

**LONDON METROPOLITAN UNIVERSITY**

**Faculty of Life Sciences and Computing (FLSC)**

**A Business Model Architecture Framework (BMAF)  
for the Architecting of  
Business to Business Electronic Commerce**

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To the person that changed my life, lights up my days, inspires my future!

## *Ithaka*

*As you set out for Ithaka  
hope the voyage is a long one,  
full of adventure, full of discovery.  
Laistrygonians and Cyclops,  
angry Poseidon—don't be afraid of them:  
you'll never find things like that on your way  
as long as you keep your thoughts raised high,  
as long as a rare excitement  
stirs your spirit and your body.  
Laistrygonians and Cyclops,  
wild Poseidon—you won't encounter them  
unless you bring them along inside your soul,  
unless your soul sets them up in front of you.*

*Hope the voyage is a long one.  
May there be many a summer morning when,  
with what pleasure, what joy,  
you come into harbors seen for the first time;  
may you stop at Phoenician trading stations  
to buy fine things,  
mother of pearl and coral, amber and ebony,  
sensual perfume of every kind—  
as many sensual perfumes as you can;  
and may you visit many Egyptian cities  
to gather stores of knowledge from their scholars.*

*Keep Ithaka always in your mind.  
Arriving there is what you are destined for.  
But do not hurry the journey at all.  
Better if it lasts for years,  
so you are old by the time you reach the island,  
wealthy with all you have gained on the way,  
not expecting Ithaka to make you rich.*

*Ithaka gave you the marvelous journey.  
Without her you would not have set out.  
She has nothing left to give you now.*

*And if you find her poor, Ithaka won't have fooled you.  
Wise as you will have become, so full of experience,  
you will have understood by then what these Ithakas mean.*

***Konstantinos P. Kavafis (1863-1933)***

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## ABSTRACT

Business to Business Electronic Commerce (B2B EC) has over 20 years experienced unprecedented growth in practice. Practice has generated many theories, models, and frameworks. The extensive literature review carried out during this research a) has investigated the origins, the terms and the concepts of business models; b) has studied the architecture of existing models used for B2B EC, and c) has evaluated the frameworks in current use for the change and development of business models. The findings show that there is a huge variety of concepts, terminology, and definitions of the architectural components used to present business models. It has showed that overlaps and gaps exist between these concepts as each, researcher and practitioner tends to focus only on a specific aspect of the business model. The result is a mix of concepts with the same meanings but different names and vice versa. Also, traditional solutions have failed to successfully support the development of a business model for e-commerce as they do not provide full and complete support (at not enough level of detail), but only provide general guidelines or steps described in quite brief terms.

This research focuses on the development of a framework for the architecting of e-business models, especially those used for B2B EC. A mixed research methodology was adopted using both qualitative and quantitative methods. In order to address the limitations identified, this research, classifies, rationalises and standardises business model architectural concepts into four thematic architecture domains namely: business, data/information, application, and technology. This new conceptualisation approach is the main axis of the proposed framework that enables the achievement of two goals a) to define the business model architecture for e-business and b) to support the process for construction/reconstruction of an e-business model. In particular, this research proposes a conceptual notation necessary for the description of business model architecture (BMA) and a business model architecture framework (BMAF) for developing e-business models. This research contributes to a broader understanding and enrichment of the B2B EC body of knowledge, and also expects to assist the different stakeholders (managers, business/IT consultants, IS designers) in representing an e-business strategy, designing the business model architecture and building e-business applications, appropriate (fit for purpose) for their business area. Finally, the developed framework (BMAF) was validated by a) using a web-based survey to evaluate the desing of the framework by experts and practitioners, b) applying the framework to two real world case studies to test and evaluate its validity and the applicability and c) carrying out interviews with the case studies' stakeholders in order to establish how well the BMAF performs its objectives. The findings helped to revise, refine and finalise the framework.

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# CHAPTER 1. INTRODUCTION

## 1.1 Research Background and Problem

As we enter the third millennium it is evident that the technological developments particularly in the area of telecommunications and information technology over the last few decades are revolutionising the way that commerce and business transactions are carried out. The existence of intranets, extranets and the acceptance of the Internet as a new business channel have led many large business enterprises to the creation and adaptation of new business models replacing or transforming their traditional model of operation. These new models are known as electronic business (e-business) models, since they allow for electronic transactions; when these transactions are between organisations, they are characterised as business-to-business electronic transactions or generally as Business to Business (B2B) E-Commerce (Varon, 2001; Turban, *et al.* 2010).

However, the process of conducting trade among business firms using the technology is not recent. In the mid-1970s, business-to-business transactions were referred to simply as trade or the procurement process. The term total inter-firm trade was used to describe the total flow of value among firms. During the 1980s, a new form of computer-to-computer communication called electronic data interchange (EDI) enabled firms to exchange commercial documents and conduct digital commercial transactions across private networks (Turban, *et al.* 2010; Turban, *et al.* 2011; Laudon & Traver, 2013;). The existence of the Internet in the mid-1990s, gives the opportunity to the firms to change the existing patterns and systems of procurement, designing and implementing new Internet-based B2B solutions or B2B E-Commerce (Agrawal, V. & Cohen, M., 2001; Turban, *et al.* 2010; Laudon & Traver, 2013). In the late 1990s and early 2000, B2B E-Commerce models are used as a platform for managing the supply chain, telemarketing, procurement just-in-time (JIT) delivery, networking with business partners, networking between headquarter and subsidiaries, and online services (Timmers, 2001; Turban, *et al.* 2011). They spread across a wide variety of sectors, including the airlines, agriculture, automobile, chemical, construction, steel and utilities spaces (Lorek, 2000). New marketplaces were created, promise to greatly increase productivity, improve economic efficiency, reduce margins between price and costs, and speed up complicated business deals. They were opened to a large number of different business partners, inviting them to expand their purchasing and selling capabilities and to make their prices more dynamic (Paltalidis & Georgiadou, 2002).

Although the initial rapid growth of B2B E-commerce, after 2000 it experienced a big shakeout and consolidation, with many mergers, acquisitions and closures. According to the European E-Business Report (European Commission, 2004), B2B e-marketplaces established in late 1990s including important brand names such as Chemdex, MetalSpectrm, GoFish, E-Chemicals, etc., went out of business; mainly because a) the low number of buyers and sellers participating in them, and b) the low number and value of the electronic transactions they perform. This slow progress was to a large extent due to a variety of organisational, operational, technological and legal factors that diminish the value offered by B2B e-marketplaces (Miller, 2001; Kjølseth, 2005).

The period of the last 10 years has been declared as a lost decade for B2B E-commerce (Kaifer, 2012). During these years there were numerous attempts to revolutionise various industries with new B2B technologies. However, most of these initiatives met with only modest levels of success. Large enterprises as well as small medium enterprises still face a number of barriers in the design of e-business model and implementation of a E-business in general and B2B e-marketplace in a particular (Wang & Hou, 2011). Based on the findings of Loukis, Spinellis, & Katsigiannis (2011) four categories of barriers have been identified. First category encompasses the technical barriers, which are mainly associated with the difficulties of integration of the e-market places with the existing complex internal information systems used by enterprises. It constitutes a big barrier because it requires considerable effort, time and cost. Second category of barriers are the organisational ones, associated mainly a) with the numerous complex internal processes, rules and regulations, which reduce their flexibility and increase the difficult of introducing innovative practices; and also b) with different procedural standards for communication and exchange of information that create problems in case of using several e-marketplaces. A third category of barriers concerns dimensions of the collaboration between the enterprises such as lack of trust and various conflicts. Finally a fourth category of barriers is associated with the legal infrastructure, in particular deficiencies of the internal regulations and the legal framework.

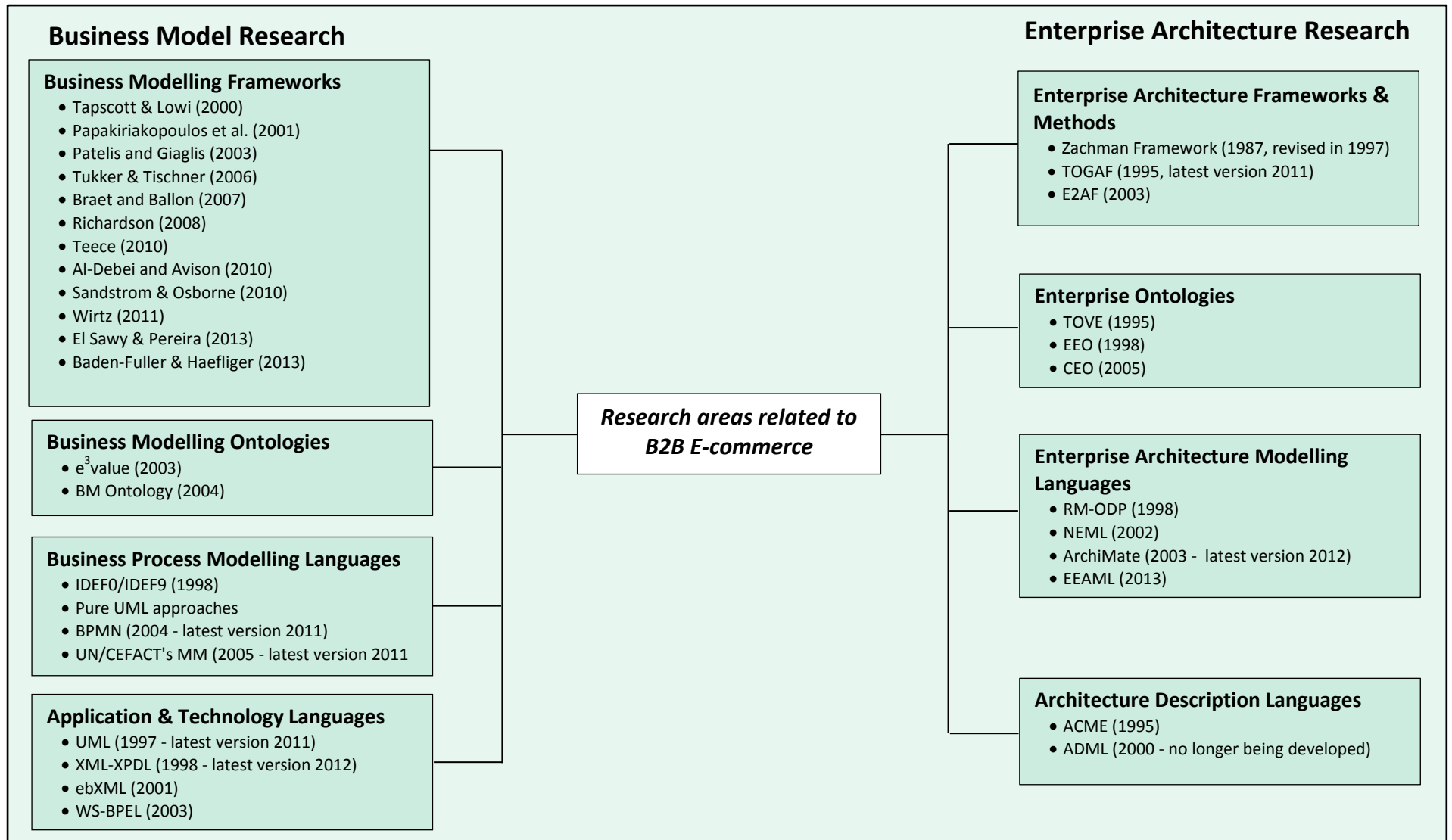
To overcome the above barriers and to achieve a smooth and successful development of e-business model for B2B E-commerce, interested parties (managers, business/IT consultants, IS designers) use an overwhelming quantity of approaches, methods, and specifications introduced in two different research areas, namely in *Business Model* research and in *Enterprise Architecture* research. An overview of these

works is presented in figure 1.1. All these works are related to the different aspects of B2B E-commerce – organisational, operational, and technological – and they use various concepts defined as components in order either to describe the business logic, or to design the business process model, or to implement an e-business application. However, an overlap exists between concepts as each research area provides its own concepts, based on a specific aspect of B2B E-commerce. The result is a mixture of concepts with the same meanings but different names.

On *Business Model* research the initial works do not give priority to business model components; simply present a set of criteria for the selection of a business model (Mahadevan, 2000) and some gives guidelines (Linder & Cantrell, 2000) or an action plan (Petrovic, Kittl, & Teksten, 2001) for changing one or more dimensions of an existing business model. Over time the focus changed, ranging from establishing taxonomies of business models (Tapscott & Lowi, 2000), to describing the components of the value creation process (Papakiriakopoulos, Poulymenakou, & Doukidis, 2001), to structuring business models into sub-domains, with the sub-domain definitions forming an individual part (Pateli & Giaglis, 2003). Then business model ontologies are created such as a) e<sup>3</sup>value ontology (Gordijn, De Bruin, & Akkermans, 2002) and b) Business Model ontology (Osterwalder A. 2004 ) that describe the business logic components by providing a set of vocabularies and concepts-partly repeating and overlapping. Finally it concluded that only a limited view of a business model is presented (Shaw, 2008), and business modelling research's interest emerged in other aspects of business model like in the organisational (Braet & Ballon, 2007), operational (Richardson, 2008; Al-Debei & Avison, 2010) (Wirtz, 2011); product/service (Sandstrom & Osborne, 2010; Ludeke, 2010), technological (El Sawy & Pereira, 2013; Baden-Fuller & Haefliger, 2013).

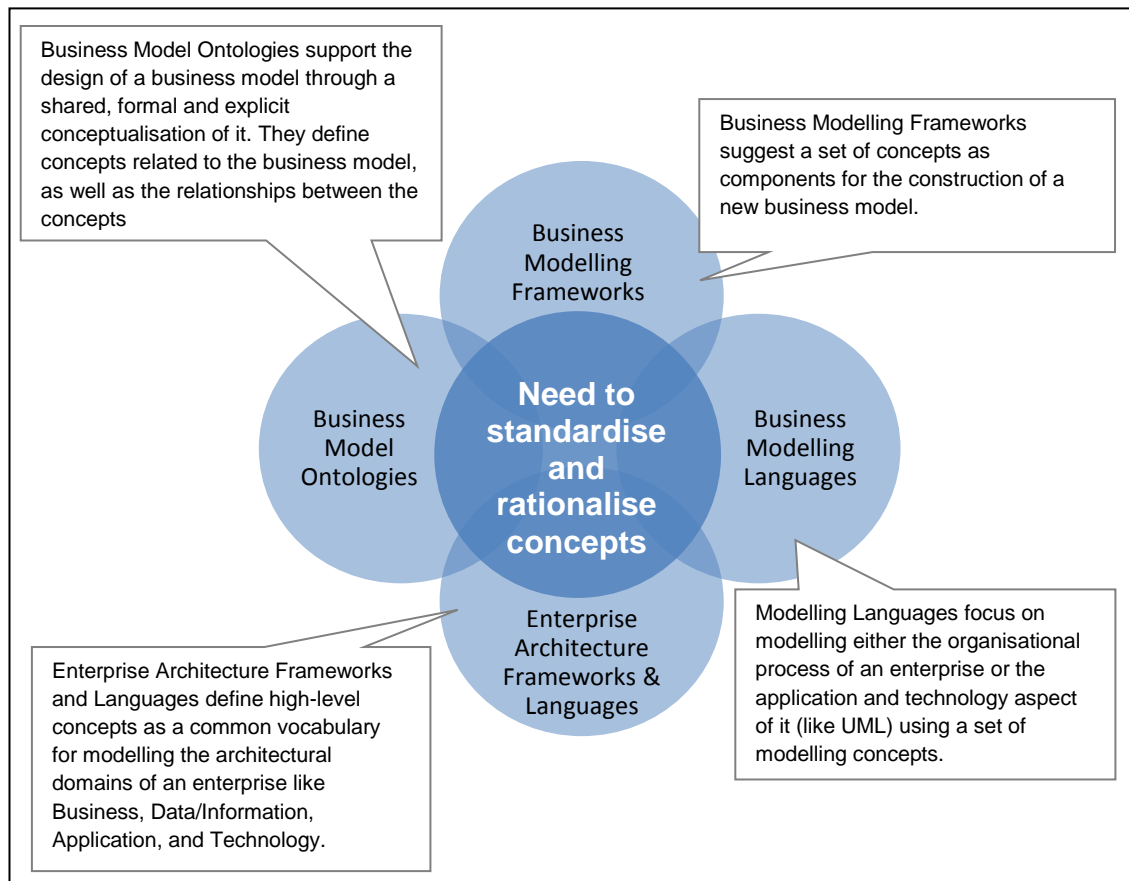
On the other hand, *Enterprise Architecture* research focus on other components related with information systems, equally important when developing e-business models and in particular for B2B E-commerce. Enterprise Architecture describes how companies do business and how information systems support the way they do business. Enterprise Architecture frameworks such as Zachman (1987-1997), TOGAF (1995-2011), E2AF (2003) use concepts to describe the components of an enterprise. New Enterprise Architecture Modelling Languages such as ArchiMate (2012) and EEAML (2013) provide also concepts and techniques for modelling the architectural domains of an enterprise like Business, Data/Information, Application, and Technology.





➤ **Figure 1.1 Research areas related to Business to Business Electronic Commerce**

All these works have significantly helped the understanding of the existing business models and the development of new ones. However, the evidences (elucidated in chapter 2) reveal a Babel tower of concepts with the same meanings but different names to describe the business model components; making obvious that there is not a standard language or conceptual notation to describe the architecture of a business model. This lack of standards makes the whole development of e-business model complex and unpredictable. Figure 1.2 depicts a summary of the overlaps.



**Figure 1.2 Need to Standardise and Rationalise Concepts**

This research aims go one step further by integrating and systematising the existing work, and standardising and rationalising the existing concepts to propose a set of concepts for the description of the Business Model Architecture; namely the components a) for the synthesis of a business model for B2B E-commerce, or b) for the development of a B2B E-Commerce application.

## **1.2 Research Questions**

This work is part of the above large research field that elicits a lot of questions. Therefore the scope of this research had to be narrowed and explicitly defined. This resulted in an attempt to provide answers only to these questions that are crucial for this work. Initially, during the review of relevant literature the following key questions were raised:

*RQ1) What is a business model and what are the components of a business model?*

*RQ2) What concepts can be used to describe the architecture of a business model?*

*RQ3) How can an e-business model be developed and how can a traditional business model be changed to an e-business one?*

A whole range of practitioners and researchers have worked on these questions, but still some are not answered with a theoretical grounding. This work is part of this new research field in business models but it focuses on the business model architecture for B2B E-Commerce which is relatively new and not addressed adequately until now. So, after further review two more questions that need further investigation were added:

*RQ4) What is the architecture of e-business models used for B2B E-Commerce?*

*RQ5) How can the architecture of business model be used in order to synthesise an e-business for B2B E-Commerce?*

## **1.3 Research Aim and Objectives**

This research aims to answer the above questions by developing a framework for the architecting of e-business models, especially those used for B2B E-Commerce. The intentions of this research are:

1. To elucidate the architecture of the existing business models used for B2B E-Commerce;
2. To develop a business model architecture conceptual notation necessary for the description and design of the e-business model for B2B E-Commerce;
3. To define the process for developing an e-business model for B2B E-Commerce;
4. To develop the framework for the architecting of e-business models used for B2B E-Commerce;
5. To validate the framework using mixed methods approach (Survey, Case Study, Interviews)

## 1.4 Research Plan

The following table presents the main research activities that will be taken for the achievement of each research objective.

**Table 1.1 Research Plan: Research Objectives and Activities**

Research Objectives	Research Activities
<b>1. To elucidate the architecture of the business models used for B2B Electronic Commerce</b>	1.1 Investigate the existing e-business models used for B2B EC 1.2 Identify e-business model's architectural components 1.3 Define a visual architectural representation of e-business models
<b>2. To develop a business model architecture conceptual notation necessary for the description and design of a e-business model for B2B EC</b>	2.1 Understand the existing <i>business model</i> definitions 2.2 Evaluate the existing <i>business model</i> definitions 2.2 Define a working definition for the term <i>business model</i> 2.3 Investigate existing work on business model architecture, on ontologies and languages used for business model description. 2.4 Understand concepts and techniques used to describe business model architecture 2.5 Define my <i>Business Model Architecture</i> concepts 2.6 Classify my <i>Business Model Architecture</i> concepts
<b>3. To define the process for developing an e-business model for B2B EC</b>	3.1 Investigate the existing frameworks and methods used for e-business model development; 3.2 Understand the key aspects of each framework and method; 3.3 Define the process for developing an e-business model for B2B EC;
<b>4. To develop the proposed framework for the architecting of e-business models used for B2B E-commerce</b>	4.1 Explain the philosophy, approach, and scope of the framework; 4.2 Present the main steps of the framework; 4.3 Describe the stages for developing an e-business model for B2B EC;
<b>5. To validate the framework using mix techniques</b>	5.1 Run a survey to validate the framework's design 5.2 Apply the framework to two case studies to test and evaluate the validity and applicability of the framework 5.3 Carry out interviews with case studies' stakeholders to evaluate the framework's performance. 5.4 Revise, Refine and Generalise the Framework

## **1.5 Thesis Outline**

Chapter 1 presented the motivations of this research, the problem statement, the research objectives, and the main research activities that were taken for the achievement of each research objective.

Chapter 2 gives an overview of the existing research and developments in the research field; it a) investigates the origins, the terms and the concepts of business models; and b) evaluates the business modelling frameworks and methods used for the change and development of business models.

Chapter 3 opens up with the philosophical background that underpins this research, and also describes the research framework and approach used for this work. At the end, the chapter defines the research strategy and presents the chosen research methods used at each stage of the research providing justification.

Chapter 4 presents the major contribution of this thesis: the Business Model Architecture Framework (BMAF) for B2B EC. It a) defines what is meant Business Model Architecture (BMA) in this thesis, b) studies the architecture of the existing models used for B2B EC, c) develops a BMA conceptual notation defining the concepts, suggesting precise unambiguous text definitions for each concept, and providing guidelines for the behaviour of each concept as well as their relations, c) describes the stages of the BMAF for the construction/reconstruction of a business model.

Chapter 5 explains the validation process of the proposed BMAF using an online survey– among a group of experts and practitioners in the field of business and computing.

Chapter 6 presents the qualitative validation of the BMAF. In particular it details a) the application of the framework to two real-world case studies in order to test and evaluate the validity and the applicability of the framework, and b) the findings of interviews with the case studies' stakeholders in order to evaluate how well the BMAF performs its objectives.

Chapter 7 summarises the conclusions of the various steps taken in the research project from the introduction chapter to the results. This chapter also highlights some of the major contributions that this project has made to knowledge. It finally makes recommendations for further studies as well as for the outcomes of this project.

## CHAPTER 2. INVESTIGATION OF PROBLEM DOMAIN

### 2.1 Introduction

This chapter presents the main areas of the problem domain in known as “*Business Modelling*”. In particular, a) the origins, the terms and the concepts of business model are investigated; b) the business modelling frameworks and methods used for the change and development of business models are reviewed; the enterprise architecture languages related to the research were explored.

### 2.2 Business Model Literature Review

#### 2.2.1 Business Model Concept and Definitions

The concept of business model was first introduced in 1975, in process and data modelling and information management literature. In the late 1990’s, when the use of the internet created the a new foundation for the development of new business models - known as internet based business models or as e- business models - the concept received an enormous attention (Amit & Zott, 2001). From that time a massive literature on *business model* term is proposed by academics and business practioners. In 2000, the term *business model* yielded 600 hits in Google, and ten years later this has increased to 102 million hits. Performing a recent detailed analysis of the use of the term business model in academic and non-academic articles - using the EBSCOhost database – the results (see Figure 2.1) reveal a continuing increase in the incidence of the term.

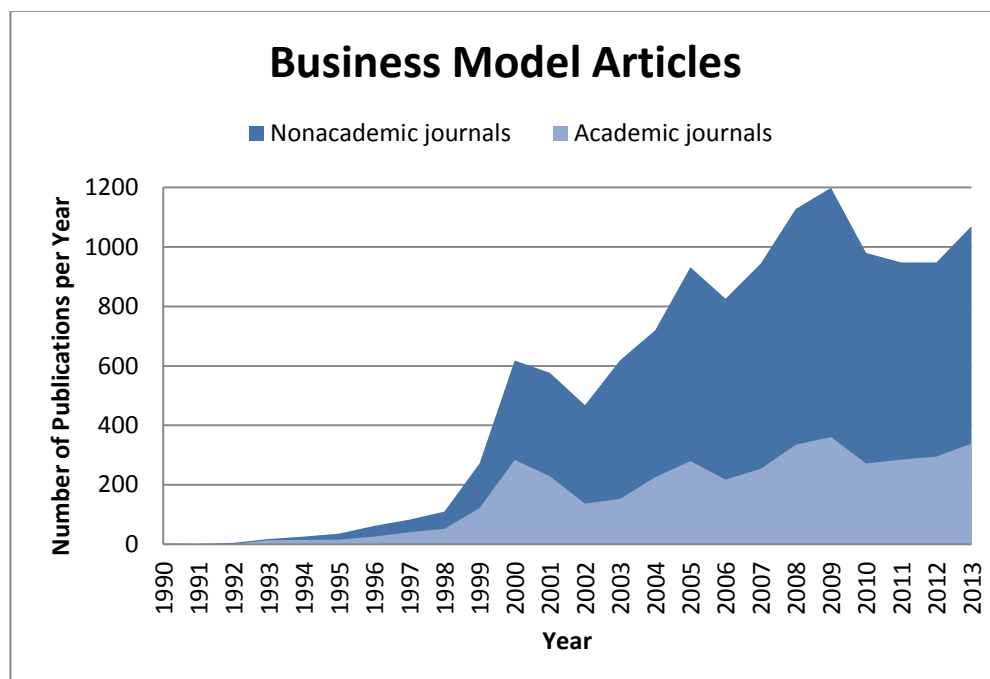


Figure 2.1 Number of Academic & Non-Academic articles related to the term *Business Model*

During the period of January 1990 to December 1999, the term had been mentioned in 908 documents. After this period, the interest in the concept virtually exploded; from 2000 to 2009, 2,477 academic and 8,031 non-academic articles on business model research have been published, making a total of 10,508 articles. Over the last three years only, 5,137 publications that contained the term *business model* have been revealed. Figure also indicates that academic research on business models seems to lag behind practice.

Surprisingly, although the business model is often studied, there is not an explicit definition of the concept. According to Zott, Amit, & Massa (2011) and their review of 103 business model publications, more than one third (37%) do not define the concept at all, taking its meaning more or less for granted. Fewer than half (44%) explicitly define or conceptualize the business model, for example, by enumerating its main components. The remaining publications (19%) refer to the work of other scholars adopting the definition. Moreover, existing definitions only partially overlap, giving rise to a multitude of possible interpretations.

An early view on business model, P.Timmers (1998) initially defined business model as the architecture for the product, service and information flows, including a description of the various business actors and their roles, and a description of the potential benefits for these actors, and the sources of revenues (Timmers, 1998). Similarly, influenced by this definition, other authors such as Weill & Vitale (2001) defined business model as a description of the roles and relationships among a firm's consumers, customers, allies and suppliers that identifies major flows of product, information and money and major benefits to participants. Some authors simply perceive a business model as a description of a complex business that enables study of its structure, the relationships among structural elements, and how a business model will respond to the real world (Applegate, 2001). Similarly, Pateli & Giaglis (2003) highlight the primary components of a business model and their possible relationships.

Other authors defined business model from a different perspective. According to them it is a statement of how a firm will make money (Steward & Zhao, 2000). It is the organisation's core logic for creating value that lies behind the actual processes (Linder & Cantrell, 2000;). Its main goal is to answer the question: "who is offering what to whom and expects what in return" (Gordijn, *et al.*, October 2000). It spells out how a company makes money by specifying where it is positioned in the value chain (Rappa, 2001; Petrovic, *et al.* 2001). More specifically it is a method by which a firm builds and

uses its resources to offer its customer better value than its competitors – that is generate revenue (Afuah & Tucci, 2001).

