Phalp, T.K. (2006a) 'B-SCP: a requirements analysis framework for validating strategic alignment of organizational IT based on strategy, context, and process', *Information and Software Technology*, Vol. 48, pp.846–868.
- Bleistein, J.S., Cox, K. and Verner, J. (2006b) 'Validating strategic alignment of organizational IT requirements using goal modeling and problem diagrams', *The Journal of Systems and Software*, Vol. 79, pp.362–378, Elsevier.
- Brown, E. (1998) *Competing on the Edge*, Harvard Business School Press, New York.
- Chaudhary, A. and Upreti, I. (2016) 'Analysis of telecom service quality factors with analytic hierarchy process and fuzzy extent analysis: a case of public sector unit', *International Journal of Business and Systems Research (IJBSR)*, Vol. 10, Nos. 2/3/4, pp.162–185.
- Coleman, P. and Papp, R. (2006) 'Strategic alignment: analysis of perspectives', *Proceedings of the 2006 Southern Association for Information Systems Conference*, 11–12 March, Florida, USA.
- Coltman, T., Tallon, P., Sharma, R. and Queiroz, M. (2015) 'Strategic IT alignment: twenty-five years on', *Journal of Information Technology*, Vol. 30, No. 2, pp.91–100.
- de Waal, A.A. (2003) 'The future of the balanced scorecard: an interview with Prof. Dr. Robert S. Kaplan', *Measuring Business Excellence*, Vol. 7, No. 1, pp.30–35.
- der Zee, T.M.V. and de Jong, B. (1999) 'Alignment is not enough: Integrating business and information technology management with the balanced business scorecard', *Journal of Management Information Systems*, Fall, Vol. 16, No. 2, pp.137–156.
- Feld, S.C. and Stoddard, B.D. (2004) 'Getting IT right', *Harvard Business Review*, February, Vol. 82, No. 2, pp.72–9, p.122.

- Gerow, J., Bennett, J., Grover, T. and V. (2015) 'Six types of IT-business strategic alignment: an investigation of the constructs and their measurement', *European Journal of Information Systems*, Vol. 24, No. 5, pp.465–491.
- Gomez, R.J. (2015) 'Strategic alliances: strategy of the future', *Touro Accounting & Business Journal*, Spring, Vol. 2015, pp.13–17.
- Henderson, J. and Venkatraman, N. (1990) *Strategic Alignment: A Model for Organizational Transformation Via Information Technology*, Working Paper No. 3223-90, Sloan School of Management, Massachusetts Institute of Technology.
- Henderson, J. and Venkatraman, N. (1996) 'Aligning business and IT strategies', in Luftman, J.N. (Ed.): *Competing in the Information Age*, Oxford University Press, New York.
- Hsu, L-L., Chen, S-J., Chiu, M-C. and Chen, J.C.H. (2015) 'Determinants of successful online transactions – effects of transaction assurance seal and reputation rating affecting trust and purchase intention of consumers', *Human Systems Management*, May, Vol. 34, No. 2, pp.105–118.
- Kaplan, R. (2002) 'Building strategy focused organizations with the balanced scorecard', Presentation during the *Third International Performance Measurement and Management Conference*, July, Boston.
- Kaplan, R. and Norton, D. (2000a) 'The balanced scorecard – measures that drive performance', *Harvard Business Review*, January–February, pp.71–79.
- Kaplan, R. and Norton, D. (2000b) 'Having trouble with your strategy? Then map it', *Harvard Business Review*, September–October, pp.167–176.
- Kaplan, R. and Norton, D. (2000c) *The Strategy-focused Organization, How Balanced Scorecard Companies Thrive in the New Business Environment*, Harvard Business School Press, New York.
- Katsikogiannis, G., Kallergis, D., Garofalaki, Z., Mitropoulos, S. and Douligieris, C. (2018) 'A policy-aware service oriented architecture for secure machine-to-machine communications', *Journal of Ad Hoc Networks*, November, Vol. 80, pp.70–80, Elsevier Science Publishers
- Kearns, G.S. (1997) *Alignment of Information Systems Strategy with Business Strategy: Impact on the Use of IS for Competitive Advantage*, PhD thesis, University of Kentucky.
- Kim, E., Nam, D. and Stimper, J.L. (2004) 'The applicability of Porter's generic strategies in the digital age: assumptions, conjectures, and suggestions', *Journal of Management*, Vol. 30, No. 5, pp.569–589.
- Lee, Z. and Gosain, S. (2002) 'A longitudinal price comparison for music CDs in electronic and brick-and-mortar markets: pricing strategies in emergent electronic commerce', *Journal of Business Strategies*, Vol. 19, No. 1, pp.55–71.
- Lerner, S. (2015) 'Digital business strategy', *Touro Accounting & Business Journal*, Spring, Vol. 2015, pp.48–52.
- Littler, K., Aisthorpe, P., Hudson, R. and Keasey, K. (2000) 'A new approach to linking strategy formulation and strategy implementation: an example from the UK banking sector', *International Journal of Information Management*, Vol. 20, pp.411–428.
- Mitropoulos, S. (2012) 'A simulation-based approach for IT and business strategy alignment and evaluation', *International Journal of Business Information Systems*, Vol. 10, No. 4, pp.369–396.
- Nikitina, A. (2010) *SMART Goal Setting: A Surefire Way to Achieve Your Goals* [online] <http://www.goal-setting-guide.com/smart-goals.html> (accessed 20 February 2019).
- Pagani, M. (2013) 'Digital business strategy and value creation: framing the dynamic cycle of control points', *MIS Quarterly*, October, Vol. 37, No. 2, pp.617–632.
- Papp, R. (2004) 'Assessing strategic alignment in real time', *Journal of Informatics Education Research*, Vol. 6, No. 1, pp.242–250.