In some cases both above perspectives are included in the business model definitions. Hawkins (2001) defined business model as a description of the commercial relationship between a business enterprise and the products and/or services that it provides in the market; and he added it is a way of structuring various, cost and revenue streams such that a business becomes viable, usually in the sense of being able to sustain itself on the basis of the income it generates. According to Magretta (2002) a business model is like a story that explains how an enterprise works, how an enterprise deliver value to customers at an appropriate cost. The primary components such as product/service architecture, business actors are described, as well as the possible relationships and actions for creating value.

A number of authors introduce business model definitions quite similar to the above, incorporating an additional dimension. They consider the relationship of business model with business strategy. For example Osterwalder & Pigneur (2002) view business model as the link between business strategy and business processes. They conceive it as a description of the value a company offers to one or several segments of customers, and as the architecture of the firm and its network of partners for creating, marketing and delivering this value and relationship capital, in order to generate profitable and sustainable revenues streams. Elliot (2002) also distinguishes business model and business strategy arguing that business models specify the relationships between different participants in a commercial venture, the benefits and costs to each and the flow of revenue; and business strategies specify how a business model can be applied to a market to differentiate the firm from its competitors. Similarly Seddon & Lewis (2003 July) supports that a business model is an abstraction of the firm's strategy that may apply to many firms. In the same vein, Leem, et.al (2004) defines it as a set of strategies for corporate establishment and management including a revenue model, high-level business processes, and alliances. Moreover, researchers and business practioners, emphasise the need to clarify the relevance between the *business model* concept and other related concepts such as business strategy and business process model, but they also list the business model definition on the top of their proposed agenda for future research on business models (Pateli & Giaglis, 2004). Seppänen & Mäkinen (2005) argued, there is a need for an unambiguous definition.

Thus, the relation among business strategy-business model-business processes is also discussed in the literature quite often (Campanovo & Pigneur, 2003; Tikkanen et



al., 2005; Rajala & Westerlund, 2005. This approach explains these connections considering different business “layers”, where a business model is an interface or a theoretical layer between the business strategy and the business processes. According to Richardson, 2008 a business model helps to link the firm’s strategy, or theory of how to compete, to its activities, or execution of the strategy. Although it is generally agreed that there is a link between both concepts and that they are not the same thing (Magretta, 2002), the discussion about differences and relationship between business strategy and business model is still not solved (Al-Debei, *et al.* 2008).

An extended definition based to the previous business model literature is proposed by Wirtz (2011), according to him “*“A business model is a simplified and aggregated representation of the relevant activities of a company. It describes how marketable information, products and/or services are generated by means of a company’s value-added component. In addition to the architecture of value creation, strategic as well as customer and market components are considered in order to realize the overriding objective of generating and preserving a competitive advantage.”* This is a general definition, based on a broad perspective that describes the business model components associated with the strategic point of view.

The result is that is not a generally accepted definition of what is a business model; according to Sabir, *et al.* (2012) the theoretical grounding of most business model definitions is rather fragile. Several authors have made in the last years a review of publications on business model concept (Al-Debei & Avison, 2010; Bask, *et al.* 2010; Teece, 2010; Zott, *et al.* 2011; George & Bock, January 2011). The detailed analysis of definitions of the business model by Al-Debei and Avison, (2010) proved that authors mean different things when they write about business models. The analysis of publications carried out by Zott *et al.* (2011), suggested for this concept some common themes, such as (1) the business model as a new unit of analysis, (2) a holistic perspective on how firms do business, (3) an emphasis on activities, and (4) an acknowledgement of the importance of value creation. George and Bock, 2011 made a similar analysis but more focused on the organizational theory and entrepreneurship. These authors found six broad themes for business model concept as commonly described and reflect on (1) the organizational design, (2) the resource-based view of the firm, (3) a narrative and sense making role of the business model, (4) the nature of innovation, (5) the nature of opportunity, and (6) the structure and governance of transactions, such as the streams of logistics and revenue.

The above literature review - on *business model* concept - reveals that the term business model is defined differently and each definition is derived from a different view. The number and diversity of definitions it is difficult to explain or even to describe in a few words a complex and diverse concept that should reflect reality. The studies confirm that the term is still fuzzy and vague and still in its conceptualisation phase, despite its perceived importance. As scholars do not agree on business models in general, they are also unanimous in the question what the essential components in a business model are (Kuparinen, Business Model Renewal and its Networking Aspects in a Telecom Service Company, 2012). As we will see in the next section - there is not a consensus regarding the business model components as well as their definitions.

### **2.2.2 Business Modelling Frameworks**

Along the literature in the last decade, there are several frameworks for business modelling. Not all of them are called as *frameworks*, each researcher or practitioner use a different term; some they called their work simply as *steps* or *stages*, other as *approach*, or as *method*, or as *ontology*, or sometimes either *tool*. And although that all works aim to the transition from the current to a future business model, it has been considered by different perspectives; to *extent* a business model (Linder & Cantrell, 2000), to *select* one (Tapscott & Lowi, 2000), to *guidance for change* (Petrovic, *et al*, 2001), to *build/contract* (Papakiriakopoulos, *et al*. 2001), to *evolute* (Pateli & Giaglis, 2005), to *renew* (Doz & Kosonen, 2010), to *transform* (Aspara, *et al*. 2011). Similarly, not all of authors use the term *component* to describe the parts of a business model; in addition they have used terms such as *stream* (Mahadevan, 2000), *element* (Papakiriakopoulos, *et al*. 2001), *functions* (Chesbrough & Rosenbloom 2002), *building blocks* (Osterwalder A. 2004), *dimensions* (Schweizer 2005). In some cases, for instance Demil and Lecocq (2010) argue that components are further divided into elements, but in general all of the terms can be used interchangeably.

In addition, the literature for *Business Modelling* can be seen as having progressed into phases (Gordijn, *et.al*. June 2005). In the initial phase, when the term business model started to become prominent, a number of authors proposed works for selection of a business model for Electronic Commerce (Tapscott & Lowi 2000; Mahadevan 2000) or give guidelines for extending an existing business model (Linder & Cantrell 2000). Then, during the second phase authors started to analyse the external factors (Van Hooft & Stegwee 2001) and to introduce works for e-business strategy

formulation (Petrovic, Kittl, & Teksten, 2001; Papakiriakopoulos, et.al. 2001). In the third phase works give emphasis on proposing what components belong into a business models. Initially, these propositions were simple a list - just mentioning the business model components (Alt & Zimmermann, 2001) followed soon by guidelines on how to identify these components (Afuah, A., & Tucci, C., 2001; Stähler, 2002); in the meantime during this phase some authors defined phases and steps for business model description (Pateli & Giaglis, June 2003). In a fourth phase researchers started to model the components conceptually culminating in business model ontologies (Gordijn, 2002; Osterwalder A. 2004). In the fifth phase, the business modelling research's interest emerged in other aspects of business model like in the organisational (Braet & Ballon, 2007), operational (Richardson, 2008; Al-Debei & Avison, 2010) (Wirtz, 2011); product/service (Sandstrom & Osborne, 2010; Ludeke, 2010), technological (El Sawy & Pereira, 2013). Baden-Fuller & Haefliger (2013).

***Phase 1: Selection of an E-business Model***

Early works on business modelling research simply restricted to either provide criteria for the selection of an e-business model (Tapscott & Lowi 2000; Mahadevan 2000) or guidelines for extending one or more of the dimensions of the existing business model (Linder & Cantrell 2000). As we will see in the next paragraphs, researchers and practitioners presented works making elucidation only on a limited number of business model components. For example, Tapscott & Lowi (2000)'s work focuses only on the how the value exchanges among the participants (partner, customer, and supplier) providing six steps (presented in Figure 2.2) that finally limited to strictly select one of the five suggested *web type* business models.

- Step 1:** Describe the current value from the customer's viewpoint;
- Step 2:** Disaggregate: Consider the five categories of value contributors (end-customer, context provider, content provider, commerce service provider, infrastructure service provider) and their contributions, strengths, and weaknesses;
- Step 3:** Envision b-web-enabled value: this step concerns the definition of future scenarios for the new value proposition through brainstorming and other design techniques;
- Step 4:** Reaggregate: Define what it will take to deliver the new value including processes, contributors, contributions, applications and technologies, and other success factors.
- Step 5:** Prepare a Value Map. To visualise the new value-creating system, construct a value map, including the key participants and the most important among them.
- Step 6:** Do the business web Mix. Define a business web typing strategy. The new web type business model will correspond to one of the five business web types: Agora, Aggregation, Value Chain, Alliance or Distributive Network.

**Figure 2.2 Steps proposed by Tapscott & Lowi (2000)**

Similarly to Tapscott & Lowi (2000), Mahadevan (2000)'s work also is narrowed to the selection of an appropriate e-business model that involves picking up the right mix of alternatives. According to Mahadevan a business model consists of a configuration of three streams (see in Table 2.1) considered by the author as critical to the business. The alternatives are presented under the three streams indicating the possible options available to an organisation, based on the market structure - *portals*, *market maker*, *product/service provider* - that organisation has adopted.

**Table 2.1 Business Model Streams proposed by Mahadevan (2000)**

Streams	Description
<b>Value Stream</b>	It identifies the value proposition for the business partners and the buyers
<b>Revenue Stream</b>	A plan for assuring revenue generation for the business
<b>Logistical Stream</b>	It addresses various issues related to the design of the supply chain for the business

In the same vein, Linder & Cantrell (2000)'s work does not include a real change but a perspective alteration; it describes the path which a company should take in order its current business model to become a better business model. Initially they presented six business model components (see in Table 2.2) ranging from the revenue model and the value proposition to the organisational structure and the arrangement for trading relationship. They don't include a description or a definition for each component but a list of examples. They clarify that each may be an important part of a business model, but not the whole thing.

**Table 2.2 Business Model Components proposed by Linder & Cantrell (2000)**

Components	Examples
<b>Pricing Mode</b>	a) Cost plus, b) CPM (cost per thousand)
<b>Revenue Model</b>	a) Advertising or broadcast model, b) Subscription or cable model, c) Fee-for-service
<b>Channel Model</b>	a) Bricks 'n' mortar b) Clicks 'n' mortar, c) Direct-to-customer
<b>Commerce Process Model</b>	a) Auction, b) Reverse auction, c) Community
<b>Internet-enabled commerce Relationship</b>	a) Market-maker, b) Aggregator, c)Virtual supply alliance, d) Value network
<b>Organisational Form</b>	a) Stand-alone business unit, b) Integrated Internet capability
<b>Value proposition</b>	a) Less value and very low cost, b) More value at the same cost, c) Much more value at greater cost

For a better business model, Linder & Cantrell (2000) provide questions that target to identify the current business model's sources of revenue and by giving possible answers to extend them in order to sustain the competitiveness. They introduce four basic types of change model - *Realization Model*, *Renewal Model*, *Extension Model*, and *Journey Model* – that indicate the degree of the core logic change in a business model (Linder and Cantrell, 2001). By acknowledging this degree they support that a company can estimate the existing potential for change and predict the impacts of a change, but from the practical point of view, the logic of the current business model does not change.

Summarising the evidences the above works, their objective is not to change the current business model or develop a new business model, but to choose one of the existing possible e-business models. They address the business logic of a company take into account the value creation process and using a short list of business model components providing only examples and no descriptions. According to Schafer *et.al* (2005) the use of few business model components only leads to making flawed or untested assumptions about crucial aspects of the business model. Therefore, a misunderstanding about value creation and value capture or the inability of company to financially capitalize on the value that it creates, can negatively affect the revenue generation aspect of a business model.

### ***Phase 2: Analysis of the factors and formulation of an e-business strategy***

During the second phase of business modelling research, the scope of works is limited to a future possible change of the business model analysing the internal, external and competitor, and critical factors in order develop an action plan for change. Priority is still the modelling of the business logic and the analysis of components regarding the value creation process. Only some authors (Papakiriakopoulos, *et.al.* 2001) add new business model components like participating *actors* (e.g. stakeholders) and describe the *relationships* between them in order to capture better the value chain concept.

Van Hooft & Stegwee (2001) suggests that the analysis of internal, external and competitor factors will clarify the strategic e-business vision of an organisation. Stockdale & Standing (2002) in their proposed work for organisations seeking to participate in an e-marketplace, support that issues such as the internal company factors, the business drivers of the electronic marketplaces and the facilitators that contribute to the likely success of an e-marketplace, should be used as the main critical issues for decision making. Lee (2001) equally emphasises that these factors are important for e-commerce success. In short these works target to intepret the critical factors and to

facilitate the decision making process without recommending ways for changing or development a business model.

Petrovic, Kittl, & Teksten, (2001) similarly adapt and modify a problem solving approach in order a) to identify the problem of the current business model and its factors, and b) to identify the possibilities for changing the problem situation developing an action plan. The aim is restricted to the process of formulating an action plan considering the analysis of the micro and macro business environment, and to clarify some possibilities for changing a business model rather than to guide the real change.

Papakiriakopoulos, et.al. (2001) also bounds on the analysis of several issues associated with the business environment. However, they identify two new components (Table 2.3) that a business model is consisted of and they apply 4 steps (Figure 2.3) to investigate the evolution of the market structure.

**Table 2.3 Business Model Components proposed by Papakiriakopoulos, et.al. (2001)**

Components	Description
<b>Actor</b>	It quotes organisations having a common understanding of the market, produce same products or services, maintain a common set of business processes etc.
<b>Relationship</b>	It is referring to the transactions between two or more players. Both components are “static” because they are presenting an instance of the whole business environment.

**Step 1. Identification of players:** This stage aims to identify the stakeholders of the market where the business model will be applicable. The results of this stage are the definition of participating actors, the strategy (business objectives) and the boundaries for each participant in the business model.

**Step 2. Highlight the Value Flows:** The second stage in the method is the description of the relationships between the participants, holding the perspective to capture the value chain concepts.

**Step 3. Identification of key competitive drivers in the market:** The third step combines at a more detail level the relationships and the roles for each player in order to clarify the positioning of each player. Following the business objectives of each player, two basic things need to be defined; the difference between the instances of the same business entity and how these affect the business model, and second the nature of competition in the market.

**Step 4. Construction of Feedback Chain:** Feedback Chain, as complementary to the value chain, aims to examine and collect all the information resources that could help and empower some processes that are placed on the Value Chain.

**Figure 2.3 Steps proposed by Papakiriakopoulos, et.al. (2001)**

During each step, they highlight several issues corresponding to four elements (Table 2.4): Coordination, Cooperation/Competition, Customer Value, Core competence. This is clear example where authors present business model components using the term *elements*; and it is also an example of a mixture the meaning of the term *Value Proposition* with *Customer Value* where both describe the same, namely the value that a customer will receive by the business.

**Table 2.4 Elements of the framework proposed by Papakiriakopoulos, et.al (2001)**

Elements	Description
<b>Coordination</b>	It is defined as the management of dependencies among activities. As dependencies reflect the interconnections between the resources and the activities, the chosen coordination process affects the way the business is carried out as well as the structure of the market.
<b>Cooperation/Competition</b>	It highlights the relationship to other companies, which can be competitive, co-operative, or both at the same time. Several companies that were competitors have been merged in order to repose in several business models.
<b>Customers Value</b>	It describes the market and customer needs.
<b>Core Competence</b>	They define how a firm exploits its resources facing the opportunities of the market.

A further limitation of Papakiriakopoulos, et.al (2001) work is that the four and final step aims at constructing as so they called a “feedback chain”. This is quite generic technique that subject to limitations examining and collecting information resources that could help and empower only some processes placed on the value chain. The outcome is a very high level of the new business model’s structure that limited to presents the actors and their roles, and only the financial relationships between them. The analysis is also focused on industry level change only, making the work applicable to a small group of business segments.

In summary, the above proposed works are aligned with the strategic aspect of business model change. Papers typically presented what is believed to be the critical factors about what makes business model change possible - in some cases they focus so much that restricted to the possibilities for changing, not the change itself. They give the impression that presents a business model, while only the value creation part of business more is presented. Investigating one aspect of how a company does business without looking at the entire picture is, however, dangerous and does not make sense (Goethals, *et. al.* 2004).

### ***Phase 3: Identification of Business Model Components***

On the other hand during the same period, some scholars' work shifts from the analysis of the factors for the formulation of a strategy to the identification of business model components using a list of questions. Although they make a step further introducing more components considering also other aspects of a business model (e.g. legal issues and technological changes) and they don't describe their relationships among the components. For example, Alt & Zimmermann, (2001) distinguish six generic business model components (illustrated in table 2.5) giving a short description for each; the first four defining vertical dimensions of a business model such as mission, structure, processes and revenues, and the rest two defining the horizontal dimensions such as the legal and technological requirements and constraints that affect all business models.

**Table 2.5 Business Model Components proposed by Alt & Zimmermann, (2001)**

<b>Components</b>	<b>Description</b>
<b>Mission</b>	A critical element of the business model is developing a high-level understanding of the overall vision, strategic goals and the value proposition including the basic product or service features.
<b>Structure</b>	It determines the roles of the different agents (actors and government) involved and the focus on industry, customers and products.
<b>Processes</b>	They provide a more detailed view on the mission and the structure of the business model. It shows the elements of the value creation process.
<b>Revenues</b>	They are the "bottom line" of a business model. Sources of revenue and necessary investments need to be carefully analysed from a short and mid-term perspective as well.
<b>Legal issues</b>	They influence all aspects of the business model and the general vision
<b>Technology</b>	It is an enabler and a constraint for IT-based business models. Also, technological change has an impact on the business model design.

Afuah & Tucci, (2001) introduce a strategic approach in which the business model is conceptualised by means of a set of components that corresponds to the determinants of company profitability. Their work defines the components answering a number of questions. Firstly, *what value offer to customers*; a firm must ask if it is offering its customers something distinctive or at a lower cost than its competitors; this is defined as **customer value**. Then, *which customers provide the value to*; company must define to what customers it is offering value and what range of products and services embody this value. This describes the **scope** of business model. Thirdly, *how the firm prices the value it offers (pricing)*, and *who is in charge for it*; a firm must ask itself where the income comes from and who will pay for what value and when. It must also define



margins in each market and find out what drives them (**revenue source**). Further, *what strategies are undertaken in providing the value* should be determined, including the set of **connected activities** that the firm has to perform to offer its value as well as the organisational structure, systems, people, and environment that suit the implementation of connected activities best. A firm has also to find out *what its capabilities are* and which capability gaps it has to fill. It should ask itself if there is something distinctive about these **capabilities** that allow the firm to offer the value better than other firms and that makes them difficult to imitate. Finally, a company should understand *how to sustain any advantage from providing the value* (**sustainability**); what it is about the firm that makes it difficult for other firms to imitate. It must define how it can keep making money and sustain a competitive advantage.

On the same track, Stahler's (2002) work defines four main business model components, answering four key questions. The first component is the **value proposition** that describes *what value a customer or partner (e.g. a supplier) receives from business*. The second is the **product or services** that the firm provides in the market, which answers the question of *what the firm sells*. Thirdly, the **architecture of value** component, delineating the value chain, the economic agents that participate in the value creation and their roles explains *how the value is created and in what configuration*. Finally, the **revenue model** of a business model describes *how a company earns money*; the basis and the sources of income for the firm.

Synthesising previous research works (Petrovic, et al. 2001; Pramataris, et al., 2001; Alt & Zimmermann, 2001) with a scenario based approach for designing an IT strategy (Kulatilaka & Venkatraman, 2001), Pateli & Giaglis, (2003) propose an stepwise work (presented in Figure 2.4) for design alternatives scenarios for business model evolution or extension. In particular, their work intend in a situation when a company has innovative technology that influences its business and thus its current business model. The primary limitation of such a contribution concerns the driver of the change, which is considered to be a technology innovation rather than a business opportunity. Secondly although that a set of alternative future business models - in the form of scenarios - gives the opportunity to the strategic managers to select the scenario (that better suits to the company) the numbers of possible scenarios can be almost endless; without a clear direction the key factors and description are difficult to limit. Also, the scenario practice is very time-consuming process and it is tempting to condense the scenario work which may not allow enough time for developing the part of existing preconceptions (Mietzner, 2004).

**Phase 1. Understand:** This phase is concerned with a detailed analysis and documentation of the existing business model. Namely

Step 1. Document the current business model

The initial step aims to understand the current business environment including the key elements of the business model and their relationships, the business and technology stakeholders, the valid requirements for technology innovation, and possible options for changing and extending the current business model.

**Phase 2. Identify Technology's Influence:** This phase is concerned with assessing the impact of technology innovation on the current business model. The anticipated result is the identification of possibilities for evolution or extension of the current business model.

Step 2: Assess the influence of technology innovation

This step aims to identify the benefits and impacts that a given technological solution brings to key elements of the business model and to specify the changes imposed on the current business model's structure.

Step 3: This step includes an identification of the requirement for one or more new roles that accomplish new business functions, and a description of the activities and the functions of each of these roles.

**Phase 3. Change:** This phase is concerned with the design and description of the future business model

Step 4: Define Scenarios

According to the outcomes of the previous step (3), a set of scenarios is defined each of which proposes a different cooperation scheme and way of distributing responsibilities between new and existing players in the business environment.

Step 5: Describe the new business models

Based on the above scenarios, this step revisits the current business situation as illustrated in the step 1. This step aims to describe one or more business models by indicating the value provided by each player in the future model, as well as defining financial and communication flows among players.

Step 6: Evaluate the impact of changes. This step aims to estimate the impact of the transformed business model on the structure and dynamics of the market concerned.

**Figure 2.4 Steps proposed by Pateli & Giaglis, (2003) for business model evolution**

Finally, Pateli & Giaglis, (2003) present an extension of Alt & Zimmermann (2001) components adopting the distinguish into horizontal and vertical dimension. According to the authors a) the horizontal one includes all the primary components of a business model, such as **Mission** (Strategic Objectives), **Target Market** (scope and market segment), **Value Proposition** (product/ service offering), **Resources** (capabilities, assets), **Key Activities** (intra- and inter-organisational processes), **Cost and Revenue Model** (cost and revenue streams, pricing policy), **Value Chain/Net** (alliances and partnerships); and b) The vertical include the underlying components of business models and the issues that outline the wider business and social environment of a business model such as **Market Trends**, **Regulation**, and **Technology**.

Summarising, nevertheless the above works attempt to identify the business model components by synthesising theoretical perspectives from previous works on strategy, business modelling, and e-business research. But they do not provide theoretical definitions - each component is presented by simple term supported only by a simple question without a description or an explanation of the meaning of the term. Also they do not theoretically integrate these components. According to (Shaw, 2008) this can have two implications in the business modelling; firstly, there is no theoretical justification for the completeness of the business model while there may be other components that could be added and there could be other levels that contain components, e.g. components that business model substitutes and complements and sub-component constructs. Secondly, it cannot be clear how the components interrelate below a certain level of changes. The relations between the components are only described in terms of causes produced by one component and affects upon another component. The actual relations are not described or explained and so it does not model how changes are transmitted between the components or why this is so.

#### ***Phase 4: Conceptualisation of Business Model***

In a fourth phase researchers started to model the components conceptually culminating in business model ontologies. During 2000 and 2004 two well-known ontologies were developed: the *e<sup>3</sup>value* ontology (Gordijn & Akkermans, May 2001) and the Business Model (BM) ontology (Osterwalder & Pigneur, 2002).

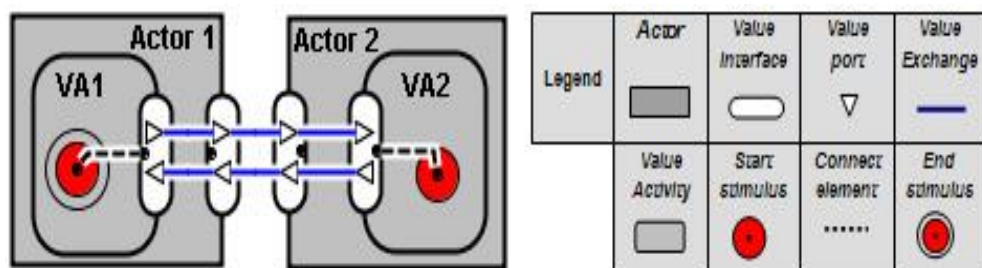
J. Gordijn & H. Akkermans during 2000 to 2003 proposed a lightweight ontology called *e<sup>3</sup>value* ontology that aims to define how economic value is created, interpreted and exchanged within a multi-actor stakeholder network of enterprises and customers (Gordijn, et.al, 2000). The *e<sup>3</sup>value* ontology concentrates only on the design of a value constellation's business model. It contains concepts (illustrated in Table 2.6) to describe the **actors** as independent economic entities, such as enterprises and consumers which exchange **value objects** like services, products or even experiences to make profit or increase their utility. A set of actors can be grouped into a **market segment**. A **value port** is used by an actor to show to its environment that he/she wants to offer or request value objects to or from other actors. A value port has a direction: in-going (e.g., receive goods) or out-going (e.g., make a payment), indicating whether a value offering is in to or out from the actor. A **value interface** consists of in and out ports that belong to the same actor. It shows the value object(s) an actor is willing to

exchange *in return for* other value object(s). A value exchange is used to connect two value ports with each other. A **value exchange** represents one or more potential trades of value objects between these value ports. A **value activity** is an operation that can be carried out in an economically profitable way for at least one actor (Gordijn & Akkermans, May 2001).

**Table 2.6 Business Model Components proposed by (Gordijn & Akkermans, May 2001)**

Components	Description
<b>Actors</b>	Actors are independent economic entities, such as enterprises and consumers which exchange value objects
<b>Value Objects</b>	Value Objects like services, products or even experiences to make profit or increase their utility.
<b>Market Segment</b>	A set of actors can be grouped into market segment
<b>Value Port</b>	A <b>value port</b> is used by an actor to show to its environment that he/she wants to offer or request value objects to or from other actors. A value port has a direction: in-going (e.g., receive goods) or out-going (e.g., make a payment), indicating whether a value offering is in to or out from the actor.
<b>Value Interface</b>	A <b>value interface</b> consists of in and out ports that belong to the same actor. It shows the value object(s) an actor is willing to exchange in return for other value object(s). A value exchange is used to connect two value ports with each other.
<b>Value Exchange</b>	A <b>value exchange</b> represents one or more potential trades of value objects between these value ports.
<b>Value Activity</b>	A <b>value activity</b> is an operation that can be carried out in an economically profitable way for at least one actor

To enhance understanding of these  $e^3$ value concepts, they are represented graphically (see Figure 2.5). It uses notation inspired by UML class diagrams to initially present the core concepts and their relations. The result is the visualisation of the value model, providing a common, more precise understanding of the idea among stakeholders.



**Figure 2.5  $e^3$ value Business Models Graphical Representation (Gordijn, et al. 2001)**

The graphical presentation of value model is supported by a lightweight scenario technique called Use Case Maps. UCMs show which value exchanges should occur as a result of an event, possibly caused by an actor. Scenario paths are used to explain the

causality of value exchanges. This operational scenario mechanism aims to “tell” the business model as a story to the stakeholders (Gordijn, *et al.* 2001). On the other hand, using UCMs and following the scenario paths it is able to account the number of value exchanges for each actor. Based on that profitability sheets can be created for each actor which show ingoing and outgoing value objects related to satisfied actor needs. The results can give an indication whether the business model is viable or not (Gordijn & Akkermans, 2003).

The *e<sup>3</sup>value* ontology provides significant contribution in the field as it introduces a conceptual and graphical approach for the design of the value creation process of a business model. But, it is restricted to modelling the actors’ exchanges only on the economic value view point, and no other interactions such as the exchange of control information between actors and business processes. This limited scope can have implications while requirements expressed on the one view point may influence choices to be made on another viewpoint. For instance, many solutions chosen on the business value requirements result in requirements on the business process viewpoint, and sometimes on the information system viewpoint. By modelling these relations explicitly, we can reason about choices for a particular feature and solution on each viewpoint (Gordijn, *et. al* June 2005).

In the meantime, Osterwalder & Pigneur, (2002) picked up also the idea of building ontology aiming at improving understanding, communication and flexibility in the business model domain. Influenced by the Balanced Scorecard approach (Kaplan and Norton 1992) and more generally business management literature (Markides 1999), they identified four main areas (called by the authors *pillars*, see in Table 2.7) that constitute the essential business model issues of a company.

**Table 2.7 Business Model Pillars proposed by Osterwalder & Pigneur (2002)**

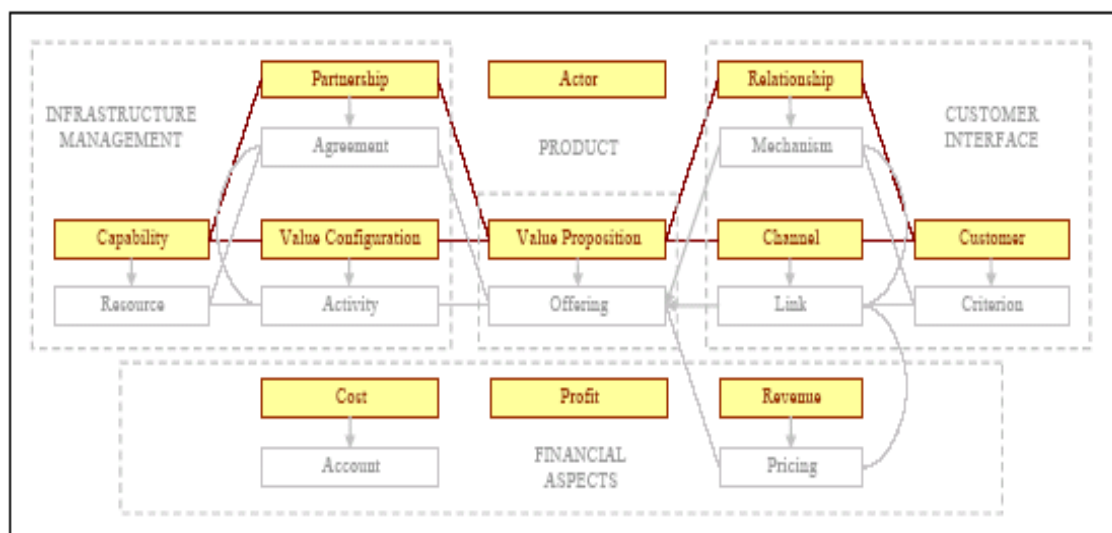
Areas (pillars)	Description
<b>Product</b>	What business the company is in, the products and the value propositions offered to the market.
<b>Customer Interface</b>	Who the company’s target customers are, how it delivers them products and services, and how it builds a strong relationship with them.
<b>Infrastructure Management</b>	How the company efficiently performs infrastructure or logical issues, with whom, and as what kind of network enterprise
<b>Financial Aspects</b>	What is the revenue model, the cost structure and the business model’s sustainability?

In a second step, these areas are broken down into a set of nine interrelated business model components (called by the author *buildings blocks*, see in table 2.8) that allow conceiving a business model.

**Table 2.8 Business Model Components proposed by Osterwalder & Pigneur (2002)**

Areas	Components	Description
Product	Value Proposition	A Value Proposition is an overall view of a company's bundle of products and services that are of value to the customer
Customer	Target Customer	The Target Customer is a segment of customers a company wants to offer value to
	Distribution Channel	A Distribution Channel is means of getting in touch with the customer
	Relationship	The Relationship describe the kind of link a company establishes between itself and the customer
Infrastructure Management	Value Configuration	The Value Configuration describes the arrangement of activities and resources that are necessary
	Capability	A Capability is the ability to execute a repeatable pattern of actions that is necessary in order to create value for the customer
	Partnership	A Partnership is a voluntary initiated cooperative agreement between two or more companies in order to create value for the customer
Financial Aspects	Cost Structure	The Cost Structure is the representation in money of all the means employed in the business model
	Revenue Model	Describes the way a company makes money through a variety of revenue flows

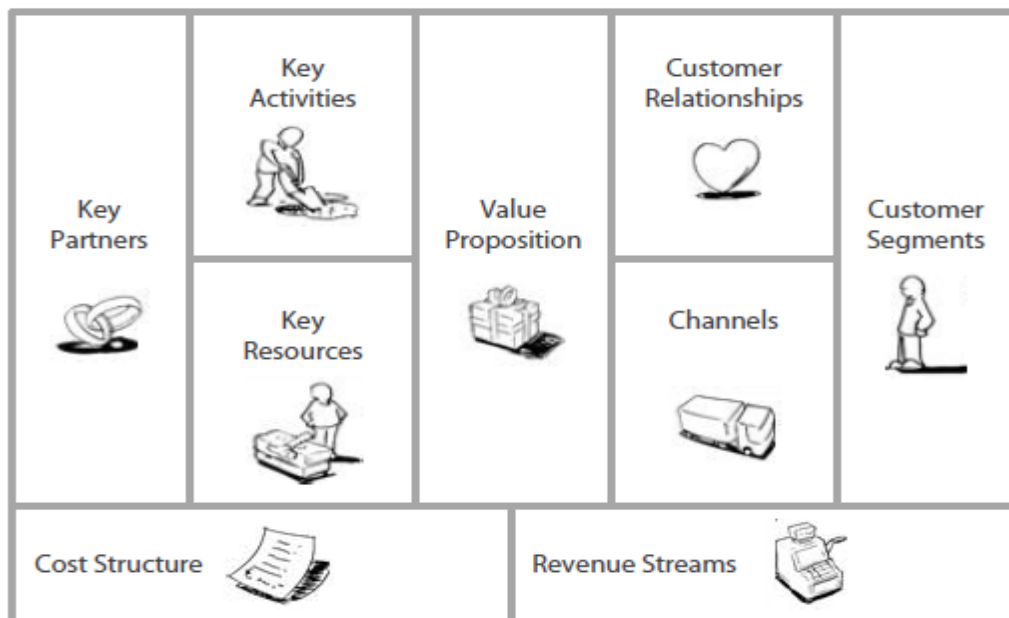
Every business model component is then decomposed into a set of defined sub-components. Figure 2.6 shows an overview of the BM ontology and how the specific components and sub-components, relate to each other. The yellow boxes indicate the components and the grey boxes indicate the related sub-components.



**Figure 2.6 Relations of the Business Model Components (Osterwalder & Pigneur, 2002)**

At the end, BM ontology is translated into formal description language called Business Model Modelling Language BM<sup>2</sup>L. This is nothing else than a codification of the ontology with an eXtensible Markup Language XML structure (XML being a meta-language to describe information). BM<sup>2</sup>L focuses on the representation of a company's business model, rather than concentrating on e-business processes. BM<sup>2</sup>L is situated at a higher level of abstraction of the business logic of a company (Osterwalder, 2004).

According to the later version of business model (BM) ontology (Osterwalder & Pigneur, 2010) the business model components still remain the same but lightly renamed - value configuration and capabilities to give a business ontology of value proposition, customer segments, channels, customer relationships, key resources, key activities, key partnerships, cost structure, revenue streams. They are also presented into a canvas (Fig.2.7) conceptual tool to help companies to develop their business models.



**Figure 2.7 Business Model Canvas proposed by Osterwalder & Pigneur (2010)**

Although that the BM canvas seeks to develop a more generic aspect with broad applicability across all industry sectors, case studies carried out with BM ontology reveals that a limited number of components and relations were captured to express a business model. For instance, a recent application of the BM canvas in a case of a telecommunication service company (Kuparinen, 2012) shows that it lacked the ability to describe ICT attributes; in particular to visualise the network structure, its actors and processes as well as the network's linkages between the actors. At the same time it was concluded that in case of a narrative business model such BM canvas that describes well the value creation, there is reasonable intention to be merged with other aspects of a

business model (e.g. the operational and technological) and to provide ways to bring all the aspects closer.

The finding of the phase 4 of *Business Modelling* literature review, reveal that the business model ontologies are lightweight approaches meaning that only a limited view of a business model is presented. They seek to support the design of a business model, representing conceptually the way that a company does business and its logic as to earning revenues. They are concerned with company level analysis when managers are increasingly concerned with additional such as supply chain management and B2B network orchestration (Shaw, 2008) According to Laudon & Traver (2013) most authors focus on the value proposition and on the revenue model, but that while “*these may be the most important and most easily identifiable aspects of a company’s business model, the other elements are equally important when evaluating business models or plans, or when attempting to understand why a particular company has succeeded or failed*”.

Another notable issue is that current conceptual approaches attract criticism for the lack a common theoretical basis and for the many different definitions used to describe the same terms. Zott et al., (2011) complain that business modelling field has yet to develop a common and widely accepted language that would allow researchers to examine the business model construct. Baden-Fuller & Haefliger (2013) explain that it appears because there is a diverse set of definitions and a diverse set of approaches to classify them.

#### ***Fifth phase: Organisational, Operational, Technological aspect of a Business Model***

During the last phase, the business modelling research has moved from the value creation perspective to an abstract representation of the company’s architecture (Wirtz, 2011). Researchers recognise that business environment has changed. The business model is not a single company as it was in the past, but it is the network of suppliers, manufactures, partners, investors and customers that ingrate using new technologies and information systems. This indicates business and technology are effectively fused into one fabric that the companies are more and more concentrated on their core competencies (El Sawy & Pereira, 2013). Also customers have changed their perceptions, as they do not want just products in bundled packages, but instead they want solutions to their perceived needs (Teece, 2010). Thus, the business modelling



works has evolved from the focus on the value creating processes to the focus on other aspects of the business model like organisational, operational, and technological.

Thus, Braet & Ballon (2007) define business modelling as *“the description of the organisational prerequisites / requirements necessary for the creation of a specific product / service, the technical characteristics / architecture of that product or service, the roles and relations between the company, its customers, partners and suppliers, and the different value-creating—be it physical, virtual or financial—flows between them.”* They develop a business modelling process for a remote management system categorising the actors and roles that are active within a given value network. They proposed four business modelling design phases (illustrated in Figure 2.8) giving equally emphasis to the organisational, technological, service, and finance aspect of a business model; and they use business model scenarios to describe each aspect.

**Organisation design phase** involves defining a business scope (who are customers we will try to reach and how will we do this?), identifying distinctive competences, and taking business governance decisions (make versus buy decisions)

**Technology design phase** involves defining the technology scope (what technical design are we trying to develop and how will we do this?), identifying the systemic competences that will contribute to the business strategies, and deciding on the IT governance (how will we develop or acquire the needed technical competences?).

**Service design phase** involves offering a specific value proposition towards the end user. On the demand side, firms have to make a choice about the delivery channels they will follow. The organisation can calculate the share of the overall profitability of each sales channel, but has to keep in mind that sales channels with a higher cost structure might also be more important to the overall business if an important customer segment prefers this costlier alternative

**Financial design phase**, it is the definition of a financial model for financial exchanges among actors of the value network. In this stage, the financial modalities are formalized in binding contracts that clearly describe each partner’s responsibilities and the financial or other benefits they will receive in return.

**Figure 2.8 Business Model Design Phases proposed by Braet & Ballon (2007)**

Consequently, the number of the proposed business model scenarios is almost endless. The application of their approach for the design of remote management systems reveals a total number of 8 scenarios, where authors enforced to limit into four in order to identify the possible options for a business model. Also, it is appeared that the final scenarios overlapping while they repeat same functions. Another weak issue is that the proposed work is limit to four design phases and to two business model components, without to provide a detailed presentation of the possible associations, affiliations and interactions between different business actors and of their respective roles.

On the other hand, Richardson (2008) emphasises on the execution of business strategy linking it to the operational aspect of business model and considering the business activities organised around the concept of value. Only three components (see in Table 2.9) are illustrated: the value proposition, the value creation and delivery system and the value capture, reflecting the logic of strategy thinking about value.

**Table 2.9 Business Model Components proposed by Richardson (2008)**

Components	Description	Sub-components
<b>Value Proposition</b>	What the firm will deliver to its customers, why they will be willing to pay for it, and the firm's basic approach to competitive advantage	The offering.
		The target customer.
		The basic strategy to win customers and gain competitive advantage.
<b>Value Creation and Delivery System</b>	How the firm will create and deliver value for its customers and the source of its competitive advantage	Resources and capabilities.
		Organization: the value chain, activity system, and business processes.
		Position in the value network: links to suppliers, partners, and customers.
<b>Value Capture</b>	How the firm generates revenue and profit	Revenue sources.
		The economics of the business

Also Sandstrom & Osborne (2010) work describes a business modelling process related to one aspect of the business model, namely to the product (see in Figure 2.9). Their aim is to provide guidelines to managers to handle a product innovation process involving a business model renewal and multiple actors working as a network. Thus, the guidelines include business model components that are related to product innovations and its starting point is that the capable networking actors are unknown.

<p><b>Step 1.</b> Map all relevant actors in terms of their incentives, resources and activities</p> <p><b>Step 2.</b> Find out how value is created and distributed among the actors</p> <p><b>Step 3.</b> Identify actors which are critical for the adoption of product innovation</p> <p><b>Step 4.</b> Design a business model which aligns incentives throughout the established actor network</p>
--

**Figure 2.9 Steps proposed by Sandstrom & Osborne (2010)**

In short terms, both above works restrict to consider only one aspect of the business model. This can be dangerous because a company cannot be aligned just pinpointing one distinguishing element, other, less visible elements can also be important. Therefore, changes in one aspects of the business model can have significant influences to another (Kuparinen, 2012).

Some authors also (Demil & Lecocq, 2010; Wirtz, 2011) support that there are three basic approaches in business modelling research. First, the technology-oriented approach includes e-business models and other models that emphasize technology and information systems. The second approach is strategy-oriented business models that emphasise value creation and innovation. Finally, the third approach is organisation. Organisational approaches deal with business model architecture and components. So Wirtz's work focus on design process related to business model innovation and includes a strategic aspect that is developed during the process. This means that this process assumes that a business model designing is related to strategy designing. In this work, Wirtz defines four business model levels the *industry level*, *corporate (company) level*, *business unit level* and *product level*; and he names four phases, namely idea generation, feasibility study, prototyping and decision-making (see in Figure 2.10).

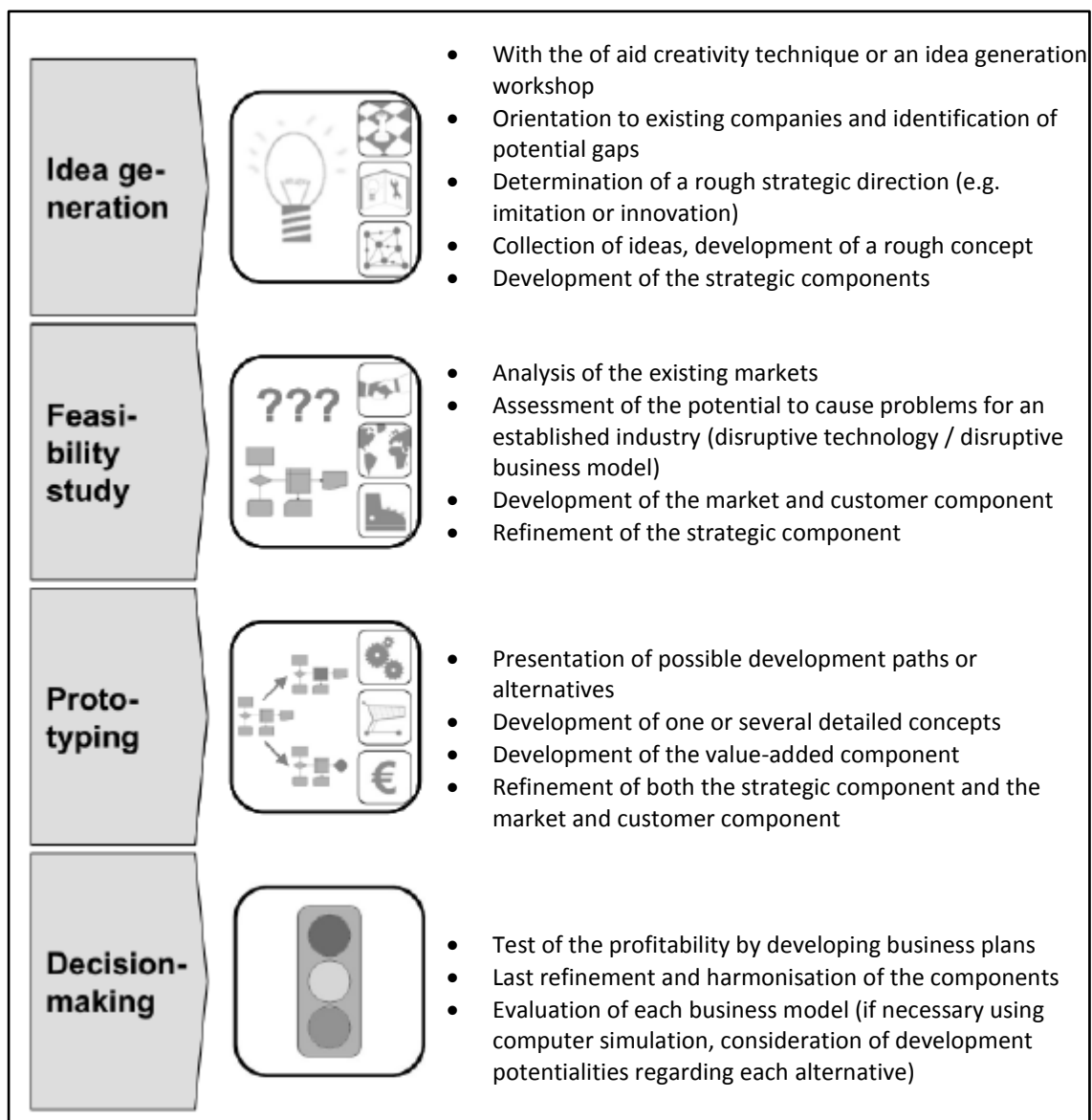


Figure 2.10 Phases proposed by (Wirtz, 2011)

Similarly, in most recent research, scholars recognise that the role of technology innovation and its relationship to the businesses has shifted. Business models have become more digital. Companies have progressively transitioned from a focus on the design of information systems, to the design of IT-enabled business processes, and more recently to the design of business models for services provided through digital platforms (El Sawy & Pereira, 2013). Thus, Baden-Fuller & Haefliger (2013)'s work take into account the influence of technology innovation on business model innovation. They argue that a confusion still keep on key questions *“what are the components of a business model, and how does business model innovation occur?”*. In their attempt to answer these questions, they depict the business model system as a model containing cause and effect relationships, and it provides a basis for classification. In order to understanding of business model innovation and its relationship to technical innovation, they develop a classification with four business model components (see in Table 2.10): customer identification, customer engagement, value delivery, and monetisation. These components they considered to be necessary in order to understand innovation because only then can it is appreciated what is meant by new.

**Table 2.10 Business Model Components proposed by Baden-Fuller & Haefliger (2013)**

Componets	Description
<b>Customer Identification</b>	It is essential that the business model identifies the users and the customers, and indicates whether users pay for what they use or another group of customers actually pays.
<b>Customer Engagement</b>	This requires sensing what the customer-user or groups of customer-users need, and establishing the value proposition for each of these groups.
<b>Value Delivery</b>	The third component is the set of linkages between identifying the customer groups, and sensing their needs on the one hand, and monetisation on the other. These linkages sometimes are described as value delivery, but they may go further than the traditional value chain.
<b>Monetisation</b>	Monetization often labelled as value capture. Discussions of monetisation have often stopped with pricing ignoring important issues of timing and effectiveness which are paramount additional value capture dimensions for organizations. Concerning pricing, there are many other possibilities, including negotiated prices, and price based on value delivered.

In actuality, Baden-Fuller & Haefliger they don't introduce business model components but four variables for the classification of business models. The description of these variables reveals that business model components are still multifaceted without agreed unified definitions. This suggests that the domain is fuzzy and vague and still in its conceptualization phase, despite its perceived significance (Sabir, et. al 2012).

### **2.3 Enterprise Architecture Literature Review**

*Enterprise Architecture* research focus on other components related with information systems, equally important when developing e-business models and in particular for B2B E-commerce. Enterprise architecture describes how companies do business and how information systems support the way they do business. According to Goethals *et.al* (2004) it means “*actively organizing the components of an enterprise and the relationships between those components and the environment*”. In this section we review three of the most widely used frameworks - Zachman Framework, TOGAF and E2A Framework - and a most well-known enterprise architecture modelling language - ArchiMate.

#### **2.3.1 Enterprise Architecture Frameworks and Methods**

##### ***a) Zachman Framework***

Enterprise Architecture frameworks and methods have been created for the development of enterprise architecture. Their aim is to design, evaluate, and build the right enterprise architecture that meets the needs of an organisation. The key characteristic is the use of a method for designing an information system in terms of building blocks, and showing how the buildings block fit together. A set of tools and a common vocabulary are also usually provided, as well as a list of recommended standards and products that can be used to implement the buildings blocks. In this section we review three of the most well-known and widely used frameworks; these are Zachman Framework, TOGAF, and E2A Framework.

In 1987, J. Zachman highlighted the significance of information systems architecture writing “*To keep the business from disintegrating, the concept of information systems architecture is becoming less of an option and more of a necessity*” (Zachman, 1987). As a result of his belief, he introduced a framework for enterprise architecture that has been evolved over the years and has been widely adopted by the IS community. The aim of this work is to provide a framework for defining and describing complex enterprise systems. It establishes a common vocabulary and describes the enterprise’s information infrastructure based on set of six views, taken by various players. Planner, owner, designer, builder, sub-constructor, and the system itself are the main participants that specify their point of view on six key aspects of a system, namely: data (*What*), function (*How*), network (*Where*), people (*Who*), time (*When*), and motivation for the system (*Why*) (Zachman2, 2003). Combining the above, the

framework presents 30 different perspectives of an information system and identifies tools, methods, and techniques appropriate for tasks pertaining of each perspective (Schekkerman, 2004).

The primary strength of the Zachman framework is that it explicitly shows that there are many views that need to be addressed in enterprise architecture. It provides a reminder of the issues that need to be considered and it involves all the necessary stakeholders ensuring that it meets their needs (Ambler, 2002-2007).

Although it successfully defines the various perspectives, it does not define a process for enterprise architecture development. Within the framework only some major principles and rules exist that guide the application of it, but there is no description on architectural process. Nothing is referred to the processes for developing viewpoints or conformant views, or even to the order in which they should be developed (Tang, Han, & Chen, 2004). There is not distinction between the activities for modelling the existing enterprise architecture and the activities for design a new one. Only some descriptions of the architectural outcomes for each cell of the matrix are provided briefly.

For these descriptions several modelling techniques are used to describe the different aspects of the enterprise, (e.g. Entity Relationship technique for modelling the data description or Functional Flow diagram for modelling the process description) (Zachman, 1987). The Zachman framework is independent of specific methodologies. No specific techniques are proposed. Any technique may be placed in the matrix to create the suggested architectural outcome in each cell of the framework (Leist & Gregor, 2006).

### ***b) TOGAF***

In the mid-90, the Open Group, a vendor-neutral and technology-neutral consortium, developed also an industry standard architecture framework that aim to be used by organisations wishing to develop enterprise architecture. The proposed tool is based on the Technical Architecture for Information Systems (TAFIM) and it is named Open Group Architecture Framework (TOGAF) (OpenGroup1, 2006). It consists mainly of a practical, freely available, industry standard method of designing an enterprise architecture called Architecture Development Method (ADM). Adopting a life cycle approach, ADM aims to a reliable-proven way of developing the architecture providing architecture views which enable the architect to communicate concepts, linkages to practical case studies, and guidelines on tools for architecture development

(OpenGroup2, 2006; Pallab, 2003). The initial versions of TOGAF, including version 7, use ADM for developing IT architectures only. TOGAF version 8 applies the method to the others domains of the overall enterprise architecture, namely *Business*, *Data*, *Application*, and *Technical* architecture (Schekkerman, 2004).

Summarising, TOGAF provides a detailed procedure model for developing enterprise architecture, including a set of phases (which are provided by the TOGAF ADM), the use of reference models (which are provided by the TOGAF Enterprise Continuum), and guidelines (which are provided by the TOGAF Resource Base). Even though TOGAF ADM describes the inputs and outputs for each phase of the architecture development cycle, there are no specification documents that describe the output. For example in phase (C) *Information Systems Architecture*, ER modelling technique is used to illustrate views of the data architecture; although it leads to a distinct specification document (the ER model), within the TOGAF procedure there are no instructions that clearly define it as output. From that point of view, only in some of the TOGAF ADM phases, specification documents exist (Leist & Gregor, 2006). Similarly, techniques are recommended only in some parts within the TOGAF framework. It does not define a complete set of modelling techniques necessary to accomplish intended architectural activities in each phase.

### ***c) E2A Framework***

The new technological developments and the attempt of enterprises to use them as a platform to extend them to new ways of business operation, have had as a result the development of a new framework. It is the Extended Enterprise Architecture (E2A) Framework developed in 2003 by the Institute for Enterprise Architecture Developments. This framework aims to explain how enterprises can transform effectively and become an 'Extended Enterprise' that matches their challenges. Real life experiences in using several frameworks like Zachman framework, Enterprise Architecture Planning (EAP), Integrated Architecture Framework (IAF) and Federal Enterprise Architecture Framework are its sources. The framework focuses on the processes and activities of extending the enterprise architecture beyond its original boundaries, defining a collaborative environment for all entities involved in the collaboration process (Schekkerman, 2001; Schekkerman, 2006).

Its structure contains 4 rows and 6 columns yielding 24 unique cells or aspect areas. Similarly to the enterprise architecture, the four rows represents: *Business or*

*Organisation*, expressing all business elements and structures; *Information*, extracted from business an explicit expression of information needs, flows, and relations, necessary to identify the functions that can be automated; *Information – Systems*, the automated support of specific functions; *Technology – Infrastructure*, the supporting technology environment for the information systems. The columns represent six levels namely:

- the *Contextual level* which aims to answer the question “Why”, describing the extended context of the organisation and the scope of the enterprise architecture study. The enterprise mission, vision and scope, and the business and technology drivers are considered.
- the *Environment level*, which describes the formal extended business relations and the related information flow, answering the question “With Who”. It represents the business and technology relationships within the extended enterprise i.e. the type of collaboration.
- the *Conceptual level* which addresses the requirements, “What”. It describes the goals and the objectives, and the requirements of the enterprise entities involved in each aspect area of the enterprise.
- the *Logical level* which answers the question “How”, addressing the ideal logical solutions within each aspect area.
- the *Physical level* which shows physical solutions in each aspect area, including business and communication changes, supporting software products and tools, hardware and communication products.
- the *Transformation level* which describes the impact for the organisation of the proposed solutions, representing the transformation roadmap, dependencies within aspect areas, supported by business cases.