- Parmenter, D. (2015) *Key Performance Indicators: Developing, Implementing, and Using Winning KPIs*, John Wiley & Sons.
- Phau, I. and Poon, S.M. (2000) 'Factors influencing the types of products and services purchased over the internet', *Internet Research, Electronic Networking Applications and Policy*, Vol. 10, No. 2, pp.102–113.
- Pilinkien, V., Kurschus, R.J. and Auskalnyte, G. (2013) 'E-business as a source of competitive advantage', *Economics and Management*, Vol. 18, No. 1, pp.77–85.
- Porter, M. (1996) 'What is strategy?', *Harvard Business Review*, Vol. 74, No. 6, pp.61–78.
- Porter, M. (2001) 'Strategy and the internet', *Harvard Business Review*, March, Vol. 79, No. 3, pp.62–78.
- Prahalad, C. and Krishnan, M. (2002) 'The dynamic synchronization of strategy and information technology', *MIT Sloan Management Review*, Summer, Vol. 43, No. 4, pp.24–33.
- Rathnam, R.G., Johnsen, J. and Wen, H.J. (2005) 'Alignment of business strategy and IT strategy: a case study of a Fortune 50 financial services company', *Journal of Computer Information Systems*, Winter, 2004–2005, Vol. 45, No. 2, p.1.
- Rathod, G., Puranik, V. and Hiremath, V. (2019) 'Developing agility system in supply chains', *International Journal of Business and Systems Research (IJBSR)*, Vol. 13, No. 2, pp.247–258.
- Reeves, M. and Deimler, M. (2011) 'Adaptability: the new competitive advantage', *Harvard Business Review*, July–August, pp.135–141.
- Rouhani, B.D., Mahrin, M.N., Nikpay, F., Ahmad, R.B. and Nikfard, P. (2015) 'A systematic literature review on enterprise architecture implementation methodologies', *Information and Software Technology*, June, Vol. 62, pp.1–20.
- Sautter, B. and Clar, G. (2017) 'Strategic guidance in 'leading-edge' clusters for sustainable business success in future markets', *International Journal of Business and Systems Research (IJBSR)*, Vol. 11, No. 3, pp.243–264.
- Scherer, D. (2002) *Turning Organizational Knowledge into Business Assets: Balanced Scorecard Overview*, 17 June [online] <http://www.coreparadigm.com/articles/balancedscorecard.pdf> (accessed 20 February 2019).
- Shen, Y-C., Chen, P-S. and Wang, C-H. (2016) 'A study of enterprise resource planning (ERP) system performance measurement using the quantitative balanced scorecard approach', *Computers in Industry*, January, Vol. 75, pp.127–139.
- Silva, E. and Chaix, Y. (2008) 'Business and IT governance alignment. Simulation essay on a business process and IT service model', *Proceedings of the 41st Hawaii International Conference on System Sciences, HICSS 2008*, Waikoloa, Big Island, Hawaii, p.434.
- Som, O. and Diekmann, J. (2017) 'Barriers of non-technological innovation – explorative case study insight from European firms', *International Journal of Business and Systems Research (IJBSR)*, Vol. 11, No. 3, pp.265–283
- Tallon, P.P. and Kraemer, L.K. (2003) 'Investigating the relationship between strategic alignment and it business value: the discovery of a paradox', in Shin, N. (Ed.): *Creating Business Value with IT: Challenges and Solutions*, Idea Group Publishing, Hershey, PA.
- Toten, M. (2005) *Using KPIs as an Organization Scorecard*. HR Writer/Consultant, 22 March [online] <http://workplaceinfo.com.au/nocookie/alert/2005/050322143.htm> (accessed 20 February 2019).
- Tucker, R. (2001) 'Strategy innovation takes imagination', *Journal of Business Strategy*, May/June, pp.23–27.
- Venkatraman, N., Henderson, J. and Oldach, S. (1993) 'Continuous strategic alignment: exploiting IT capabilities for competitive success', *European Journal*, Vol. 11, No. 2, pp.139–149.
- Versteeg, G. and Bouwman, H. (2006) 'Business architecture: a new paradigm to relate business strategy to IT', *Information System Frontiers*, Vol. 8, No. 2, pp.91–102.
- Whittington, R. (2014) 'Information systems strategy and strategy-as-practice: a joint agenda', *The Journal of Strategic Information Systems*, March, Vol. 23, No. 1, pp.87–91.

- Yelkur, R. and DaCosta, M.M.N. (2001) 'Differential pricing and segmentation on the internet: the case of hotels', *Management Decision*, Vol. 39, No. 4, pp.252–261.
- Yoo, Y., Boland Jr., R.J., Lyytinen, K. and Majchrzak A. (2012) 'Organizing for innovation in the digitized world', *Organization Science*, 1 October, Vol. 23, No. 5, pp.1398–1408, InformsPubsOnLine.
- Zijl, C.v. and Belle, J-P.v. (2014) 'Organisational impact of enterprise architecture and business process capability in South African organisations', *International Journal of Trade, Economics and Finance*, Vol. 5, No. 5, pp.405–413.