### **2.3.2 Enterprise Architecture Modelling Languages.**

Architecture Description Languages (ADLs) define high level concepts for architecture description such as components and connectors. They focus only on one area of enterprise architecture and aim to present the software architecture, describing how systems are constructed (Medvidovic & Taylor, 2000). They express the overall structure of a system in an abstract, structured way, describing the elements from which

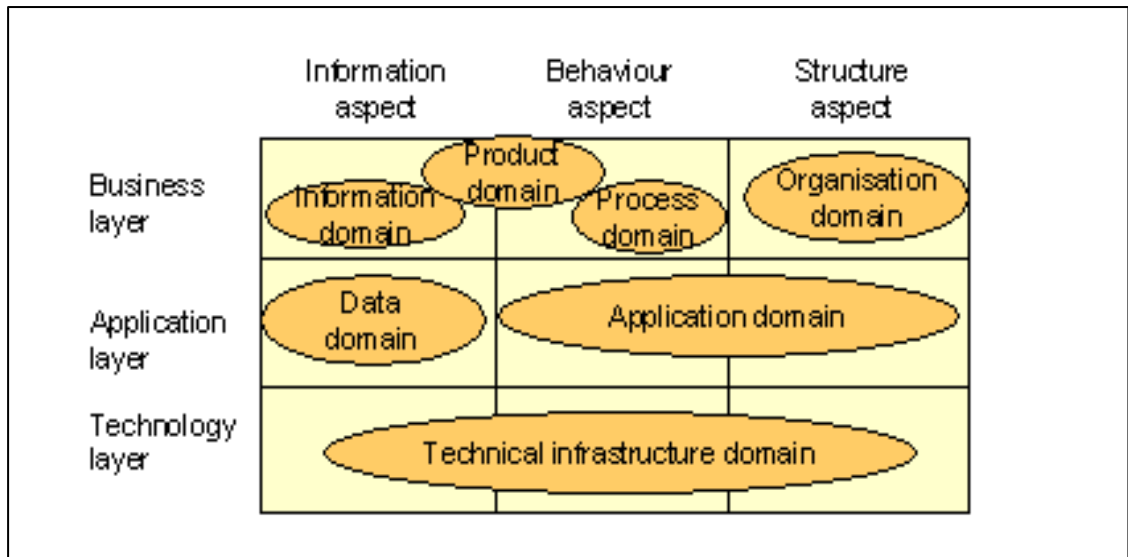


the system is built, showing the interaction among those elements, and providing patterns that guide their composition, and constraints on these patterns (Abdurazik, 2000).

One of the most commonly used and widely accepted architecture description language is the ACME. ACME is not a simple language; it provides an easy way to describe relatively simple software architectures, but it can also be used as a common interchange format for architecture design tools, or even as a foundation for developing new architectural design and analysis tools. It supports mapping of architectural specifications from one architecture description language to another, and hence, enables integration of support tools across architecture description languages (Medvidovic & Taylor, 2000). Currently, the ACME Language and the ACME Tool Developer's Library (AcmeLib) provide a generic, extensible infrastructure for describing, representing, generating, and analysing software architecture descriptions (ABLE, 2008).

As complete languages cover separate domains of the enterprise architecture, recent attempts have focused on the development of a new type of language that aims to the integration of the existing languages. The ArchiMate project is one of these attempts started in 2003 (later version 2012). Its aim is to provide enterprise architects with concepts and techniques for modelling, visualising, and analysing the relationships among architectural domains of an enterprise (Lankhorst 2009). It is inspired by previous enterprise architecture modelling languages (RM-ODP, NEML) and architecture description languages (ACME, ADML), and it reuses elements from business process modelling languages for organisation and process modelling (such as ebXML, BRML, IDEF, ARIS, AMBER) as well as from application and technology languages (like UML) (Jonkers, *et al.*, 2003).

The ArchiMate Language is based on the conceptual domains commonly distinguished in architectural frameworks or methods, and in the architectural practice within organisations participating in the ArchiMate project. Each domain covers a specific area: Product, Organisation, Process, Information, Application, and Technical Infrastructure (See Appendix A). The domains and their concepts (Figure 2.11) are classified according to the organisational layers (business, application, and technology layer); for each layer, concepts are distinguished into three aspects (information, behaviour, structure) (Jonkers & *et al.*, September 2003).



**Figure 2.11 Classification of ArchiMate Concepts (Jonkers, et al., 2003)**

The ArchiMate language can be defined as a language for describing integrated enterprise architecture. It provides the main concepts for enterprise architecture description, and it describes the relationships of these concepts reusing elements from existing languages (as much as possible). It cannot be defined as a complete integrated enterprise architecture modelling language, as the existing version does not provide a complete set of architecture description techniques that fully enable and exploit integrated enterprise modelling. According to the ArchiMate framework one of the main conceptual domains is the product domain. However, in the ArchiMate language limited emphasis has been given to the description of this domain; and only the concept ‘organisational service’ is directly related to the description of the product.

## 2.4 Findings and Outcomes

### 2.4.1 Summary of the Findings

Table 2.11 illustrates a summary of the works presented earlier in this chapter, highlighting the attributes of the business modelling frameworks; in particular, the *philosophy* and the *scope* of each work, the *objective* of each framework, the *approach* used by each framework to achieve its objective, the *technique(s)* used by each framework, the *output delivered* by each framework, the *component(s)* proposed by each.

Summarising the extensive literature review of the business modelling frameworks the following findings are revealed:

**a) Early works of business modelling research:**

- focus on choose one of the existing possible e-business models, not to change the current business model, not to develop a new business model;
- address the business logic of a company take into account the value creation process and
- use a short list of business model components providing only examples and no descriptions.

**b) Midpoint works of business modelling research:**

- give priority only to the strategic aspect of business model change, evaluating the critical factors about what makes business model change possible;
- give the impression that presents a business model, while only the value creation part of business more is presented.
- add only two new business model components *actor* and *relationship* to capture better the value chain concept.

**c) Later works of business modelling research:**

- introduce more components considering also other aspects of a business model (e.g. legal issues and technological changes)
- do not provide theoretical definitions - each component is presented by simple term supported only by a simple question without a description or an explanation of the meaning of the term
- don't describe their relationships among the components

**d) Recent works of business modelling research:**

- support the change of a business model, representing conceptually the way that a company does business and its logic as to earning revenues.
- present only a limited view of a business model;
- focus on the value proposition and on the revenue model, missing other components equally important;
- attract criticism for the lack a common theoretical basis and for the many different definitions used to describe the same terms.

**e) Most recent works of business modelling research:**

- focus on other aspects of the business model like organisational, operational, and technological.
- include business model components that are related to the product concept
- recognise that the role of technology innovation and its relationship to the businesses has shifted
- face confusion still on what are *the components of a business model*.
- agree that components are still multifaceted without agreed unified definitions.
- conclude that the domain is fuzzy and vague and still in its conceptualization phase, despite its perceived significance

**Table 2.11 Summary of the Business Modelling Frameworks**

	<b>Author(s)/Year</b>	<b>Philosophy</b>	<b>Scope</b>	<b>Objective</b>	<b>Approach</b>	<b>Technique</b>	<b>Output</b>	<b>Component(s)</b>
	<b>Tapscott et al. (2000)</b>	The new business model corresponds to one of the five b-web types: Agora, Aggregation, Value Chain, Alliance or Distributive Network.	Select an e-business model	Disaggregate and re-aggregate the value proposition from a customer perspective	Sequence of steps, Questions/Answers	Value Map. To visualise the new business model	Selection of one of the five b-web type business models	Customer Value
	<b>Mahadevan (2000)</b>	Internet economy is divided the overall market space into three broad structures: portals, market makers, and product/service providers	Select an e-business model	Select a possible option available to an organisation, based on the market structure that it has adopted	General guidelines	Presentation mix of alternatives	Selection of the right mix of alternatives	Value Stream, Revenue Stream, Logistical Stream
	<b>Linder &amp; Cantrell (2000)</b>	Construct an alteration to the current business model to become a good business model	Change one or more of the dimensions of the existing business model	Extend business model by creating new positions on the price/value curve	Questions and possible Answers	Presentation of the questions/answers in a structured way	Degree to which business logic will change	Sources of Revenue v Value Propositions, Assets, Capabilities, Relationships
	<b>Van Hooff &amp; Stegwee (2001)</b>	Clarify the strategic e-business vision of an organisation	Formulate and e-business strategy	Analyse of the internal, external and competitor factors	Decision Making Process	Critical success factors analysis	Strategic e-business vision	No
	<b>Petrovic et al. (2001)</b>	Solve the problem of the current business model	Develop an action plan for possible future change	Understand the current business model, develop an action plan.	Problem Solving	No	Action Plan	No
	<b>Papakiriakopoulos &amp; Poulmenakou (2001)</b>	Examine and collect information resources that could help and	Investigate the evolution of the market structure	Analyse four elements: Coordination, Collective/Competit	Sequence of steps	Communication Augmented Value Chain to present new business	Analysis of the four elements	Coordination, Collective/Competit ion, Customer value, Core

		empower processes placed on the value chain		ion, Customer value, Core Competence		model's structure		Competence
	<b>Afuah &amp; Tucci (2001)</b>	Explain competitive advantage and company performance	Describe the business model's components	Determine the company's profitability	List of Components	Questions/Answers	Answers to the questions	Customer Value Scope Pricing Revenue Source Connect Activities Capabilities Sustainability
	<b>Stahler (2002)</b>	Simplify the complex reality.	Describe the business model's components	Determine the company's value and sustainability	List of Components	Questions/Answers	Answers to the questions	Value Proposition Product or Service Architecture Value Revenue Model
	<b>Pateli &amp; Giaglis (2003)</b>		Evolution of business model	Develop and choose from a group of possible scenarios	Create Scenarios	Representation of the business parties and their relationships		Mission, Target Market Value Proposition Resources Key Activities Cost and Revenue Model Value Chain/Net s Market Trends, Regulation, and Technology.
	<b>Gordijn &amp; Akkermans (2003)</b>	Analyse whether the business model is viable or not	Conceptualise the business model	Define how economic value is created, interpreted and exchanged within a multi-actor stakeholder network of enterprises and customers	List of Components	Conceptualisation, Graphical Presentation and Scenario (inspired by UML Notation), Scenarios	Visualisation of the value model	Actors Value Objects Market Segment Value Port Value Interface Value Exchange Value Activity
	<b>(Osterwalder, 2004)</b>	Depict company's strategy and business opportunities. It can be used to	Conceptualise the business model	Capture, understand, communicate, design, analyse, and change the	Categorised components decomposed into a set of defined sub-components	Business Modelling Canvas to present the business components	Conceptualisation of the value model	Value Proposition Offering Target Customer Criterion Distribution

		describe the current state and the „where we want to be“ state		business logic of a company				Channel Link Relationship Mechanism Value Configuration Activity Capability Resource Partnership Agreement Cost Structure Revenue Model Pricing Actor
	<b>Braet and Ballon (2007)</b>	Create four designs Organisation Technology, Service, Finance	Develop business modelling scenarios for Remote Management	Categorise the actors and roles that are active within a given value network using business modelling designs	Sequence of phases	Scenarios	Four designs: Organisation Technology, Service, Finance	Business Actors, Business Roles Business Relationships Value Chain Value Network
	<b>Richardson 2008</b>	Reflect the logic of strategy thinking about value.	Execution of business strategy,	Identify three major components, the value proposition, the value creation and delivery system and the value capture	Questions/Answers	No	A consistent logical picture of how all of the company's activities form a strategy	Value Proposition, Value Creation and Delivery System Value Capture
	<b>Ludeke &amp; Freund (2010)</b>	Corporate sustainability with an emphasis on eco-innovation and value creation	Strategic change for sustainability strategies driven by eco-innovations	Create an extended customer value (considering not only value for the customer but also value created for the public and for the own organisation)	Theoretical, deductive approach	Adopt the business model canvas created by Osterwalder and Pigneur	No	No

	<b>Sandstrom &amp; Osborne (2010)</b>	Business model renewal and multiple actors working as a network	Product Innovation	Provide guidelines to managers to handle a product innovation process	Sequence of steps	No	Guidelines to manage product innovation	Actor Resources Product
	<b>Wirtz, 2011</b>	Business model designing is related to strategy designing	Business model innovation	Develop a a strategy related to business model innovation	four phases, namely idea generation, feasibility study, prototyping and decision-making (Figure ).	Business Model Prototype	Create a business model prototype and a business plan	Strategy Market Customer Value Added
	<b>Baden et al (2013)</b>	Used classified business model components to depict the business model system	Take into account the influence of technology innovation on business model innovation	Depict the business model system as a model containing cause and effect relationships	Develop a classification with four business model components	No	Description of the business model based on the classification of the components	Customer Identification Customer Engagement Value Delivery Monetisation



## **2.4.2 Summary of the Outcomes**

Summarising the various issues discussed in this chapter, it was concluded that a complete and appropriate solution for the architecting of e-business models must cover the following aspects:

### **a) Business Model Conceptualisation**

As it was explained earlier, various concepts to describe the business model components have been suggested by researchers and practitioners creating a Babel tower of concepts with the same meanings but different names. The findings reveal that there is not a standard language or conceptual notation to describe the business model architecture. This research aims to go one step further by integrating and systematising the existing work, and standardising and rationalising the existing concepts to propose a set of concepts for the description of the Business Model Architecture; namely the components of a business mode each one addressing one specific set of concerns.

### **b) Business Model Representation/Visualisation**

Furthermore, the conceptual view needs to be supported by a representation view; a template to present the high level structure of a business model. Sometimes the architecture of a business model suffers from extended presentation that goes too far into prematurely partitioning of business model or from an over emphasis on one aspect of the business model. A single architecture style is therefore necessary to assemble only a certain number of business model's components in an abstracted form. This will be used as blueprint to capture the initial architecture of a business model and to build an extended view. In the case of transformation of business to e-business this will help to capture the key architectural components of the current business model, and in case of development of e-business to visualise fundamental aspects of the e-business model.

### **c) Business Model Construction/Reconstruction**

Business model cannot be considered as static. New and existing businesses have to revise their business model according to the changing external environment. Changes in technology, new customer needs, new regulatory conditions, need to remain competitive, etc. put companies under the pressure to adapt their business model constantly in order to respond to the fast-changing environment.

According to the existing research and practice, presented in this chapter, the transition from the current to a future business model has been considered by different perspectives and been described with different terms; *extent* business model (Linder &

Cantrell, 2000), *select* (Tapscott & Lowi, 2000), *guidance for change* (Petrovic, *et al.*, 2001), *build/contract* (Papakiriakopoulos, *et al.* 2011), *evolution* (Pateli & Giaglis, 2005), *renew* (Doz & Kosonen, 2010), *transform* (Aspara, *et al.* 2011).

Renewal describes a single process of making changes in order to improve a current state so that it becomes more successful in the future (CBED, 2012). Business model literature often refers to the strategic innovation renewal for adjustment of strategies and business models to the changes in the external environment. According to Hamel, (2003), “*Strategic renew is creative reconstruction*” during which a traditional business model is decomposed, and using innovative ways, aims to reconstruct the business model in order to create new value for the company and its customers. This reconstruction process usually includes business model redesign in combination with product(s), service(s), experiences, and technology innovation (Gibson, 2013). In conclusion, a company is innovated strategically and the business model is reconstructed.

### **2.4.3 Evaluation of the Findings**

Table 2.12 summarises the evaluation of the works of the presented earlier in this chapter. Using a rating scale from 0 to 3, this evaluation task aims to measure the level of contribution of existing works on the above three aspects: a) the “Conceptualisation” (C) row shows if the existing works have carefully identify concepts for the description of the business model architecture, including text definitions for such concepts; b) the “Representation” (R) row indicates which work propose a tool or a set of tools or graphical view to simply present the current business model of a firm; c) the “Visualisation” (V) row points out works that go beyond a simple tool for representation of the business model, it examines works that used technique(s) to model the architecture of an e-business model, including aspects like the application and technology that e-business model is structured around; and d) the last “Construction/Reconstruction” (C/R) row presents works that has focused on change of a business model.

None of the existing works provided a clear definition or documentation of all key aspects. More research and appropriate standards are required in order to improve these weaknesses and fill the gaps. In conclusion, the above three aspects will guide this research work and they will be the main principles that proposed framework will address.

Table 2.12 Evaluation of the Existing Works related to Business Modelling

	Enterprise Architecture Frameworks & Methods			Enterprise Architecture Description Languages	Modelling Languages			Business Model Ontologies			Business Modelling Frameworks											
	ZIFA	TOGAF	EZAF	ArchiMate	ebXML, BPMN, IDEF	UML	EEO, TOVE	BMO	e <sup>3</sup> value	Tapscott <i>et al.</i>	Petrovic <i>et al.</i>	Papakiriakopoulos <i>et al.</i>	Patelis & Giaglis	Tukker & Tischner	Braet and Ballon	Richardson	Teece	Al-Debei and Avison	Sandstrom & Osborne	Wirtz	El Sawy & Pereira	Baden-Fuller & Haefliger
	'97	2011	'03	2003-2012	'04-11	'97-11	1998	2004	2003	2000	2001	2001	2003	2006	2007	2008	2010	2010	2010	2011	2013	2013
<b>C</b>	2	1	1	2	1	1	2	2	2	1	1	2	1	1	1	1	2	2	1	1	1	1
<b>R</b>	1	1	0	2	2	2	1	2	1	0	0	1	1	1	0	0	1	1	0	1	0	2
<b>V</b>	1	1	0	3	1	2	1	1	2	0	0	0	2	0	1	0	0	2	0	1	0	1
<b>C/R</b>	1	2	1	1	1	0	1	1	2	2	2	2	3	1	0	1	0	3	1	3	1	1

**Using a rating scale from 0 to 3, this evaluation task aims to measure the level of contribution of existing works on the above three aspects:**  
 "Conceptualisation" (C) row shows if the existing works have carefully identify concepts for the description of the business model including text definitions for such concepts.  
 "Representation" (R) row indicates which work propose a tool or a set of tools or graphical view to simply present the current business model of a company  
 "Visualisation" (V) examines works that used technique(s) to model the architecture of an e-business model  
 "Construction/Reconstruction" (C/R) row presents works that has focused on change of a business model.

**0: NOT Identified or Addressed, NOT Defined or NOT Documented**  
**1: Poorly Identified or Addressed**  
**2: Partially Clear Addressed and Documented**  
**3: Clear defined and Documented**

## **2.5 Conclusion**

This chapter presented the two main research areas of “*Business Modelling*”. In particular, a) the origins, the terms and the concepts of business model were investigated; and b) the business modelling frameworks used for the change and development of business models were reviewed, c) the enterprise architecture languages related to the research were explored too. The outputs of the literature reviewed were evaluated using set of appropriate criteria in order to address and measure the strengths and weaknesses of the existing work done so far. Various issues discussed in this chapter helped to identify the key aspects that the designed framework must be covered.

## CHAPTER 3. RESEARCH METHODOLOGY

### 3.1 Introduction

The aim of this chapter is to provide the pathway through which the objectives of this research are achieved. Initially it presents the philosophical background that underpins this research, and also describes the research framework and approach used for this work. At the end, the chapter defines the research strategy and presents the chosen research methods used at each stage of the research providing justification.

### 3.2 Research Philosophy and Approach

The choice of a research methodology is not “neutral”; it reflects a range of the researchers personal interests and values, the research objectives, the nature of the problem to be explored and its novelty in research terms, as well as the time and resources available to carry out the research (Wilson, 2002; Nevile, 2005).

This work aims to an architecture solution. The meaning of architecting has been simply and succinctly expressed by Michael Graves (in Godin, 2008) an American architect: *“I think architecting something is different from designing it.....Design carries a lot of baggage related to aesthetics. We say something is well-designed if it looks good..... Architecture describes the intentional arrangement of design elements to get a certain result..... You can architect a train station to get more people per minute through the turnstiles. You can architect a computer server set up to make it more efficient”*. Translated to this thesis therefore, architecting means the arrangement of the business model architectural components in order to develop an e-business model for B2B E-Commerce.

Working on a framework for the architecting of e-business models sounds like theoretical work; and it is true that traditional research in the area of frameworks’ development focuses on theory building and theory testing. But the main dilemma is if this research will focus on generating theory or evaluating theory. Jarvinen (2004) argued that a new theory can be developed by comparing previous theories. He suggests that this theory-creating approach is qualified for conceptual-analytical research. The study of e-business models in general and the business model architecture in particular, is a new discipline, still searching for its conceptual identity. It is therefore priority in this research to evaluate the relevant theory in business model architecture in order to generate a conceptual and theoretical structure. Consequently this study will be part of

the research contribution and it can be used as the foundation of the intended framework.

However, the nature behind this kind of research is quite different; it is not only conceptual. It does not aim to the understanding the WHY of a phenomenon, to generalise inferences from the observations of the phenomenon and to establish a theory. It is research with an innovation building aspect that aims to solve a problem; in particular to explain how to build the business model architecture of a company for B2B EC.

According to Jarvinen, (2004) research questions in the information systems field that contain verbs like build, change, improve, construct, enhance, extend etc. belongs to the *design science* research. Van Aken (2004), referring to Simon (1981), explains that “ *the mission of design science research is to develop knowledge for the design and realisation of an innovation.....in order to solve construction problems....or to be used in the improvement of the performance of existing entities, namely to solve improvement problems* ”. For example, when people have a vital need to cross a river, a civil engineer will construct a bridge “ *it is important to know subjects like physics and mechanics, but he/she needs also the design knowledge developed by his/her discipline, like for instance the properties of different types of bridges* ”. Summarising, knowledge is created by a professional through the design and construction of an innovation - a solution to a problem.

After the solution has been created, the second main activity is to evaluate its utility. It is a process of determining how well the solution works. Evaluation requires the development of metrics and the measurement of innovation performance against these metrics. The process starts from an idea to the first realisation of the innovation, and then to the use, and finally to its demolition (Hevner, *et al.* 2004).

Design science research has initially been framed by a framework designed by March & Smith (1995). It consists of two axes (see Figure 3.1), namely research activities and research outputs. Research activities deal with the two main processes namely to *build* and *evaluate* the design science of the solution. In parallel to this two more activities *theorise* and *justify* are presented by the authors; they deal with nature science that refers to the construction of theories on how a solution works within its environment.

RESEARCH ACTIVITIES						
RESEARCH OUTPUTS		Design Science		Natural Science		
		Build	Evaluate	Theorise	Justify	
	Constructs					
	Models					
	Methods					
Instantiation						

**Figure 3.1 March & Smith’s Design Science Research Framework (March & Smith, 1995)**

Research outputs are the products of any design science research project and are broadly defined in information systems projects as: a) *Constructs* namely the vocabulary and symbols of a domain; b) *Models* the abstractions and representations expressing relationships among constructs; c) *Methods* a set of steps (algorithms and practices) used to perform tasks; d) *Instantiations* the implementation of the artifacts (prototype systems) in their environment (Hevner & Chatterjee, 2010).

### 3.3 Research Design

The choice of research design depends on the objectives of the research in order to be able to answer the research questions. Thus, this research work adopt the March & Smith’s design science framework discussed above. However, the framework was slightly modified in order to be adapted to the objectives and the nature of this research. Research activities have been organised into four stages (see Table 3.1):

- The first stage involves the *Investigate* activities. It aims to search and review all the relevant constructs and models. The outcome was an extensive literature review of the last 13 years.
- The second stage *Evaluate* focuses on assessing the outputs of the investigation using appropriate criteria. To address and measure the strengths and the weaknesses of the existing work carried out so far.
- The third stage *Develop* focuses on the main contribution of this research, namely the development of the proposed framework. Based on the findings of the evaluation, initially we define the business model architecture and then the main components of the framework.
- The last stage - *Validate* - deals with the validation of the designed framework. The quantitative approach is applied for validation of the framework’s design and the qualitative approach to evaluate the application and usefulness of it. The findings help to revise and finalise the framework.

**Table 3.1 Summary of Research Phases and their Outcomes**

	Investigate	Evaluate	Develop	Validate
<b>Constructs</b>	1.1 Understand the existing e-business models used for B2B EC	1.2 Identify e-business model's architectural components	1.3 Define a visual architectural representation of e-business models	
<b>Model</b>	2.1 Understand the existing <i>business model</i> definitions	2.2 Evaluate the existing <i>business model</i> definitions	2.3 Define a working definition for the term <i>business model</i>	
	2.4 Investigate existing work on business model architecture, on ontologies and languages used for business model description.	2.5 Identify concepts and techniques used to describe business model architecture	2.6 Define <i>Business Model Architecture</i> concepts and their relationships	
	3.1 Investigate the existing frameworks and methods used for e-business model development	3.2 Understand the key aspects of each framework and method;	3.3 Define the process for developing an e-business model for B2B EC  4.1 Explain the philosophy, approach, and scope of the framework  4.2 Present the main stages of the framework;  4.3 Describe the phases for developing an e-business model for B2B EC	5.1 Validate the framework 5.2 Revise the framework
<b>Method</b>	<ul style="list-style-type: none"> <li>- Speculation</li> <li>- Library Research</li> <li>- Conceptual Research</li> </ul>	<ul style="list-style-type: none"> <li>- Literature Analysis</li> </ul>	<ul style="list-style-type: none"> <li>- Classification</li> <li>- Standardisation</li> <li>- Rationalisation</li> </ul>	<ul style="list-style-type: none"> <li>- Survey</li> <li>- Case Study</li> <li>- Interviews</li> </ul>
<b>Outcome</b>	<ul style="list-style-type: none"> <li>- Write up Literature Chapter</li> </ul>	Concrete more ideas about: <ul style="list-style-type: none"> <li>- the framework's axes</li> <li>- the overlaps and differences of the business model architectural concepts</li> </ul>	<ul style="list-style-type: none"> <li>- Develop a visual architectural representation of e-business models</li> <li>- Classification of the business models used for B2B E-Commerce</li> <li>- Standardisation and rationalisation of business model architectural concepts</li> <li>- Design the framework</li> <li>- Design Questionnaire</li> </ul>	<ul style="list-style-type: none"> <li>- Quantitative validation of the framework</li> <li>- Qualitative evaluation of the framework applying into two case studies</li> <li>- Revised Framework</li> <li>- Thesis Submission</li> </ul>



### **3.3.1. Quantitative, Qualitative & Mixed Research**

Research can be classified in various ways; however there is a major distinction between quantitative and qualitative research (Corbetta, 2003; Flick, 2009; Saunders, Lewis, & Thornhill, 2012).

Quantitative research originally appeared in the natural sciences to study natural phenomena. It is frequently referred to as hypothesis – testing research. According to Bryman & Bell, (2011) quantitative research is a deductive approach between theory and research, in which priority is given to the testing of theories. It is a research strategy that emphasises quantification in the collection and analysis of hard, objective and standardised data (Corbetta, 2003). These procedures contribute to the scientific knowledge base by theory testing. Examples of well accepted quantitative research methods include content analysis, survey methods, laboratory experiments, formal methods, and numerical methods such as mathematical modelling (Saunders, Lewis, & Thornhill, 2012).

On the other hand, qualitative research is an inductive approach usually emphasising the relationship between theory and research. The researcher makes knowledge based primarily on constructivist perspectives or advocacy/participatory perspectives, or both (Creswell, 2009). Data is soft, rich and deep in order to be able to accommodate the researchers' aim. In qualitative research, emphasis is placed on the generation of theories, using qualitative research methods like action research, grounded theory, ethnography, observation, and case study research (Flick, 2009). However, there are examples of studies in which qualitative research is applied to test rather than to generate theories. For example, Hochschild's theory (1983) of emotion work was subsequently tested to establish its wider significance in employment using qualitative methods including interviews and participation observation. This study enabled the testing of the initial theory as well as its development (Bryman & Bell, 2011).

An important and equally difficult decision to make is whether to use quantitative or qualitative research. Both approaches have their own advantages and limitations because they both include different methods (Hanson & Grimmer, 2007). There are some advantages of quantitative research methods that cannot be gained by using qualitative research methods, and vice versa. With the help of mixed method research the advantages of methods are combined and the weakness of one method is replaced with the strength of the other. Using both quantitative and qualitative data collection techniques and analysis procedures either at the same time (in parallel) or one after the other (sequential) (Saunders, Lewis, & Thornhill, 2012), the findings of one

method can be compared with the findings derived from the application of the other method, increasing the acceptability and generalisation of the research results (Hossain, 2012).

This new tradition received a huge boost in the 1990s. According to Denscombe's review (2010) of published mixed methods studies from 1989 to 2006 researchers use mixed method research for one or more of the following purposes: a) to improve their confidence in the accuracy of findings when they can check the findings from one method against the findings from a different method; b) to provide a fuller and more complete picture of the subject under study by seeing things from alternative perspectives. Data collected by using both qualitative and quantitative methods can be complementary; c) to compensate the weaknesses of one method by applying another method that does not suffer from that particular weakness; d) to move the analysis forward, with one method being used to inform another. In this sense, an alternative method can produce further data that might shed light on things under study; e) to use information generated from one method as the basis for selecting a sample of people who will participate in the research through another method.

Generally, in mixed method research, the researchers apply the approach called *triangulation*. Triangulation can be used in quantitative and qualitative research and it is one of the several rationales for mixed method research (Wilson V., 2014). According to Denzin (1970) there are four common types of triangulation: a) *Data triangulation*, searching for convergence among multiple and different sources of information (Creswell, 2009); b) *Investigator triangulation*, using several people (or at least more than one) in the data gathering and data analysis processes (Flick, 2009); c) *Theory triangulation*, approaching the data with multiple theories or perspectives in mind to "extend the possibilities for producing knowledge" (Flick, 2009); d) *Methodological triangulation*, two subtypes are noted – within-method and between-method. Across methodological triangulation involves combining research strategies usually qualitative and quantitative methods (Wilson V., 2014).

Triangulation provides in-depth and cross-checking data, increases the confidence in the research results as well as enables different dimensions of the problem to be considered (Bryman & Bell, 2011). A combination of methods is thought by some to improve the consistency and accuracy of data by providing a more complete picture of the phenomenon (Mertens & Hesse-Biber, 2012). In this study, the researcher employed data and methodological triangulation. Each of these aspects of triangulation will be presented in the next section.

### 3.3.2. Selection of Research Methods

The selection of the methods was based on the evidences of a detailed study of methods in the field of Management Information Systems. Over the period of 13 years, Palvia, Pinjani, & Sibley (2007) conducted an extensive content analysis of most frequently applied research methods and their trends. The results showed fourteen different methods ranked by popularity, with the survey method being the most frequently used, far exceeding the popularity of other methods, mainly for theory development and hypothesis testing. Based on this analysis, the following methods (see in Table 3.2) were chosen for this research in order to achieve the research objectives and to best answer the research questions:

**Table 3.2 Summary of the Selected Research Methods**

Research Methods	Definition
<b>Speculation/ Commentary</b>	Research that derives from thinly supported arguments or opinions with little or no empirical evidence.
<b>Conceptual Frameworks and Models</b>	Research that intends to develop a conceptual frameworks and models.
<b>Secondary Data</b>	A study that utilises existing organisational and business data, e.g., financial and accounting reports, archival data, published statistics, etc.
<b>Literature Analysis</b>	Research that critiques, analyses, and extends existing literature and attempts to build new groundwork, e.g., it includes meta-analysis.
<b>Survey</b>	Research that uses predefined and structured questionnaire to capture data from individuals. Normally the questioners are mailed (now fax, and electronic means are also used)
<b>Case Study</b>	Study of a single phenomenon (e.g. an application, technology, a decision, a process) in an organisation over a logical time frame.
<b>Interview</b>	Research in which information is obtained by asking respondents questions directly. The questions may be loosely defined, and the responses may be open-ended.

The study adopted the *data and methodological triangulation* approach, collecting the data from different sources and selecting a mix of methods used in Information Systems research. This approach is well-suited for this research because it provides the opportunity to exhaustively study the phenomenon of interest, i.e. *how to build the business model architecture of a company for B2B EC*.

During first stage of this research (see Figure 3.2) that involved the *Investigation* activities, triangulation is applied through the use of multiple sources for reviewing the literature; in particular, a) **speculation/commentary** research aimed to capture the initial research on business models; b) **conceptual research** focused on review all the

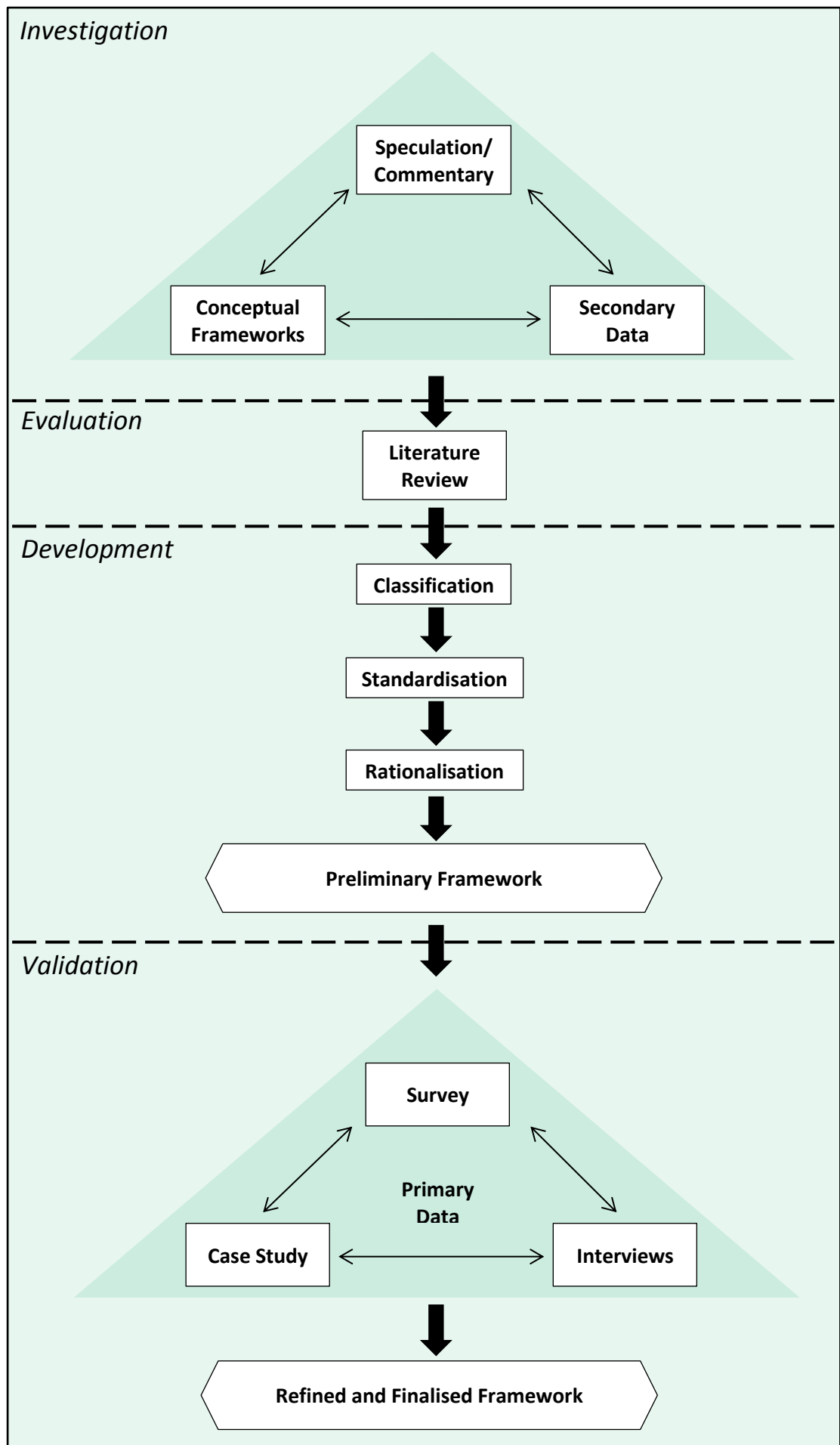


Figure 3.2 Summary of Research Phases and Methods

relevant concepts, frameworks, and models; and c) **secondary data** from company websites and published case studies relevant to e-business models were used, in order to illustrate parts of the research study. Multiple sources were beneficial to the researcher in that they contribute to deeper understanding of the research problem.

At the second stage, *Evaluation* activities were conducted using **literature analysis**. Research work went a step further and examined many past studies in particular relevant research areas. The outcome (presented in Chapter 2) was an analysis of the cumulative knowledge, measuring the strengths and the weaknesses of the past work carried out so far.

In the last stage *Validation*, triangulation was employed again, as the researcher used three different methods to validate the preliminary framework. A **survey** was conducted using an online questionnaire to validate the design of the framework, answering the questions “*Am I building the right thing? Am I building it right?*”. Further, **case study** method was used to evaluate the application of the designed framework and to answer the question “*How the proposed framework can be used?*”. After the application of the framework to two case studies, the performance and the usefulness of the framework was evaluated carrying out **interviews** with the key stakeholders. In this stage, the triangulation approach acted as a crosschecking mechanism for the validity and applicability of the framework, providing a richer understanding of what constitutes the business model architecture for B2B EC. The framework was revised and finalised based on the evidences of the above three validation activities.

### **3.4 Conclusion**

Research methodology is seen as the cornerstone in every research project. This chapter discussed the research approach followed in conducting this research and presented the research framework used for this research. Given that the investigation is multi-faceted, a combination of research approaches - qualitative and quantitative – was selected using mixed research methods. At the end, the research design was developed, describing briefly the stages involved in the design and development processes of this work, and justifying the selected research methods used at each stage. All these stages are covered in Table 3.1. The next chapter presents the outcome of the stages – *Investigate-Evaluate-Develop* – namely the designed framework.

## **CHAPTER 4. THE PROPOSED BUSINESS MODEL ARCHITECTURE FRAMEWORK (BMAF)**

### **4.1 Introduction**

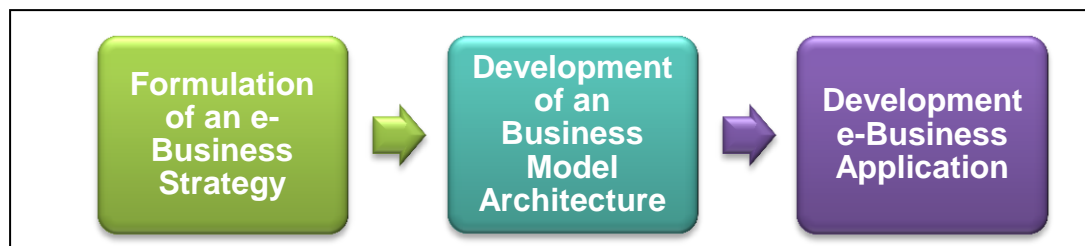
This chapter focuses on the main objective of this research, namely the development of a framework for the architecting of e-business models used for B2B EC. The extensive literature review in chapter 2 revealed a mix of concepts, terminologies, and definitions of the architectural components used to describe a business model. To address this problem, the work on this chapter - through a classification and rationalisation of the concepts - developed a conceptual notation defining the *business model architecture* concepts (with unambiguous text definitions) required for the description of a business model, and proposed a set of stages for the construction/reconstruction of a business model; the result is the design of the Business Model Architecture Framework (BMAF).

### **4.2 Role of Business Model Architecture (BMA)**

Existing business model literature revealed that the term *business model* has been defined by different perspectives creating at the end confusion rather a unified theory. The reason for the lack of an agreed common definition is that the researchers describe business models for different purpose of use. Nevertheless, a business model refers to the value adding activities: -creation-delivery-capture of value-to one or several customer's segments in order to generate growth (financial and non-financial). This is the core logic of a business, but it is not the only aspect of business model. The main reason behind this confusion is the shift that the business world experienced from the traditional way of doing business to the new way of digital business, which is engulfed with high level of complexity and rapid change. Nowadays, business models are complex, multiple, and dynamic. They include external resources and they create new relationships. A network of stakeholders like suppliers, manufacturers, partners, investors and customers plays an active role in the operation of a business and it can affect the architecture of a business mode. Also, a business operation is supported by technological platform that can change, evolve and improve the business model.

Therefore, fundamental priority for a complete understanding of business model, and for the subsequent construction of one, it is not just the description of the business model but the description of the business model architecture. The aim of the designed framework is to go one step further and to consider all the aspects of a business model including the architecture of the technology and application in case of e-business. Thus its objectives are to define the concepts that will describe the components for the construction of business model. Components are considered later on this chapter.

BMA can play a significant role; it can be the middle stage in the developing of an e-business. It can act as an abstract representation of the e-business strategy and the pattern (design) for the development of the e-business application as depicted in Fig.4.1



**Figure 4.1 Role of Business Model Architecture in the developing of an e-business**

BMA will identify all the business models components; the structure and the linkages of the components which will be driven by e-business's strategy, i.e. it will define the objectives, the roles and the behaviour of these components. At the end, the identified components will work as the building blocks that will fit together and create the e-business application.

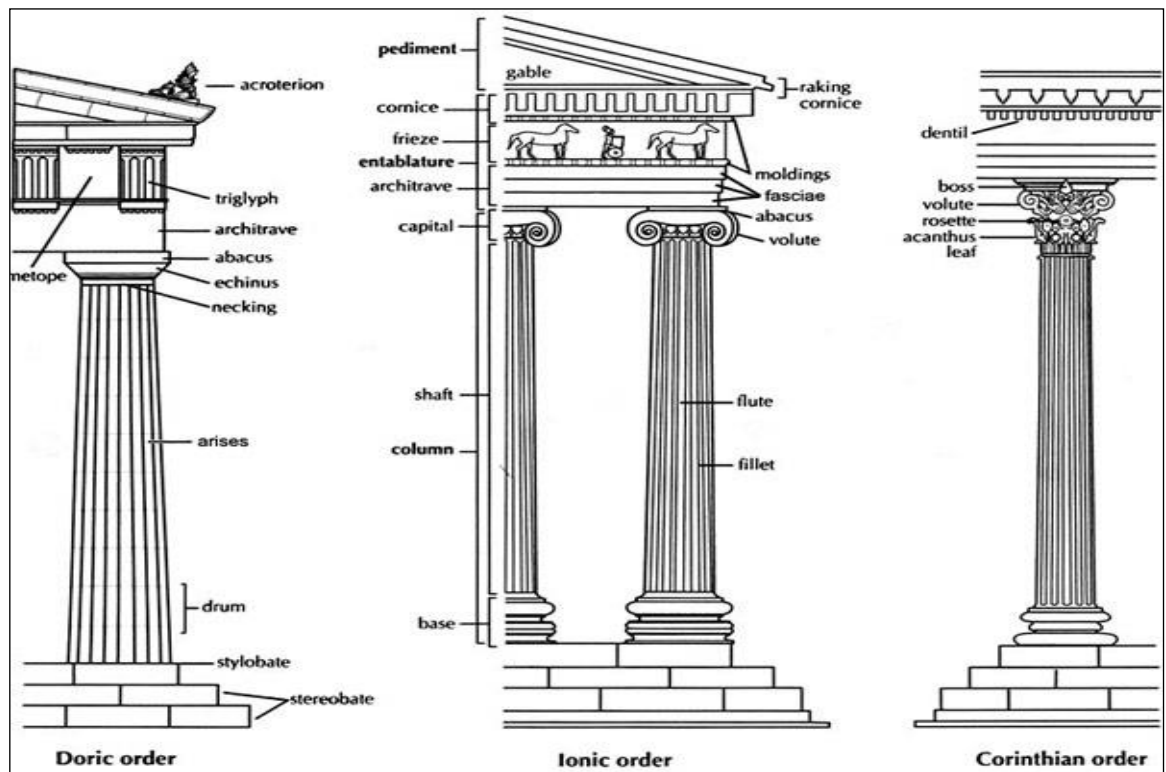
### **4.3 Components in BMA**

According to the business model literature review in chapter 2, *component* is not the only term used by the researchers; other terms have been used like *vector* (Venkatraman & Henderson, 1998), *function* (Chesbrough & Rosenbloom, 2002), *element* (Osterwalder, 2004), *dimension* (Schweizer, 2005).

The terms *component* and *element* have different meanings in different scientific fields. Usually, element refers to the material that a component is made up, for instance a car has components like doors, a trunk, a top etc. made up of an element, namely tin; the components of water are the elements hydrogen and oxygen. In others cases component and element mean the same thing, for example electrical elements are conceptual abstractions representing electrical components. In most of the cases, element is on the lowest level of a pyramid with components above them.

For this work, the terms component and element have been defined inspired by the principles in the science of architecture. In the Ancient Greek Architecture there are three major architectural systems, called orders, for the building structure and decoration of Greek temples, the Doric order, the Ionic order, and the Corinthian order (Boardman, *et al.* 1967). All orders describe the same components but each component has a different element or group of elements. The main components of the structure are the platform, the columns, the horizontal beam (entablature), and the roof (pediment)

(WisdomClassical, 2013). As we can see in figure 4.2, the building structure is the same but the aesthetic result is different for each temple; each component has a different element based on the architecture order; for example, each column has several separately cuts as well as a different number of flutings into the column shaft. Similar, each other component has a specific element depending on the architecture order. As a consequence, each architectural order is defined based on the elements rather than on the components.



**Figure 4.2 Ancient Greek Architectural Orders (WisdomClassical, 2013)**

Adopting the above approach, the proposed BMAF aims to describe the concepts, namely to give text based definition about the business model architecture components in order to describe the content, the objective(s), the role(s) and the behaviour of them; in simple terms to define the elements of a business model.

#### **4.4 Business Model Architecture for B2B EC**

This section presents the study of the existing e-business models used for B2B EC. The study reveals ten key components in the business model architecture of B2B EC.



#### 4.4.1 Existing Business Models used for B2B EC

The development and the growth of business-to-business commerce have a closed and parallel relationship with the technological achievements over the last 35 years. In the mid-1970, business-to-business transactions were referred to simply as trade or the procurement process. The term total inter-firm trade was used to describe the total flow of value among firms. During this period, the pharmaceutical firm Baxter Healthcare initiated a primitive form of B2B commerce. It developed an automated order entry system placing telephone modems into its customers' procurement offices. Using telephone technology, Baxter achieved the automation of the re-ordering process and thus discouraged re-ordering from competitors (Turban, *et al.* 2011; Turban, *et al.* 2010). During the 1980s, a new form of computer-to-computer communication called electronic data interchange (EDI) emerged. EDI standards enabled firms to exchange commercial documents and conduct digital commercial transactions across private networks. Suppliers and buyers used EDI as a new technological platform to develop new automated order solutions. Suppliers own supplier-side solutions that are seller-biased markets and they show only goods from a single seller. Buyers own buyer-side solutions that are buyer-biased markets and aim to reduce the procurements cost of suppliers for the buyer by automating the transaction. In this period, the term B2B commerce is used to describe this computer-enabled inter-firm trade (Laudon, *et al.*, 2013; Turban, *et al.* 2011; Turban, *et al.*, 2010).

The existence of the Internet in the mid-1990s, gives the opportunity to firms to change the existing patterns and systems of procurement, designing and implementing new Internet-based B2B solutions (or B2B E-Commerce). During this period, the Internet revolution started, the B2B commerce revival is just beginning. The existing patterns are expanded to complete architectural models and evolved following the new technological and business circumstances. Similarly with the initial patterns, these architectural models are classified according to who controls them namely, **supplier-oriented** and **buyer-oriented** (Turban, *et al.* 2011; Turban, *et al.*, 2010; Agrawal, *et al.*, 2001). Furthermore during this period, a third model is established. This new model of B2B commerce is called **intermediary-oriented model** because it enables a third party (an electronic intermediary company) to offer an intermediary e-marketplace for multiple business buyers and sellers. Through this e-marketplace the interested parties may be brought together to effect transactions (Burgstaller, 2000; Timmers, 2001). As a natural extension and scaling up of the above models, B2B E-Commerce has morphed into B2B **internet exchanges** and more recently into complex marketplaces. In these

new e-marketplaces, the proliferation of B2B exchanges (B2B) promises to cut costs, and to create an efficiency supply-chain by bringing together buyers and sellers (Hutt & Speh, 2013).

According to Laudon and Traver (2013), models used for B2B EC can be categorised into two main types, private e-marketplaces and public e-marketplaces:

*Private e-marketplace or private industrial networks* are Internet-based communication environments that bring together a small number of strategic business partners who collaborate with one another to develop highly efficient supply chains and to satisfy customer demand for product. They emerged in the late 1990s with commercialisation of the Internet, as natural extensions of EDI systems and the existing close relationships that developed between large industrial firms and their suppliers (Turban, *et al.* 2011; Laudon & Traver, 2013).

*Net marketplaces (or public e-marketplaces)*, which also are referred to as **Exchanges** or **hubs** bring hundreds of suppliers, each with its own electronic catalogue, together with potentially thousands of purchasing firms to form a single Internet-based marketplace. They can be owned by independent third parties backed by venture capital, or by established firms who are the main (or only market players), or by a mix of both creating a **consortia**. Net marketplaces emerged in the late 1990s as a natural extension and scaling up of the electronic storefronts (Turban, *et al.* 2011; Laudon & Traver, 2013).

Further, marketplaces are classified as vertical or horizontal (Laudon & Traver, 2013): *Vertical marketplace* provides expertise and products for a specific industry and *Horizontal marketplace* refers to market that serve many different industries.

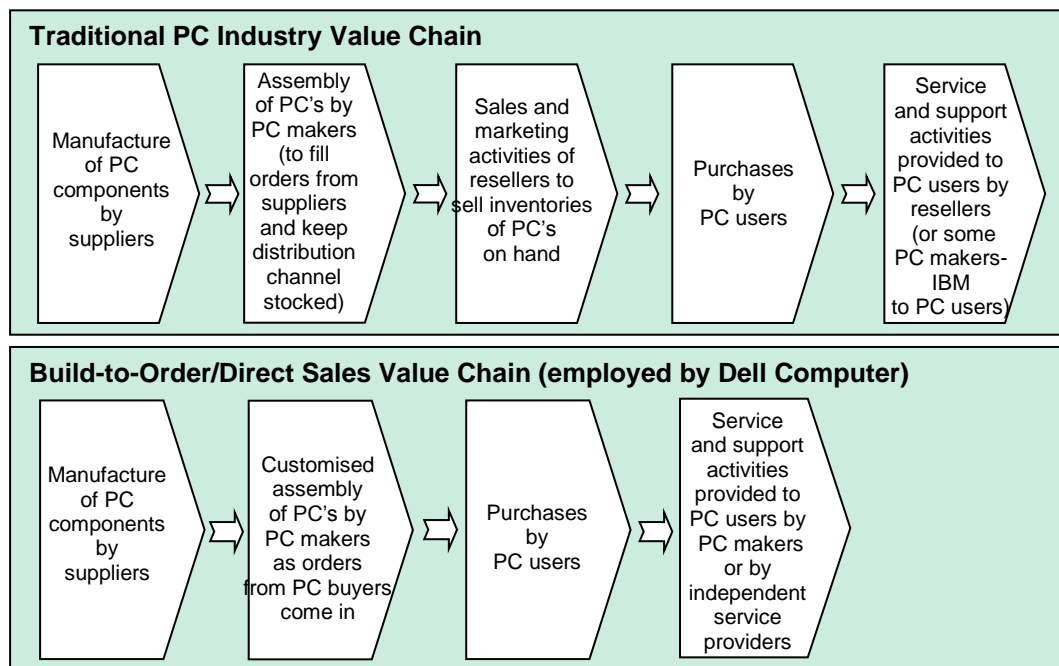
#### **a) Private e-marketplaces**

*Seller-oriented marketplace* (Turban, *et al.*, 2010) or *supplier-oriented marketplace* (Barnes-Vieyra & Claycomb, 2001) is a private marketplace owned by a seller that offers to buyers (business buyers and consumers) a single source from which to make spot purchases of seller's direct (production) materials. The architecture of this B2B EC model is similar to as that for B2C EC; a seller builds a private e-store and sales his/her product to customers through the Internet. The seller can be a manufacturer or a distributor selling to wholesalers, to retailers, or directly to businesses buyers and consumers (Turban, *et al.*, 2010; Turban, *et al.*, 2011).

The selling process (selling from electronic catalogues) is similar to B2C EC. Buyers visit the e-store (web site), search-select from a list of products (sometimes they can also customise the products) and place their orders. The major difference, in this process, is that in B2B different types of buyers may view different catalogues and price lists (Turban, *et al.*, 2010). For example, a large-business buyer may get customised catalogues, and buy the same product at a better price than a consumer.

Dell Direct business model is a successful and powerful supplier-oriented model. It was initially established in 1984 when Michael Dell pioneered the idea of selling custom-built computers through the mail directly to customers. With the emergence of the Internet in the late 1990s, the model began to grow to a very powerful e-business model enabling direct relationships with customers and with key technology partners, and providing computer solutions tailored to customers' needs. By 1998, Dell had become the largest manufacturer and marketer of business PCs in the world, and in 1999 it was the first for the entire PC market. Currently it continues its success, manufacturing and selling computer systems directly to corporate, business and consumer clients.

Dell's success element of this direct business model is the direct relationships with customers, eliminating the intermediaries (wholesalers and retail dealers) between Dell and its customers. Using the Web thoroughly and creatively Dell has created an electronic supply chain, reducing its internal activities (as shown in Figure 4.3).



**Figure 4.3 Comparative Value Chain of PC Manufactures (Paltalidis & Georgiadou, 2002)**

Its direct business model provides extranet sites called Premier Pages as vertical portals for businesses to interact with Dell. Using these Premier Pages customers take greater control of their business with Dell; they have all the information that a customer would want. Purchases of Dell computers can buy standard system configurations or can customise their own system, tailored to their specific needs. Premier Pages shorten the time and paperwork involved in ordering and tracking computer purchases and providing technical support for installed systems.

Furthermore the Dell direct business model provides close working relationships with key suppliers. As orders flow into Dell from customers, it shares these data in real time with its key suppliers so that they know exactly what Dell's daily requirements for a particular part or assembly would be. This approach allows Dell to keep inventory to a minimum by providing just-in-time (JIT) manufacturing of PCs. Each machine is built to order, so Dell is not faced with an inventory build-up of finished products that may rapidly become obsolete. This is a critical factor in the computer industry, which is subject to rapid and continuous change.

***Buyer-oriented marketplace*** (Turban, *et al.*, 2010) or *one-from-many*, (Barnes-Vieyra & Claycomb, 2001) is a private marketplace owned by a buyer that invites sellers to a single market in which they can make spot transactions, selling their indirect (non-production) materials. In this B2B EC model, a big buyer opens an electronic store on its own server and invites potential sellers to bid on the items the buyer needs (Turban, *et al.*, 2010). This process for purchasing is called the reverse auction (Turban, *et al.*, 2011). According to this process, the buyer prepares-announces a description of the products that needs (Requisitions for Quotations), and identify the potential sellers. The sellers participating in the bidding process have the opportunity to download the product information from the Web and to submit electronic bids on the announced requisitions for quotations (RFQs). This process can be in real-time or it can take a few days, until a predetermined closing date. When buyer receives the sellers' bids, will evaluate them and may negotiate electronically to achieve the best bids. The buyer will award a contract to the bidders that best meet his/her requirements.

General Electric's (GE) case is a successful example of a buyer's bidding site. After an increase of 16% in material costs between 1982 and 1992, GE started to look for ways to improve its purchasing system. Following an analysis of its procurement process, GE discovered that its purchasing system was inefficient, complex, time-consuming, and was involving too many transactions. So, in 1996, the company applied

an online procurement system, the Trading Process Network (TPN) ([tpn.geis.com](http://tpn.geis.com)). Using TPN, GE receives the requisitions of quotations (RFQs) from its internal customers and then solicits bids from selected suppliers over the Internet. In the next two hours, suppliers notify the incoming RFQs by e-mail, fax or EDI and seven days are given to prepare a bid and send it back over the extranet to GE. When a bid is received, it is transferred to the customer and a contract can be awarded on the same day. As a result, the distribution of information and specifications is executed rapidly, the cost and the time for sourced goods are reduced and more opportunities for new partnerships are created. Initially, TPN was a secure Web site developed for internal needs of GE. However, in 1998 TPN became a public bidding site, available to other subscribing companies for customised bidding and automated purchasing. In essence, GE earns revenue by charging subscribers for the service and by collecting a fee from the seller if a transaction is completed.

*Intermediary-oriented marketplace* or *many sellers to content aggregator to many buyers* (Barnes-Vieyra & Claycomb, 2001) is a private and independent marketplace owned by an intermediary company that connects buyers and sellers, offering a single market in which the interested parties can make spot transactions of indirect (non-production) materials. In this model, an intermediary company opens an intermediary e-store in order to link its business buyers and sellers. Through this e-marketplace the interested parties have the opportunity to meet and to effect transactions (Turban, *et al.*, 2010). The selling process is similar to seller-side marketplace. Using the e-store of intermediary company, company's suppliers have the opportunity to present their products (through electronic catalogues) on the web. Buyers, whose company information has been validated in advance, can visit the e-store, search-select products listed in electronic catalogues and place their orders (Turban, *et al.*, 2010).

The Boeing Company is the number one commercial aircraft producer in the world, with controlling at least 55% - 60% of the world market for more than forty years. In the late nineties, Boeing debuts its PART page on the Internet. The purpose of this electronic intermediary is to link Boeing's customers (airlines) who need maintenance parts with suppliers who produce the parts for Boeing's aircrafts. Customers around the world have the capability to check part availability and prices, to place make orders as well as a track order's status through the Internet. To date, more than 70% of Boeing's customers use this service for ordering parts and customer enquiries.

## **b) Public e-marketplaces**

### **Trading Exchanges**

**E-distributor** or *one-to-many markets* (one seller serving many firms) (Laudon & Traver, 2013), or *functional exchanges* (Turban, *et al.*, 2011) is a public independently owned intermediary that offers industrial customers a single source from which to make spot purchases of indirect materials or goods for maintenance, repairs, and operation activities, known as MROs (Turban, 2011; Laudon & Traver, 2013). It operates in a horizontal market that serves many different industries with products from many different suppliers. Under this model, an intermediary firm brings the products of thousands of sellers (direct manufacturers) into a single online electronic catalogue for sale to thousands of buyer firms. E-distributor makes money by charging a mark-up on products they distribute (Laudon & Traver, 2013). The selling process is similar to seller-side marketplace. Buyers visit the e-store (web site), search-select from a list of products and place their orders. The major difference, in this model, is that it operates as a public market in the sense that any firm can order from the catalogue, as opposed to private markets, where membership is restricted to selected firms (Laudon & Traver, 2013).

**E-procurement** or *many-to-many markets* (many sellers serving many firms) (Laudon & Traver, 2013) or *horizontal distributors* (Turban, *et al.*, 2010) is a public independently owned intermediary that connects hundreds of online sellers offering millions of MRO goods to business firms who pay a fee to join the market. It operates in a horizontal market in which long-term contractual purchasing agreements are used to buy indirect goods. An intermediary firm aggregate hundreds of catalogues in a single marketplace and make them available to firms, often on a custom basis that reflects only the suppliers desired by the participating firms. E-procurement company makes money by charging a percentage of each transaction, licensing consulting services and software and assessing network use fees. E-procurement companies expand on the business model of simpler e-distributor by including the online catalogues of hundreds of sellers and offering value chain management services to both buyers and sellers. These includes automation of a firm's entire procurement processes (purchase order, requisition, sourcing, business rules enforcement, invoicing, and payment) on the buyer side, and automation of the selling business processes (catalogue creation and content management, order management, fulfilment, invoicing, shipment, and settlement) on seller side.

### **Consortium Trading Exchanges**

A *Consortium Trading Exchanged* (CTE) or *industry consortia* formed by a group of major companies (Turban, *et al.*, 2011). They are industry-owned markets that provide industry-wide transaction services for procurement, transaction management, shipping and payment for both buyers and sellers. They emphasise long-term contractual purchasing and the development of stable relationships (Laudon & Traver, 2013).

### **Third-Party Exchanges**

Third-party exchanges or vertical aggregators-Web portals are a public independently owned online marketplace that connects hundreds of suppliers to potentially thousands of buyers in a dynamic real-time environment. They are typically vertical markets in which spot purchases can be made for direct inputs (both goods and services). Exchanges make money by charging a commission on each transaction (Laudon & Traver, 2013). In third-party exchanges, an intermediary firm aggregate hundreds of catalogues in a single marketplace and tries to match buyers and sellers pushing them to make transactions. There are two models for third-party exchanges, supplier aggregation and buyer aggregation.

**Supplier Aggregation Model:** In this model, virtual distributors standardise, index, and aggregate suppliers' catalogues or content and make these available to buyers in a centralised location. The hosting can be done by an ISP or by a large telecommunications company (Turban, *et al.*, 2011). There are two types of buyers, large and small. Large buyers need software support in the purchasing approval process (for example, using workflow software), budgeting, and the tracking of purchases across the buying organisation. This requires system integration with existing regulations, contracts, pricing, etc. Such integration is provided by an ERP system. For smaller buyer, hosted workflow and applications are available from application service providers which team up with aggregators (Laudon & Traver, 2013)

**Buyer Aggregation Model:** In this model, buyer's requisitions of quotations (RFQs) are aggregated and then linked to a pool of suppliers that are automatically notified of the RFQs. The suppliers can then make bids (Turban, *et al.*, 2011).

#### **4.4.2 Business Models Components for B2B EC**

The above study reveals ten key components in the business model architecture of B2B EC. For each component a description was given to define the element(s). Components are grouped according to four thematic sections, each of them presenting a different aspect of the business model architecture:

a) **Business Component(s)**

- **Owner** is a seller or buyer or independent party or a group of sellers or buyers that own a B2B e-marketplace;
- **Business Partners** are business sellers or buyers that collaborate within the B2B e-marketplace;
- **Business Collaboration** describes the collaboration between B2B e-marketplace and its external business partners;
- **Business Transaction** names the transaction between B2B e-marketplace and its external business partners; it can be a) *Long-Term (Systematic) sourcing* involves purchases made in long-term contracts that are usually based on private negotiations (for prices and terms) between sellers and buyers. The prices are basically fixed. b) *Spot buying* refers to purchases of goods and services made as the need arises. The prices are dynamic, based on supply and demand at any given time. This means that exactly the same product or service can be sold at different prices, to different customers (Turban, 2011; Laudon & Traver, 2013).
- **Type of Material(s)** used for the manufacturing of product. They can be described as: *Direct materials* (production materials) are used in making the product (e.g. steel in a car, or paper in a book). They go directly to the manufacture or assembly of a product or the creation of a service. Their use is scheduled, they are usually not shelf items, and they are usually purchased in large quantities and after negotiation and contracting. *Indirect materials*, such as office supplies or light bulbs, support production. They are usually used in maintenance, repairs, and operation activities, and are known as MROs, or non-production materials (Turban, 2011; Laudon & Traver, 2013).

b) **Application Component(s)**

- **Business Actor** is an active entity that performs business processes.
- **Mechanism** names the mechanism for buying/selling in the B2B e-marketplace.
- **Business Process**, a task of e-business mechanism performed by business actor.

c) **Data/Information Component(s)**

- **Database** names the main information/data stored in B2B e-marketplace system.

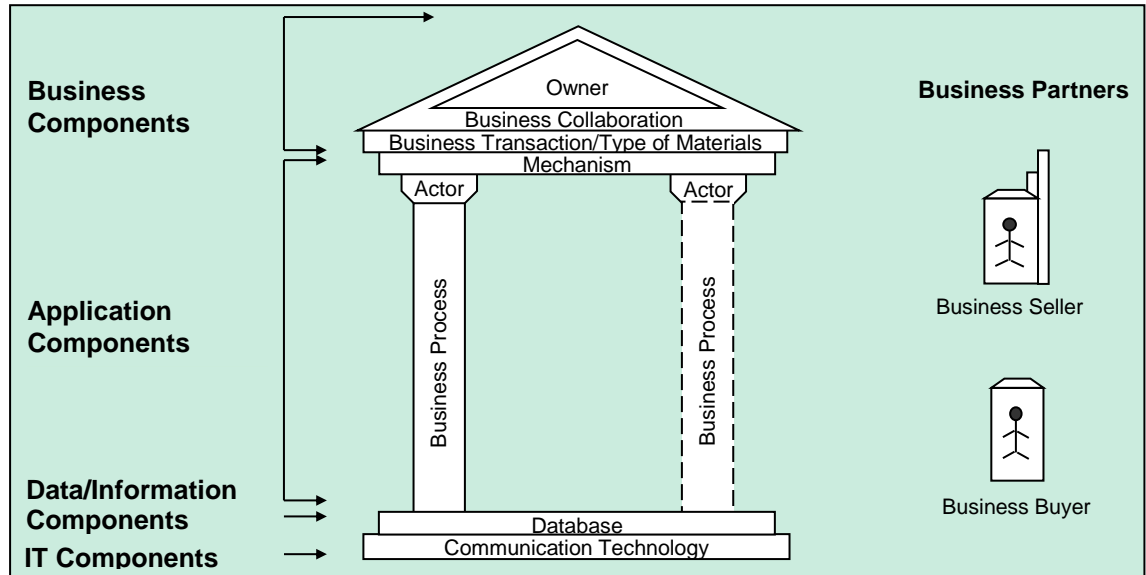
d) **IT Component(s)**

- **Communication Technology** used as a platform for the operation of B2B e-marketplace.



#### 4.5 BMA Representation Technique

As a consequence of the above evidences a single notational technique was developed for the representation of the business model. The aim was to capture the initial architecture business model in a high level structure, presenting only a certain number of business model's components, mainly those components that define the unique elements of a business model. Adopting the notation for the architecture of the ancient Greek temple, the main components of BMA for B2B EC are depicted (Figure 4.4).



**Figure 4.4 BMA Representation Technique**

The low platform presents the IT components namely the technological foundation for the operation of the e-business. The upper platform shows the data/information components such as the arrangement and store of data/information in the system. The low horizontal beam, the columns and their capitals show the key components of e-business application; they explain the operation of the mechanism for buying or selling in the e-marketplace. Each column represents one business process performed by a specific actor shown in the capital of the column. Column with dashed line symbolises a business process which will maybe optional in a business model. The components of the roof illustrated the main business components of the business logic. They specify the owner of the e-marketplace, the type of relationship with the external business partners, as well as the type of products that sell or buy.

It is a technique to capture the initial picture of the business model architecture, and to easily identify the elements of the business model. In fact the use of this technique, helped easily to represent the architecture of e-business models used for B2B EC and to classify them according to who control them (namely a supplier, buyer, or intermediary) and to the type of the e-marketplace (private, public, consortium). Figure 4.5 presents this classification, and gives the elements of each e-business model.

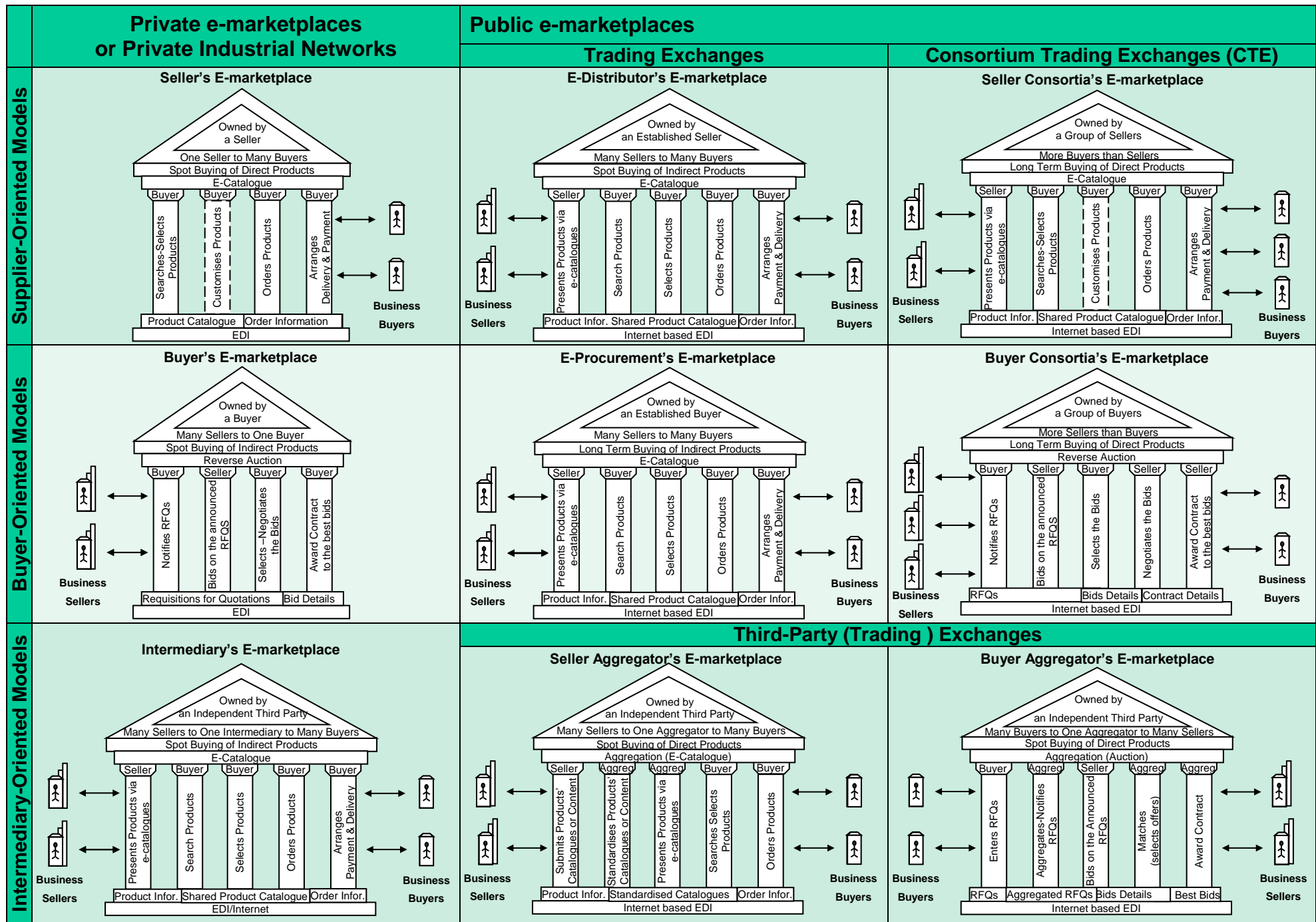


Figure 4.5 Classification of Nine E-business Models used for B2B EC

#### 4.6 BMA Domains

The detailed study of the business models used for B2B EC confirms the multiple view of the BMA. Components were grouped into four thematic sections, influenced by Enterprise Architecture; each group capture an architectural view of the business model. As a consequence, four architectural domains have been proposed as the key areas of the BMA. **Business Architecture** aims to describe the whole business idea, answering the fundamental questions relating to business models: What is the business goal and how to achieve? Who is the targeted customer? How will the business deliver value to the customer? How does the business make money? How is the business buying, selling and/or distributing a product and/or a service? The answers of the above questions are summarised into five aspects namely the organisation, product, service, customer and behaviour. **Data/Information Architecture** has main priority to identify what data and information flow within a business. The aim is to understand the behaviour, the meaning and the value of data/information in the operation of the business model, as well as structure and the content of it. **Application Architecture** focuses to define the components to build the software application, namely the e-business application that e-business model will be structured around. It presents the interactions and relationships with the core business processes. **Technology Architecture** provides the “technical architecture” software and the hardware platform needed for the operation of the application.

#### 4.7 Standardisation of BMA Concepts

In this section, we classify and rationalise the main concepts identified in the literature review (chapter 2). The columns of the table 4.1 show the concepts of each of literature area: a) Enterprise Architecture Framework & Methods, b) Enterprise Architecture Description Languages, c) Modelling Languages, d) Enterprise & Business Model Ontologies, e) Business Modelling Frameworks; including also f) the components of business models used for B2B E-Commerce. Concepts are classified according to the four architectural domains used as filters. In the case of Business Architecture, subsections are defined too; concepts are structured into four categories: Organisation, Product/Service, Customer, Behaviour. Rows of the table show the overlaps; this enables the rationalisation of the concepts. The last column reveals the standardised concepts of the Business Model Architecture.

**Table 4.1 Toward the Standardisation of BMA Concepts**

Architectural Domains	Architecture components of the Business Models used for B2B EC	Enterprise Architecture Frameworks & Methods	Enterprise Architecture Description Languages	Modelling Languages		Ontologies		Business Model Frameworks	Business Model Architecture Concepts
				for Organisational Process	for Application & Technology modelling	Enterprise Ontologies	Business Model Ontology		
<b>BUSINESS ARCHITECTURE</b>									
<b>Organisation</b>		<i>Bus. Vision</i>						<i>Mission</i>	Business Vision
		<i>Bus. Strategy</i>				<i>Plan</i>		<i>Bus. Strategy</i>	Business Strategy
		<i>Bus. Principles</i>				<i>Manage</i>		<i>Bus. Principles</i>	Business Principles
	<i>Bus. Partner</i>	<i>Bus. Actor</i>	<i>Bus. Actor</i>	<i>Participant</i>	<i>Bus. Actor</i>		<i>Actor</i>	<i>Actor</i>	Business Actor
		<i>Bus. Role</i>	<i>Bus. Role</i>		<i>Bus. Role</i>			<i>Structure</i>	Business Roles
		<i>Bus. Object</i>	<i>Bus. Object</i>		<i>Bus. Object</i>				Business Objects
	<i>Collaboration</i>	<i>Bus. Commitment</i>	<i>Bus. Collaboration</i>	<i>Bus. Collaboration</i>			<i>Partnership</i>	<i>Collective Competition</i>	Business Collaboration
			<i>Relationship</i>				<i>Relation</i>		Business Relation
	<i>Bus. Transaction</i>		<i>Contract</i>	<i>Bus. Transaction</i>			<i>Agreement</i>	<i>Agreement</i>	Business Transaction
		<i>Value</i>				<i>Revenue Model</i>	<i>Pricing</i>	Revenue Model	
						<i>Revenue Stream and Pricing</i>	<i>Revenues</i>	Revenue Sources	
						<i>Value Proposition</i>	<i>Value Proposition</i>	Value Proposition	
<b>Product</b>		<i>Bus. Outcome</i>	<i>Bus. Service/Product</i>			<i>Outcome</i>			Product/Service
	<i>Direct Materials</i>					<i>Consumable passive entities (material)</i>			Type of Materials
	<i>Indirect Materials</i>					<i>Usable passive entities</i>			Product homogeneity
							<i>Offering (Reasoning, Value Level, Price Level)</i>		Offering (Reasoning, Value Level, Price Level)
<b>Customer</b>		<i>Bus. Object</i>					<i>Target Customer</i>	<i>Customer Value</i>	Target Customer
							<i>Criterion</i>		
							<i>Distribution Channel</i>		Distribution Channel
							<i>Link (Customer Buying Cycle)</i>		Link (Customer Buying Cycle)
	<i>Relationship</i>						<i>Relationship</i>		Customer Relationship
<i>Selling Mechani.</i>						<i>Mechanism</i>	<i>Coordination</i>	Mechanism	

Behaviour		<i>Bus. Behaviour</i>				<i>Perform</i>			Business Behaviour
		<i>Bus. Function</i>	<i>Bus. Function</i>			<i>Bus. Units</i>	<i>Activity</i>	<i>Connected Activity</i>	Business Function
	<i>Bus. Process</i>	<i>Bus. Process</i>	<i>Bus. Process</i>	<i>Process</i>			<i>Value Configuration</i>	<i>Process</i>	Business Process
			<i>Bus. Interaction</i>						
		<i>Bus. Event</i>	<i>Bus. Event</i>		<i>Bus. Event</i>	<i>Event</i>			Business Event
		<i>Bus. Resources</i>	<i>Bus. Interface</i>				<i>Resources</i>	<i>Resources</i>	Business Resources
		<i>Bus. Location</i>							Business Location
	<i>Bus. Activity</i>		<i>Activity Rules</i>	<i>Bus. Activity</i>				Business Activities	
								Business Rules	
INFORMATION-DATA ARCHITECTURE			<i>Representation</i>		<i>Message</i>	<i>Documentation</i>			Message
			<i>Purpose</i>						Purpose
			<i>Meaning</i>						Meaning
			<i>Value</i>						Value
					<i>Attribute</i>				Attribute
					<i>Class</i>				Class
				<i>Package</i>				Package	
APPLICATION ARCHITECTURE		<i>Component</i>	<i>Applic. Component</i>		<i>Component</i>				Application Component
		<i>Collaboration</i>	<i>Applic. Collaboration</i>		<i>Collaboration</i>				Application Collaboration
		<i>Interface</i>	<i>Applic. Interface</i>		<i>Interface</i>				Application Interface
	<i>Database</i>		<i>Data Object</i>		<i>Class</i>				Application Data Object
		<i>Services</i>	<i>Application Service</i>						Application Service
			<i>Applic. Function</i>						Application Function
	<i>Interaction</i>	<i>Applic. Interaction</i>		<i>Interaction</i>				Application Interaction	
TECHNOLOGY ARCHITECTURE			<i>Artifact</i>						Artifact
	<i>Communication Platform</i>		<i>Communication Path</i>						Communication Path
			<i>Device</i>						Device
			<i>Infrastructure Interface</i>						Infrastructure Interface
			<i>Infrastructure Service</i>						Infrastructure Service
			<i>Network</i>					<i>Technology</i>	Network
	<i>Node</i>	<i>Node</i>						Node	

Table 4.2 summarises the outcomes of the above standardisation. Each architecture domain consists of a group of concepts; each concept represents a key component of the business model architecture. In addition, for a complete description of Product, Service, and Customer perspectives further concepts have been added. In particular, for Product Description, Product Variety, Product Life Cycle, Lead time required for made-to-order products, Customer involvement. Also, all the components required for the understanding of service.

**Table 4.2 Business Models Architecture (BMA) Conceptual Notation**

Business Model Architecture						
Business Architecture				Information/Data Architecture	Application Architecture	Technology Architecture
Organisation	Product	Service	Behaviour			
- Business Vision	- Product Description	- Service Description	- Business Functions	- Message	- Application Component	- Artifact
- Business Strategy	- Product Variety	- Service Intangibility	- Business Processes	- Purpose	- Application Collaboration	- Node
- Business Principles	- Product Life Cycle	- Service Perishability	- Business Activities	- Meaning	- Application Interface	- Communication Path
- Business Actors and their Roles	- Product homogeneity	- Labour Intensity	- Business Events	- Value	- Application Data Object	- Infrastructure Service
- Business Objects	- Type of Materials	- Demand Fluctuations	- Business Resources	- Attribute	- Application Service	- Infrastructure Interface
- Business Collaboration	- Lead time required for made-to-order products		- Business Location	- Class	- Application Function	- Network
- Business Relation	- Offering (Reasoning, Value Level, Price Level)		- Business Rules	- Package		
- Business Transaction						
- Revenue Model						
- Revenue Sources						
- Value Proposition	Customer					
	- Target Customer					
	- Customer Involvement					
	- Distribution Channel					
	- Customer Relationship					
	- Customer Buying Cycle					
	- Mechanism					

In the following sections precise unambiguous text definitions have been produced for each concept highlighting the behaviour of the components as well as their relationships.

## 4.7.1 Business Architecture

### a) Organisation Concepts

Organisation concepts cover all the key components of a business model, mainly those that related to the structure of the business (see Table 4.3). *Business Vision*, *Business Strategy*, and *Business Principles* define the main axes of a company on what business aims, how to achieve it, under which values and behaviours. These are the components that govern the *Business Behaviour* and define the actions and the interrelationships - *Business Relations* - of the *Business Actors*. In addition, *Business Collaboration* describes the relationships of the business with its external business partners. *Revenue Model* and *Revenue Sources* define what the company's revenue streams are and how company makes money through *Business Transactions* by selling, lending or licensing a product or service. *Value Proposition* explains how/what/why the company value to the specific segment.

**Table 4.3 Organisation Concepts Definitions**

Organisation Concepts	Description
<b>Business Vision</b>	Business Vision describes a future identity and the Mission describes how it will be achieved
<b>Business Strategy</b>	Business Strategy is a long term plan of action designed to achieve a particular goal
<b>Business Principles</b>	Business Principles are the fundamental values and operation approach of a business.
<b>Business Behaviour</b>	Business Behaviour is an ordering of process or functions that accomplish business goals and satisfy business commitments (Jonkers, H., & et al, September 2003)
<b>Business Actors and their Roles</b>	Business Actors are the active entities that perform business behaviour. Business Role describes the work that an actor performs within an organisation (Jonkers, H., & et al, September 2003)
<b>Business Objects</b>	Business Objects are the passive entities that are manipulated by business behaviour (Jonkers, H., & et al, September 2003)
<b>Business Collaboration</b>	Business Collaboration the relationships of an organisation with its external business actors (business partners)
<b>Business Relation</b>	Business Relations are the interrelationships of entities (business actors, business objects) within an organisation.
<b>Business Transaction</b>	Business Transaction is the atomic unit of work in a trading arrangement between two business actors. A Business Transaction is conducted between two parties playing opposite roles in the transaction. The roles are always a requesting role and a responding role. (Turban, <i>et al.</i> 2010)
<b>Revenue Model</b>	Revenue Model describes the way company makes money. It measures the ability of a firm to translate the value it offers its customers into money and incoming revenue streams. A firm's revenue model can be composed of different revenue streams that can all have different mechanisms (Osterwalder A., 2004).
<b>Revenue Sources</b>	Revenue Sources describes other incoming money streams
<b>Value Proposition</b>	Value Proposition is an overall view of a company's bundle of products and services that are of value to the customer (Osterwalder A., 2004).

## b) Product Concepts

Product Concepts (as shown in Table 4.4) cover the aspects of what a company offers to its customers. *Product Description* is a generic view of what a company offers; it can be a single item or a *variety* of items. *Product Life Cycle* defines all the stages a product goes through a) from the design to the creation - using direct or indirect *materials*, b) from the use and renewal of the product to the reselling of the product to another customer. *Product Homogeneity* defines the production type and the option for customisation, while it affects the *lead time* required from the placement of the order to the delivery of the product. *Offering* explains the reasons and level of the value of the product and as well as the price of the product.

**Table 4.4 Product Concepts Definitions**

Product Concepts	Description
<b>Product Description</b>	Product is anything that can be offered to a market that might satisfy a want or need. It is of two types: Tangible (physical) and Intangible (non-physical) (Fisher, 1997)
<b>Product Variety</b>	A single product or a variety of products offered (Fisher, 1997).
<b>Product Life Cycle</b>	The conditions a product is sold under will change over time. The Product Life Cycle refers to the succession of stages a product goes through (Fisher, 1997).
<b>Product Homogeneity</b>	Large amounts of standardised products are produced (mass production) or products are modified for each client or each new situation (customised) (Fisher, 1997).
<b>Type of Materials</b>	Type of Materials used for the manufacturing of the product. It is of two types: Direct materials used in making products and Indirect used in maintenance, repairs, and operations activities, and are known collectively as MROs or non-production materials (Turban, <i>et al.</i> 2010)
<b>Lead time required for made-to-order product</b>	Lead time required from the placement of the order to the delivery of the product (Fisher, 1997).
<b>Offering (Reasoning, Value Level, Price Level)</b>	Offering captures a) the reasoning on why/what makes the product to be valuable to the customer, b) the value level of the product-how the product differs itself from one of its competitors, c) the price level of the product (Osterwalder A., 2004).

## c) Service Concepts

Service Concepts (as shown in Table 4.5) cover the aspects of what service(s) a company offers to its customers. Similarly to the product, *Service Description* is a generic view of what a company offers; it can be a single service or a group of services. Service involves considerable human activity, thus *Labour Intensity* defines the human resources required. *Service Perishability* analyses the service time required and time that can be lost. *Demand fluctuation* estimates the demand of the service as it can vary by the type of service, the season, the time of day, etc. *Service intangibility* makes the evaluation of the service difficult. However, there are always some tangible ways which help consumers to evaluate services.



**Table 4.5 Service Concepts Definitions**

Service Concepts	Description
<b>Service Description</b>	<i>Service is the non-material equivalent of a good.</i> It is an intangible product involving a deed, a performance, or an effort which cannot be physically possessed. It should not be confused with the related topic of customer service, which involves any service activity that adds value to a core product.
<b>Service Intangibility</b>	Service Intangibility - Service cannot be seen, handled, smelled, etc. There is no need for storage. Because services are difficult to conceptualise, marketing them requires creative visualisation to effectively evoke a concrete image in the customer's mind. From the customer's point of view, this attribute makes it difficult to evaluate or compare services prior to experiencing the service (Bebko, 2000)
<b>Service Perishability</b>	Service Perishability - Unsold service time is "lost", that is, it cannot be regained. It is a lost economic opportunity. For example a doctor that is booked for only two hours a day cannot later work those hours— she has lost her economic opportunity. Other service examples are airplane seats (once the plane departs, those empty seats cannot be sold), and theatre seats (sales end at a certain point).(Bebko, 2000) (Bhasin, 2010)
<b>Labour Intensity</b>	Labour intensity - Services usually involve considerable human activity, rather than precisely determined process. Human resource management is important. The human factor is often the key success factor in service industries. It is difficult to achieve economies of scale or gain dominant market share (Bhasin, 2010).
<b>Demand Fluctuations</b>	Demand fluctuations - It can be difficult to forecast demand (which is also true of many goods). Demand can vary by season, time of day, business cycle, etc (Kandampully, 2000).

**d) Customer Concepts**

Customer Concepts (as shown in Table 4.6) cover aspects related to the profile of the firm’s customers. Knowing the customer’s specific needs a business model can be designed around these needs. Company targets to a specific group of customers, business and/or individual consumers, thought a *distribution channel* a) directly where the *customer involvement* can be high and/or b) indirectly thought intermediaries. *Customer Buying Cycle* describes the full process, from the aware of the product to advocating it after the sales, including the selling/buying *mechanism*.

**Table 4.6 Customer Concepts Description**

Customer Concepts	Description
<b>Target Customer</b>	Target Customer is a group of customers a company wants to offer value (Osterwalder A., 2004).
<b>Customer Involvement</b>	Customer involvement - Most service provision requires a high degree of interaction between client and service provider .
<b>Distribution Channel</b>	A Distribution Channel is a mean of getting in touch with the customer, either directly or indirectly (Osterwalder A., 2004).
<b>Customer Buying Cycle</b>	Customer Buying Cycle describes the process customer go through to make a purchase, from the aware of the product to advocating it after the purchase.
<b>Customer Relationship</b>	Customer Relationship component describes the relationship a company establishes with a target customer segment (Turban, <i>et al.</i> 2010)
<b>Mechanism</b>	Mechanism describes the ways that company selling/buying Turban,2010)

**e) Business Behaviour Concepts**

Business Behaviour concepts (see Table 4.7) cover all the aspects that related with the operation of the business. These describe the components that business process model of the company consisted of: namely a) the *Business Functions* and *Business Processes* for the accomplishment of the business goals and satisfaction of the business commitments; b) the *Business Activities* that are performed according to the *Business Rules* which affect the activities selection and govern the outcome of the activity; c) the *Business Resources* - all those things that are required by a business to sustain its processes and create its outcomes. The result is the action of the outcomes, namely a *Business Event*.

**Table 4.7 Business Behaviour Concepts Definitions**

<b>Business Behaviour Concepts</b>	<b>Description</b>
<b>Business Behaviour</b>	Business Behaviour is an ordering of process or functions that accomplish business goals and satisfy business commitments.
<b>Business Functions</b>	Business Functions are on-going activities that support the business including manufacturing and production, sales and marketing, finance, accounting and human resources. Functions can be decomposed into other functions and eventually into discrete processes.
<b>Business Processes</b>	Business Processes are discrete activities that have inputs and outputs, as well as starting times and stopping times. Some business processes happen repetitively, while others happen occasionally or even rarely.
<b>Business Activities</b>	Business Activity is a set of tasks an individual or group perform. This activity could be writing a sales order, taking a customer service call, or any activity that occurs in one department or functional area of the organisation. Each of these tasks is defined and typically supported in an application as a set of procedures that lets individuals or a group accomplish them in some repeatable process.
<b>Business Events</b>	Business Event is an action that results from a business activity. The event can be an interaction with an individual, the completion of a business task, or the collection of certain types of information. Although the event can take many forms, it's the lowest form of system information that can be captured.
<b>Business Resources</b>	Business Resources represents all those things that are required by a business to sustain its processes and create its outcomes. Resources break down into five general categories: physical things (tangible molecular things), energy, monetary value, information resources, and various kinds of capabilities (skills, knowledge, attitudes, and experiences of humans).
<b>Business Location</b>	Business Location house resources and functions; they come in two main varieties physical and logical: Physical locations have to do with space. Logical locations include accounts, postal addresses, and network addresses.
<b>Business Rules</b>	Complex business logic demands that a process selects one of several alternative activities, or discriminate the information upon which it acts. This is expressed in the form of rules that affect activity selection (branching and repeating) and govern message consumption.

### 4.7.2 Information/Data Architecture

Information/Data concepts (see Table 4.8) describes the information and data of *Business Behaviour*, and mainly how they flow and how they organised. The operation of business processes required the exchanges of information- *Message(s)*-that target specific *Purposes(s)*. Each message has a *Meaning*-a informative value-that has practical *Value* to the functionality of a business process. The content of a message is described by *Attributes*; the structure and the behaviour of a message described by a *Class*. A group of organised messages greats a *Package*.

**Table 4.8 Data Concepts Definitions**

<b>Data Concepts</b>	<b>Description</b>
<b>Message</b>	Message is piece of information that flows between the processes and its participants.
<b>Purpose</b>	Purpose is the description of functionality of a message (Jonkers, H., & et al, September 2003).
<b>Meaning</b>	Meaning represents the informative value of a message (Jonkers, H., & et al, September 2003)
<b>Value</b>	Value is the practical/functional value and the value of information or knowledge of a message
<b>Attribute</b>	Attribute is a data item that exist in and describe the content of a message
<b>Class</b>	Class is a collection of methods, operations and attributes that fully describe the structure and behaviour of a message
<b>Package</b>	Package is a group of organised messages

### 4.7.3 Application Architecture

Application concepts (see Table 4.9) describe the components of a software application that support the operation of business behaviour. An *Application Component* can be a software application e.g. an information system or part of a software application e.g. a database that has a particular functionality - an *Interface*. An application component operates using a *Data Object* – a piece of information. Each application component performs one or more *Application Functions* and provides a *service* which shares with other application components and makes it available to its environment, namely to the users. Interactions - *Application Collaborations* – occur between the application components.

**Table 4.9 Application Concepts Definitions**

<b>Application Concepts</b>	<b>Description</b>
<b>Application Component</b>	Application Component is part of an application that performs one or more applications functions (Sparx Systems, 2007; Lankhorst, 2009)
<b>Application Collaboration</b>	Application Collaboration describes the interaction between the components (Sparx Systems, 2007; Lankhorst, 2009)
<b>Application Interface</b>	Application Interface describes the functionality of a component
<b>Application Data Object</b>	Application Data Object is self-contained piece of information suitable for operation of the application component (Sparx Systems, 2007; Lankhorst, 2009)
<b>Application Service</b>	Application Service describes functionality that application components share with each other and the functionality that they make available to the environment (Sparx Systems, 2007; Lankhorst, 2009)
<b>Application Function</b>	Application Function describes the internal behaviour of a component (Sparx Systems, 2007; Lankhorst, 2009)

#### 4.7.4 Technology Architecture

Information Technology concepts (see Table 4.10) describe the components of the technology that support the operation of a software application. *Nodes* are active processing elements (e.g. servers, database servers, or client workstations) that execute and process *artifacts* – a piece of information. Each node has a particular functionality - an *Interface* and provides a *service* that expose to its environment. Nodes are connected and exchanged information through *communication paths*, creating a *network*.

**Table 4.10 Information Technology Concepts Definitions**

<b>IT Concepts</b>	<b>Description</b>
<b>Node</b>	Nodes are active processing elements (e.g. servers, database servers, or client workstations) that execute and process artifacts (OpenGroup-ArchiMate-TL, 2009)
<b>Artifact</b>	Artifact is a physical piece of information that is used or produced by deployment and operation of a system. An instance (copy) of an artifact can be deployed on a node (OpenGroup-ArchiMate-TL, 2009)
<b>Infrastructure Interface</b>	Infrastructure interface specifies how the infrastructure services of a node can be accessed by other nodes (provided interface), or which functionality the node requires from its environment (required interface) (OpenGroup-ArchiMate-TL, 2009)
<b>Infrastructure Service</b>	Infrastructure Service exposes the functionality of a node to its environment (OpenGroup-ArchiMate-TL, 2009).
<b>Communication Path</b>	Communication Path is a relation between two or more nodes, through which these nodes can exchange information (OpenGroup-ArchiMate-TL, 2009)
<b>Network</b>	Network represents the physical communication infrastructure. This may comprise one or more fixed or wireless network links. The most basic network is a single link between two devices. A network has properties such as bandwidth and latency. It embodies the physical realisation of the logical communication paths between nodes.

## **4.8 Business Model Architecture Framework**

### **4.8.1 Philosophy of BMA Framework**

The philosophy that guides the BMA Framework is defined by the principles of a) Conceptualisation, b) Representation/Visualisation, c) Construction and Reconstruction. These are the main domains that designed framework addresses as well as the main objectives that framework targets.

### **4.8.2 Scope of BMA Framework**

BMA Framework's scope covers a) the construction of e-business model and b) the reconstruction of traditional business model to an e-business model. Both aspects includes business model redesign in combination with BMA's architectural domains: organisation, product, service, customer, application and technology.

### **4.8.3 Approach of BMA Framework**

BMA Framework's approach consists of 3 stages; stage 1 and 2 assist to the understanding of the current business model of a firm, and they are required to apply in the case of traditional model's reconstruction. Stage 3 concerns the design and description of the future e-business model in case of reconstruction or it can be used simply for new business model construction.

#### **Stage 1: Description of the Architecture of Current Business Model**

At this stage the main priority is the identification of the current business model architecture. It aims to explore the current business logic of the firm and understand the overall structure of business model including the information systems and information technology used by the company. Using the BMA concepts, the current business model architecture is decomposed into components which are defined and their elements are identified. The result is to identify the current business model's elements and their inter-relationships.

#### **Stage 2: Analyse the Current Business Model**

This stage focuses on the analysis of the above evidences. The aim is to understand initially a) the possible options for changing or expanding the current business model to e-business model; and then b) what changes within or between the components have to occur and how changes will affect other components.

### Stage 3: Synthesise the e-Business Model

It aims to synthesise the e-business model in an abstract and structured way. At this stage BMA concepts have been grouped into three sets, creating three architectural visualisations of the designed e-business model:

**Mandatory Visualisation** at this phase all the compulsory components (see on Table 4.11) required for the synthesis of an e-business model are considered. In sort, this phase focuses on the strategic view of the e-business model and on the basic structure of the four architectures. This phase concerns the visualisation of the components, their objectives, roles and elements as well as their interconnections.

**Table 4.11 BMA - Mandatory Visualisation**

Business Model Architecture								
Business Architecture					Information/Data Architecture	Application Architecture	Technology Architecture	
Organisation	Product	Service	Customer	Behaviour				
Mandatory	Business Vision	Product Description	Service Description	Target Customer	Business Processes	Message Purpose Value	Application Component	Communication Path
	Business Strategy	Product Homogeneity	Service Intangibility	Customer Involvement	Business Resources		Application Interface	Network
	Business Actors/Roles	Type of Materials		Customer Relationship			Application Service	
	Business Collaboration			Mechanism			Application Data Object	
	Business Transaction							
	Revenue Model							
	Value Proposition							

**Desirable Visualisation** includes additional components (see on Table 4.12) recommended to be considered for the synthesis of e-business model. It is further concerned how the e-business model will operate adding those components that define in detail the behaviour of components

**Table 4.12 BMA – Desirable Visualisation**

Business Model Architecture								
Business Architecture					Information/Data Architecture	Application Architecture	Technology Architecture	
Organisation	Product	Service	Customer	Behaviour				
Desirable	Business Principles	Product Variety	Service Perishability	Distribution Channel	Business Functions	Attribute Class Package	Application Function	Artifact Node
	Business Object	Product Life Cycle	Demand fluctuations		Business Activities		Application Collaboration	Infrastructure Interface
	Business Relation	Lead time required for made-to-order products			Business Events			Infrastructure Service

**Optional Visualisation** concerns additional components (see on Table 4.13) recommended to be considered for the synthesis of an e-business model. These are not core components for the initial construction model, but they can assist in future extensions.

**Table 4.13 BMA – Optional Visualisation**

Business Model Architecture							
Business Architecture					Information/Data Architecture	Application Architecture	Technology Architecture
Organisation	Product	Service	Customer	Behaviour			
Optional	Revenue Sources	Offering (Reasoning, Value Level, Price Level)	Labour Intensity	Customer Buying Cycle	Business Location		
					Business Rules		

#### 4.9 Conclusion

This chapter presented the major contribution of this thesis, namely the proposed Business Model Architecture Framework (BMAF). Initially, a) the chapter justified the role of the *business model architecture* in developing an e-business, b) developed a representation technique and presented the components of the business model architecture for B2B EC, c) developed a business model architecture (BMA) conceptual notation defining the concepts and suggesting precise unambiguous text definitions for each concept, providing also guidelines for the behaviour of each concept as well as their relationships, d) presented the Business Model Architecture Framework (BMAF) proposing 3 stages and justifying the role at each stage.

In the next chapters, a) Chapter 5 validates the BMA approach and its structure as well as the BMA concepts and their classification using a quantitative research approach, and b) Chapter 6 evaluates the application and usefulness of the BMAF using a qualitative research approach.

## CHAPTER 5. QUANTITATIVE VALIDATION OF THE PROPOSED FRAMEWORK

### 5.1 Introduction

This chapter presents the quantitative validation of the proposed framework using an online survey questionnaire. The validation exercise at this stage sought to determine whether experts from the academic community and practitioners from the business community agree with the main aspects of the designed framework; namely the BMA approach, its structure, the BMA concepts and the classification of the concepts.

### 5.2 The Survey

The survey aims to validate the work of this research by collecting data from two groups of respondents a) experts and b) practitioners relevant to the research area. The experts – academics and researchers, - were selected on the basis of their experience in the areas of Business Model Transformation, Business Model Architecture, E-Commerce and E-Business. Practitioners are members of professional networks like the British Computing Society and The Institute of Engineering and Technology. Summary of the Results send to the participants.

**Table 5.1 Questionnaire Distribution**

Number Targeted	Number Received	Number Valid		Number Invalid
		Experts	Practitioners	
60	40	19 + 14 = 33		07

An electronic survey was conducted from December 2012 to February 2013. Of the 60 questionnaires administered, a total of 40 were received. As shown in Table 5.1, 19 of the 40 responses were from experts and 14 from practitioners; in total 33 were used for the analysis, and 7 responses were found to be invalid due to missing answers.

### 5.3 Questionnaire Design

Before running the electronic survey, a pilot study was carried out with one academic and two practitioners in order to evaluate the appropriateness of the questionnaire (see Appendix B - - *Pilot Research Questionnaire*). To enhance the quality of the survey, the questionnaire design and content was revised according to the suggestions and comments gained from the pilot study (see Appendix C - *Final Research Questionnaire*). The questionnaire was designed to ascertain the following aspects of the designed framework: a) the role of BMA in the construction of an e-business model,



b) the structure of BMA, namely its architectural domains and their concepts, and c) the categorisation of the concepts into mandatory, desirable, and optional.

#### **5.4 Electronic Questionnaire Design**

The electronic questionnaire was constructed using SurveyMonkey. The design was simple making respondents to feel comfortable when answering even if not familiar with electronic surveys. Questions were arranged in a logical manner and organised in four sections. Each question was presented on a new page providing a clear display and easy navigation to the participants. Answers and choices were included as part of the questions, allowing only one answer to be given. In some cases respondents had the option to enter comments thus enabling the collection of quantitative data.

Two hyperlinks for the electronic questionnaire – one for each group of participants- were created. For the experts group a list of 30 emails addresses was initially created, and then an invitation message with a unique hyperlink was delivered to each email address. A reminder message was sent - 4 weeks later - to those respondents who did not answer the first invitation. A second hyperlink with a short message about the topic and aim of the survey was posted to specialised groups on LinkedIn inviting practitioners to complete the electronic questionnaire. The questionnaire responses were anonymous, and participation in this study was entirely voluntary. Those who chose to participate were free to withdraw from the study at any time. All responses and any identifiable information provided are held confidentially; initially stored in the SurveyMonkey database and then transferred to the researcher's laptop which was password protected.

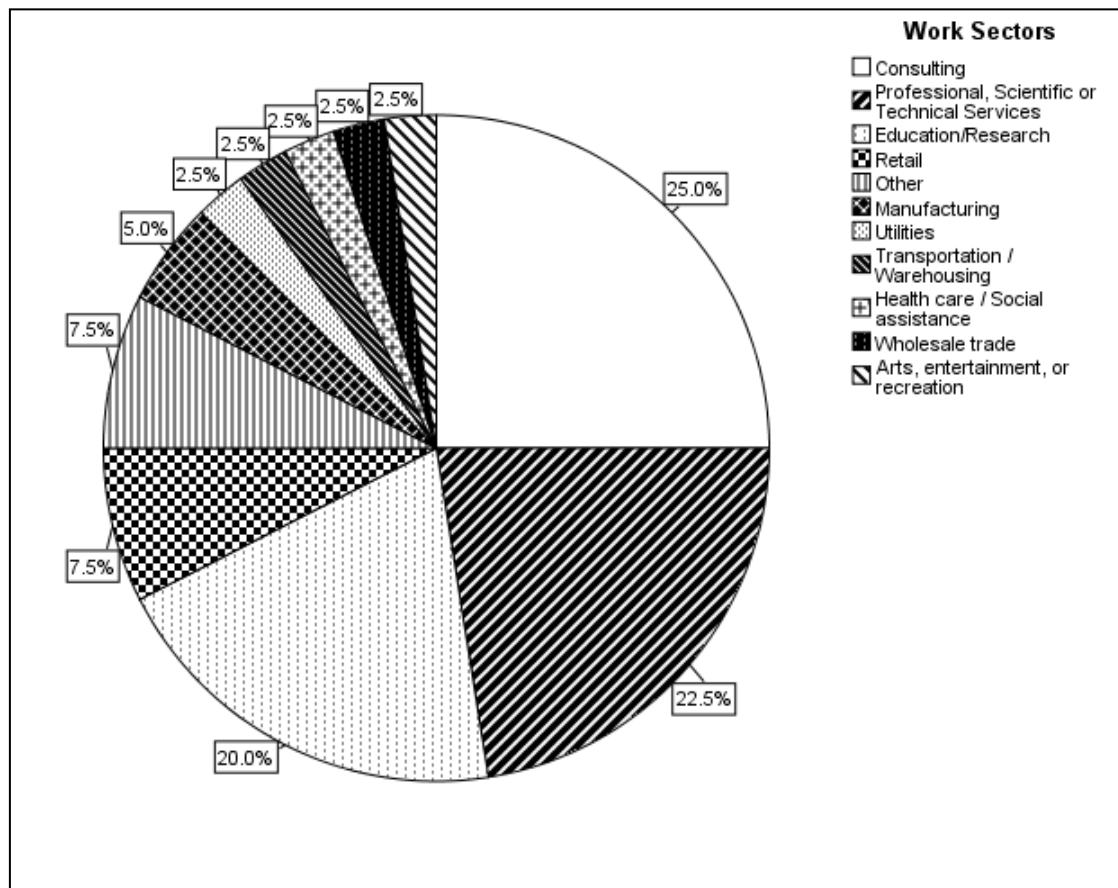
#### **5.5 Data Analysis**

The Statistical Product and Service Solutions (SPSS, Version 20) and Microsoft Office Excel 2010 were used for the data analysis.

##### **5.5.1 Analysis of Section A: Specialisation Details**

In this section respondents were asked to provide information about themselves such as the work sector and areas of specialisation (See Appendix C for questionnaire).

As mentioned above, each variable was analysed based on a) the perspective of experts and b) on the perspective of practitioners Questions 4 and 5 of the questionnaire (See Appendix C) focus on capturing information about the respondents. *Question 4* captured the respondent’s work sector and *Question 5* sought to ascertain the level of expertise of the respondents in specialised areas relevant to this research.

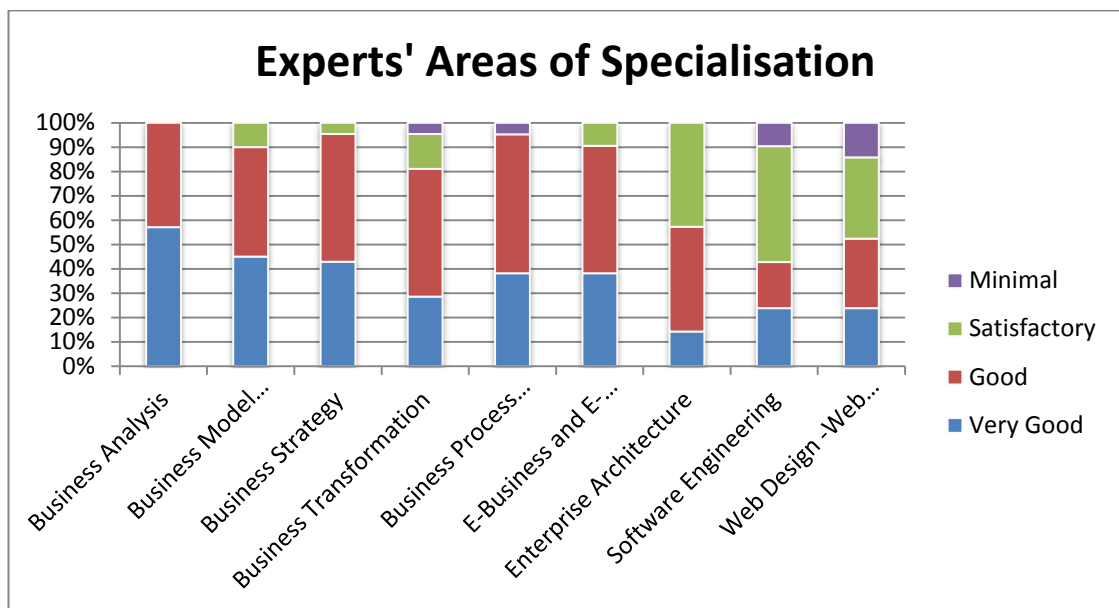


**Figure 5.1 Respondents’ Work Sector Background**

The descriptive statistics as captured in Figure 5.1 indicate an overwhelming majority of respondents are practitioners, academics and researchers. 67.5% of the respondents work in the sectors of *Consulting*, *Professional Scientific or Technological Services*, and *Education/Research*. 15 % to sectors like *Retail*, *Management* and *Personal Businesses*. Other sectors represented include *Manufacturing* and few of the respondents to *Transportation*, *Health*, and *Art*.

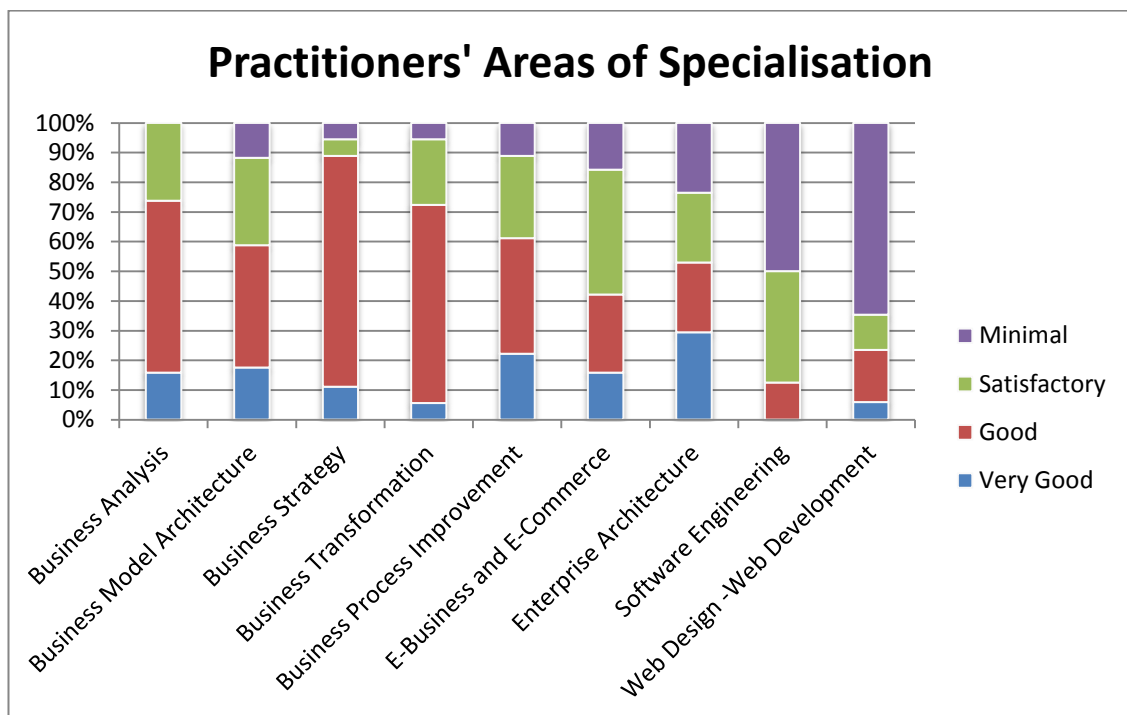
Experts are specialised to a “very good” and “good” degree in the majority of this project’s research areas (as shown in Figure 5.2). Namely they are experts in *Business Analysis*, *Business Strategy*, *Business Model Architecture*, *Business Process*

*Improvement, E-Business and E-Commerce.* A majority of them have also “good” degree of specialisation into the field of *Business Transformation* and few into *Enterprise Architecture, Software Engineering, and Web Design – Web Development.*



**Figure 5.2 Experts' Degree of Specialisation for Each Area**

Practitioners (as shown in Figure 5.3) are specialised into the Business Strategy, Business Transformation, Business Analysis. Some have satisfactory experience in the field of Business Model Architecture, Business Process Improvement, E-Business & E-Commerce.



**Figure 5.3 Practitioners' Areas of Specialisation**

## 5.5.2 Analysis of Section B: Business Model

### a) Business Model Definition (BMD)

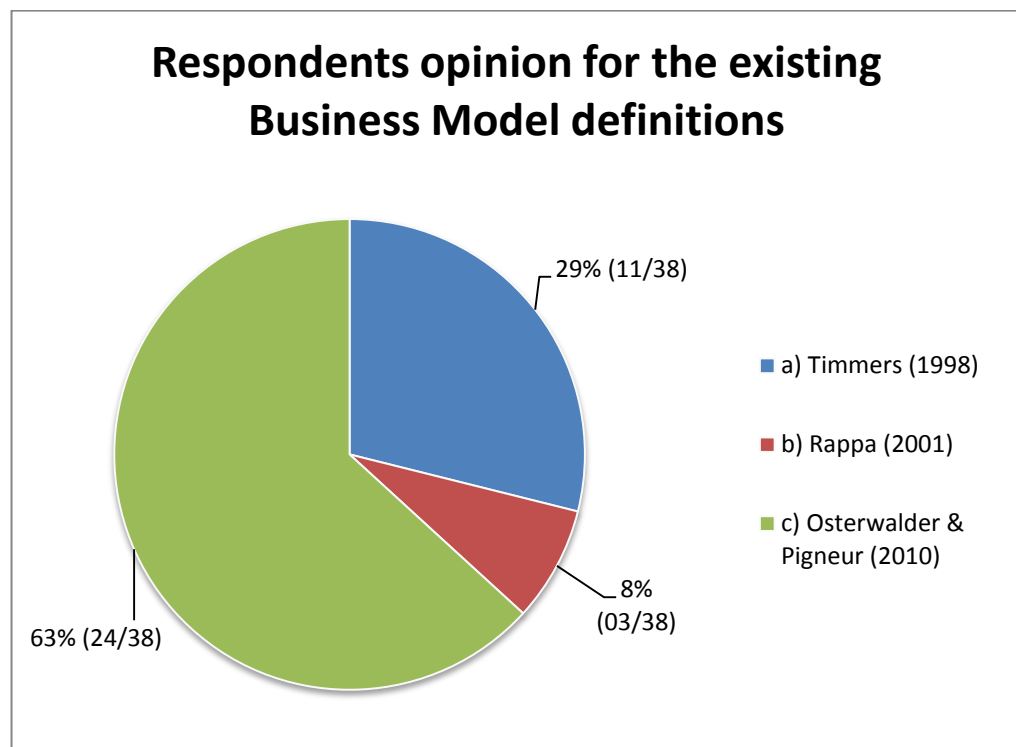
In *Question 6*, respondents were asked to choose one from the following existing definitions which reflect their opinions for business model definition (See Appendix D for questionnaire).

*a) Business model is the architecture for the product, service and information flows, including a description of the various business actors and their roles, and a description of the potential benefits for these actors, and a description of the sources of revenues (Timmers, 1998).*

*b) Business model spells out how a company makes money by specifying where it is positioned in the value chain (Rappa, 2001).*

*c) Business model is the description of the value that a company offers to one or several segments of customer; and the architecture of the firm and its network of partners for creating, marketing and delivering this value and relationship capital, in order to generate profitable and sustainable revenues streams (Osterwalder & Pigneur, 2010).*

From the descriptive statistics (as shown in Figure 5.4) the majority 63% (24/38) of the respondents selected the *Osterwalder & Pigneur's* definition to express their opinion about the term business model.



**Figure 5.4 Respondents Opinion for the existing Business Model Definitions**

This results reveals that respondents adopted two perspectives to define a business model, namely a) the description of the value that a company offers to the customers, and a) the description of the firm's architecture.

**b) Relationship between Business Model and Strategy (RBBM&S)**

In *Question 7* (See Appendix C for questionnaire) respondents were asked to indicate the degree to which they agree or disagree with the following statement for business model:

*A business model consists of a group of components that their structure and relationships are led by the business strategy; namely business strategy defines the objectives, the roles and the behaviour of these components*

The respondents responses were scored on a scale of 1 to 4 on the basis of (1) for “Strongly Agree” and (4) for “Strongly Disagree”. Data collected were analysed in respect of the two groups of respondents – experts and practitioners – in order to examine the homogeneity of the variances between the groups. Scores were analysed using the Levene’s Test to determine the equality of variance using the SPSS software. This test was considered more appropriate because a) the data were measured on an ordinal scale, b) Levene’s method statically tests the amount of difference among 2 groups’ variances; variance is a measure of dispersion, how much do the scores (of one group) vary around the mean – mean measures the central tendency (Starkweather, 2010). According to Levene’s Test:

a) if the probability level “p” as specified under “**Sig.**” is < 0.05 the variance between groups is not equal,

b) if the probability level “p” as specified under “**Sig.**” > 0.05 the variance between groups is equal;

c) if the level of significant “**Sig. (2-tailed)**” < 0.05 the difference is statistically significant.

**Figure 5.5 Levene’s Test Interpretation Rules**

The results as contained in Table 5.2 shows that for the RBBM&S variable the Sig. and Sig. (2-tailed) are greater than the specified value of .05. This indicates that there is homogeneity of the variances between the groups, and so the difference is not statistically significant. The output also indicate that experts (mean=1.95) and practitioners (mean=2.13) agree with the proposed RBBM&S statement.

**Table 5.2 Results for RBBM&S Variable from Question 7**

Relationship between Business Model and Strategy	Type of Respondents	N	Min	Max	Mean	Std. Deviation	Sig.	Sig. (2-tailed)
	Experts	21	1	3	1.95	.669	.917	.428
	Practitioners	16	1	3	2.13	.619		

### 5.5.3 Analysis of Section C: Business Model Architecture

#### a) Business Model Architecture Definition (BMAD)

In *Question 8*, respondents were asked to indicate the degree to which they agree or disagree with the following statement for business model architecture:

*Business Model Architecture describes how all the components fit together and create a business model. These components are grouped into four thematic sections referred to as **architecture domains**-these four types of architecture that are commonly accepted as subsets of enterprise architecture.*

- *Business Architecture defines the whole business idea, strategy, organisation, product/service, customer/market, key business processes.*
- *Data/Information Architecture describes key information flows and characteristics within a business area.*
- *Application Architecture provides the application systems to be deployed, their interactions, and their relationships to the core business processes of the organisation.*
- *Information Technology Architecture provides the “technical architecture” needed for the operation of the model.*

The same Levene’s Test analysis (see Table 5.3) was conducted for **BMAD** variable construct giving Sig. = .586 Sig. and Sig. (2-tailed) = .468. This indicates that experts (mean=1.89) and practitioners (mean=2.07) agree with the **BMAD** statement.

**Table 5.3 Results for the BMAD Variable from Question 8**

Business Model Architecture Definition	Type of Respondents	N	Min	Max	Mean	Std. Deviation	Sig.	Sig. (2-tailed)
	Experts	19	1	4	1.89	.737	.586	.468
	Practitioners	15	1	3	2.07	.594		

These results show that both groups of respondents agree with the suggested purpose and the recommended structure of the proposed Business Model Architecture.

**b) Role of Business Model Architecture (RBMA)**

In *Question 9*, respondents were asked to indicate the degree to which they agree or disagree with the following statement about the role of business model architecture:

*In the case of constructing an e-business, Business Model Architecture acts as an abstract representation of the e-business strategy and as a pattern (design) for the development of the e-business application*

The Levene’s Test analysis results (as shown in Table 5.4) for **RBMA** variable are Sig. = .111 Sig. and Sig. (2-tailed) = .947. This indicates that both groups express the same opinion, experts (mean=2.05) and practitioners (mean=2.07) agree with the **RBMA** statement.

**Table 5.4 Results of RBMA Variable from Question 9**

	Type of Respondents	N	Min	Max	Mean	Std. Deviation	Sig.	Sig. (2-tailed)
Role of Business Model Architecture	Experts	19	1	3	2.05	.705	.111	.947
	Practitioners	15	1	3	2.07	.458		

Based on the descriptive statistical analysis, it is concluded that responders’ answers support the role of BMA in the creation of an e-business. In particular they agree that BMA can be a tool for the planning of e-business strategy and for the design of an e-business application.

**5.5.4 Analysis of Section D: Business Model Architecture for E-Commerce**

**a) Organisation Components (OCs)**

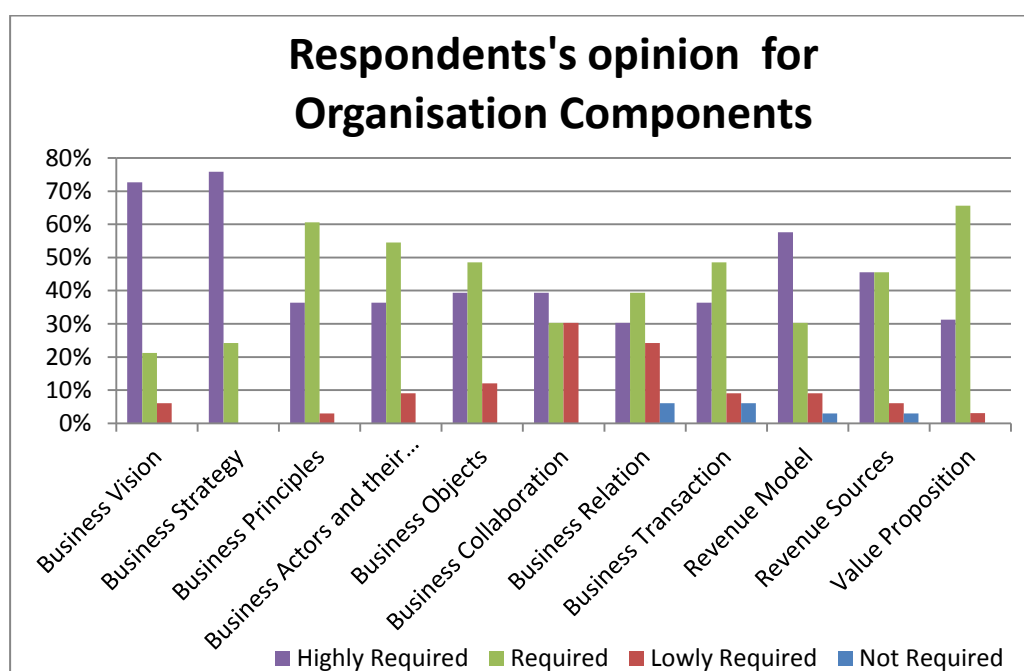
In *Question 10*, respondents were asked to indicate which Organisation Components (OCs) are *Highly Required, Required, Low Required, Not required* for the synthesis of a business model for E-Commerce (See Appendix C for questionnaire). It is noted that of the eleven individual OCs presented in the survey, the components (as shown in Table 5.5 and Figure 5.6) most considered to be ‘*Highly Required*’ by the respondents included **Business Vision, Business Strategy, and Revenue Model**. It was also noted that substantially all remaining respondents indicated these three OC’s otherwise to be ‘*Required*’. There was a natural cut-off point at the 57th percentile after which the next OC had a response rate of 45.5% in the *Highly Required* quadrant.

**Table 5.5 Results of OCs Variables from Question 10**

Organisation Components	N	Highly Required (1)	Required (2)	Lowly Required (3)	Not Required (4)	Mode
Business Vision	33	72.7%	21.2%	6.1%	0.0%	1
Business Strategy	33	75.8%	24.2%	0.0%	0.0%	1
Business Principles	33	36.4%	60.6%	3.0%	0.0%	2
Business Actors and their Roles	33	36.4%	54.5%	9.1%	0.0%	2
Business Objects	33	39.4%	48.5%	12.1%	0.0%	2
Business Collaboration	33	39.4%	30.3%	30.3%	0.0%	1
Business Relation	33	30.3%	39.4%	24.2%	6.1%	2
Business Transaction	33	36.4%	48.5%	9.1%	6.1%	2
Revenue Model	33	57.6%	30.3%	9.1%	3.0%	1
Revenue Sources	33	45.5%	45.5%	6.1%	3.0%	1 <sup>a</sup>
Value Proposition	33	31.3%	65.6%	3.1%	0.0%	2

a. Multiple modes exist. The smallest value is shown

High rates of response in the *Required* quadrant were observed for **Business Principles**, **Value Proposition**, and **Business Actors**. Substantially all remaining respondents alternatively categorised these three BMC's as '*Highly Required*'.



**Figure 5.6 Respondents' Opinion for Organisation Components**

Therefore, as illustrated in the graph respondents considered **Business Vision**, **Business Strategy**, **Revenue Model**, **Business Principles**, **Value Proposition**, and **Business Actors** as the '*Highly Required*' or '*Required*' BMC's whilst the majority of respondents categorized the remaining five BMC's as either '*Low Required*' or '*Not Required*'.



**b) Business Behaviour Components (BBCs)**

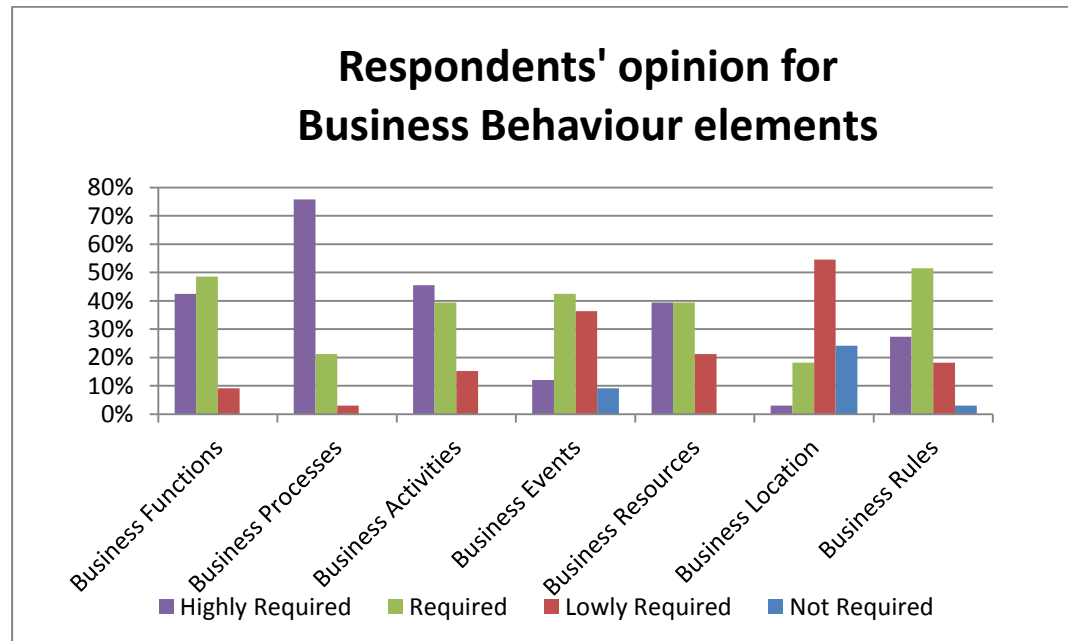
In *Question 11*, respondents were asked to indicate which Business Behaviour Components are *Highly Required*, *Required*, *Low Required*, or *Not required* for the synthesis of a business model for E-Commerce (See Appendix C for questionnaire). Of the seven BBCs listed on the survey (as shown in Table 5.6) only two had a majority of responses the outlier quadrants. 76% of respondents consider **Business Processes** to be *Highly Required*, with almost all remaining respondents considering this BBC to be *Required*.

**Table 5.6 Results for BBCs Variables from Question 11**

Business Behaviour Components	N	Highly Required (1)	Required (2)	Lowly Required (3)	Not Required (4)	Mode
Business Functions	33	42.4%	48.5%	9.1%	0.0%	2
Business Processes	33	75.8%	21.2%	3.0%	0.0%	1
Business Activities	33	45.5%	39.4%	15.2%	0.0%	1
Business Events	33	12.1%	42.4%	36.4%	9.1%	2
Business Resources	33	39.4%	39.4%	21.2%	0.0%	1 <sup>a</sup>
Business Location	33	3.0%	18.2%	54.5%	24.2%	3
Business Rules	33	27.3%	51.5%	18.2%	3.0%	2

a. Multiple modes exist. The smallest value is shown

The remaining five identified BBC's had varying distribution of responses from *Highly Required* to *Low Required* as indicated in the Figure 5.7.



**Figure 5.7 Respondents Opinion for Business Behaviour Components**

Conversely, it was noted that 79% of respondents consider **Business Location** to be either '*Low Required*' or '*Not Required*'.

c) **Product Components (PCs)**

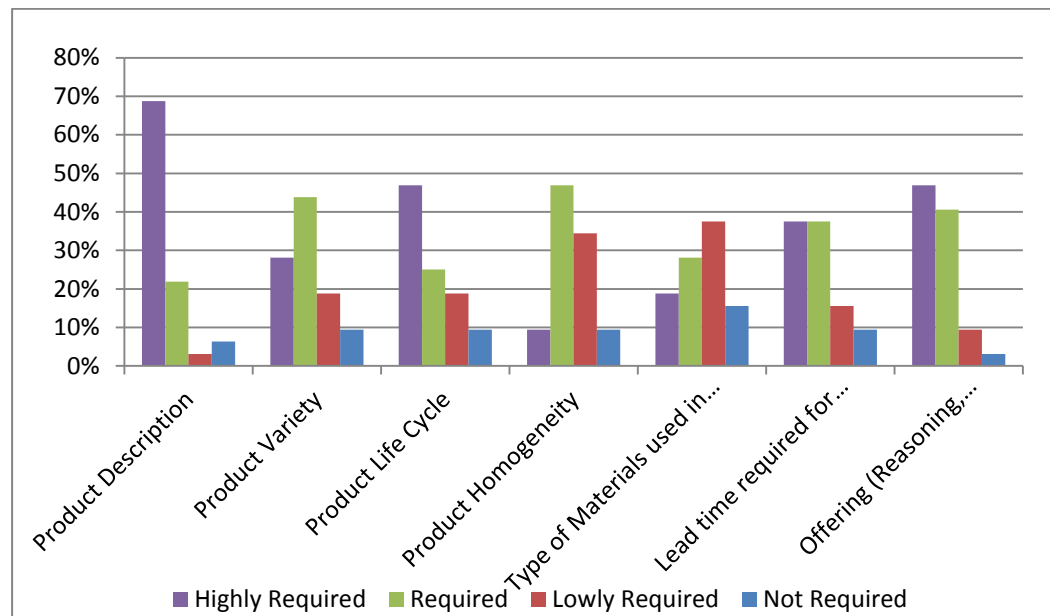
In *Question 12*, respondents were asked to indicate which Product Components are *Highly Required*, *Required*, *Low Required*, *Not required* for the synthesis of a business model for E-Commerce (See Appendix C for questionnaire). Participants were surveyed regarding seven different Product Components. The most important PCs according to respondents (as shown in Table 5.7 and Figure 5.8) were **Product Description** (69%), **Product Life Cycle**, **Lead Time** (47%), and **Offering** with 47% saying these PC's are *Highly Required*

**Table 5.7 Results of PCs Variables from Question 12**

Product Components	N	Highly Required (1)	Required (2)	Lowly Required (3)	Not Required (4)	Mode
Product Description	33	68.8%	21.9%	3.1%	6.3%	1
Product Variety	33	28.1%	43.8%	18.8%	9.4%	2
Product Life Cycle	33	46.9%	25.0%	18.8%	9.4%	1
Product Homogeneity	33	9.4%	46.9%	34.4%	9.4%	2
Type of Materials	33	18.8%	28.1%	37.5%	15.6%	3
Lead time required	33	37.5%	37.5%	15.6%	9.4%	1 <sup>a</sup>
Offering	33	46.9%	40.6%	9.4%	3.1%	1

a. Multiple modes exist. The smallest value is shown

This indicated overall that most of the PCs with the exception of **Type of Materials** are considered important in the synthesis of a business model for E-Commerce according to the respondents



**Figure 5.8 Respondents' Opinion for Product Components**

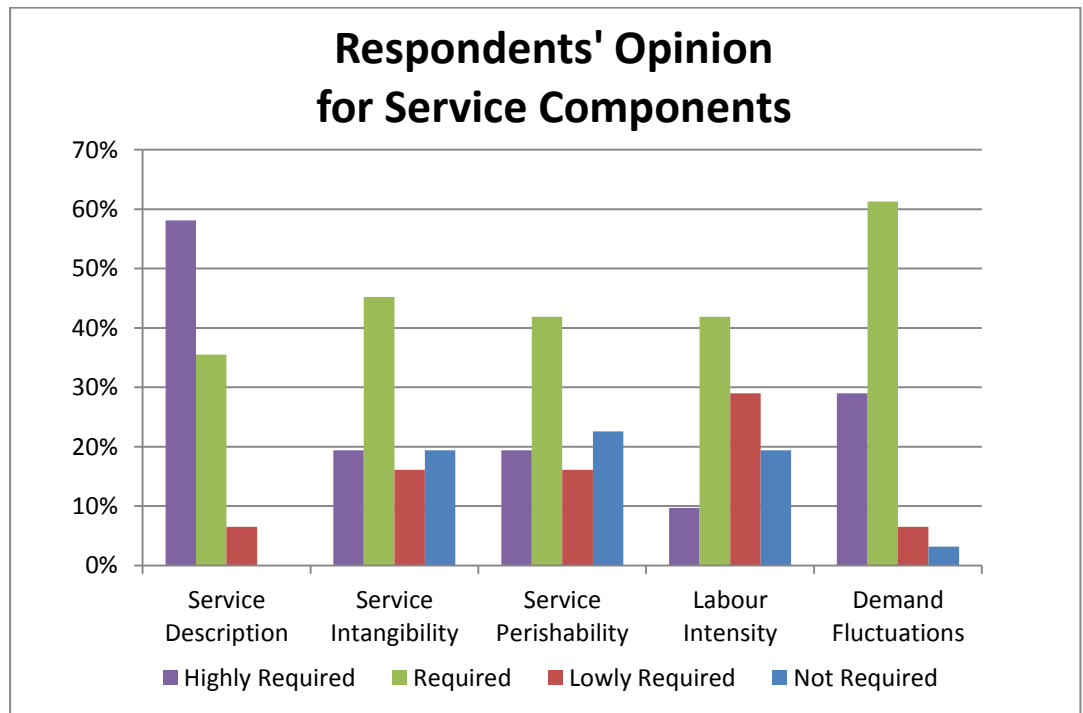
**d) Service Components (SCs)**

In *Question 13*, respondents were asked to indicate which Service Components are *Highly Required*, *Required*, *Low Required*, *Not required* for the synthesis of a business model for E-Commerce (See Appendix D for questionnaire).

**Table 5.8 Results of SCs Variables from Question 13**

Service Components	N	Highly Required (1)	Required (2)	Lowly Required (3)	Not Required (4)	Mode
Service Description	33	58.1%	35.5%	6.5%	0.0%	1
Service Intangibility	33	19.4%	45.2%	16.1%	19.4%	2
Service Perishability	33	19.4%	41.9%	16.1%	22.6%	2
Labour Intensity	33	9.7%	41.9%	29.0%	19.4%	2
Demand Fluctuations	33	29.0%	61.3%	6.5%	3.2%	2

Responses regarding the importance of service components (SCs) were broadly distributed across all four quadrants (as shown in Table 5.8 and Figure 5.9), with the notable exceptions of **Service Description** and **Demand Fluctuations**, which respondents indicated at rates of 94% and 90% respectively these two components as being either *Highly Required* or *Required*.



**Figure 5.9 Respondents' Opinion for Service Components**

Notably, this was one of the few survey questions wherein significant responses were registered as *Not Required*, which was the case for all three remaining PCs. However, as mentioned above this is analysed in the context of a broad distribution of responses across all four quadrants for these PCs.

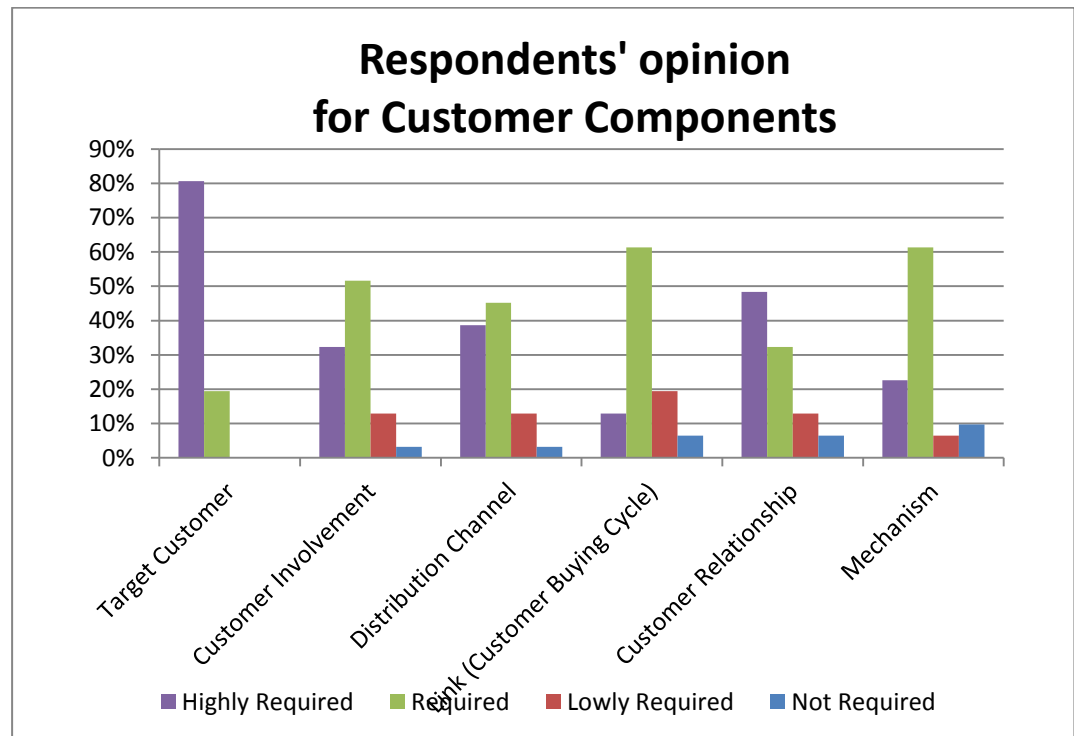
e) **Customer Components (CCs)**

In *Question 14*, respondents were asked to indicate which Customer Components are *Highly Required*, *Required*, *Low Required*, *Not required* for the synthesis of a business model for E-Commerce.

**Table 5.9 Results of CCs Variables from Question 14**

Customer Components	N	Highly Required (1)	Required (2)	Lowly Required (3)	Not Required (4)	Mode
Target Customer	33	80.6%	19.4%	0.0%	0.0%	1
Customer Involvement	33	32.3%	51.6%	12.9%	3.2%	2
Distribution Channel	33	38.7%	45.2%	12.9%	3.2%	2
Link (Customer Buying Cycle)	33	12.9%	61.3%	19.4%	6.5%	2
Customer Relationship	33	48.4%	32.3%	12.9%	6.5%	1
Mechanism	33	22.6%	61.3%	6.5%	9.7%	2

Generally, most respondents considered all six customer components (CCs) surveyed to be either *Highly Required* or *Required* (as shown in Table 5.9 and Figure 5.10). The response data suggests that **Target Customer** is the most important CC, given that 81% of respondents consider this to be *Highly Required*, with the next highest response rate for this quadrant being **Customer Relationship** with a Highly Required response rate of 48%.



**Figure 5.10 Respondents Opinion for Customer Components**

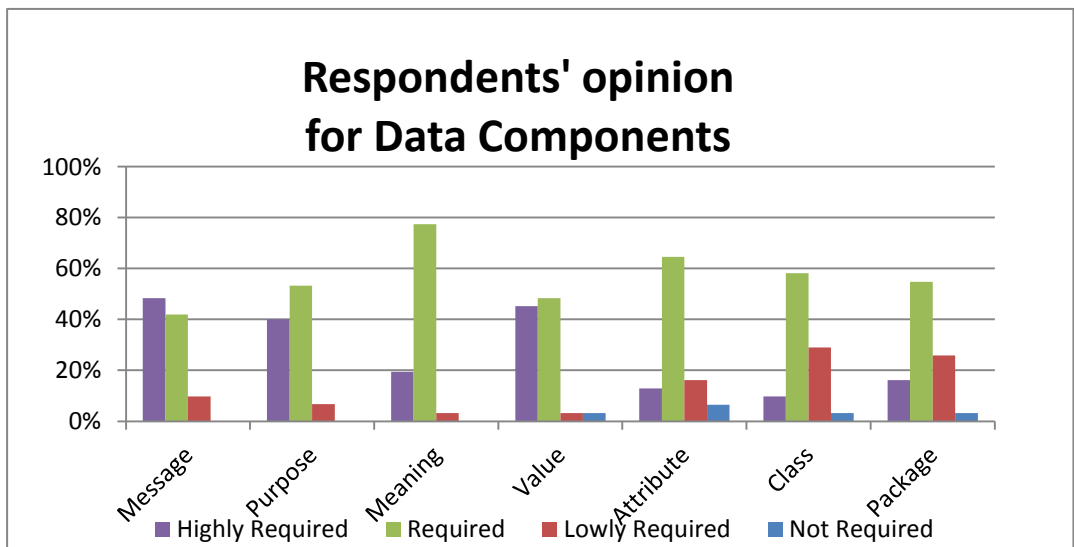
f) **Data Components (DCs)**

In *Question 15*, respondents were asked to indicate which Business Organisation Components are *Highly Required*, *Required*, *Low Required*, or *Not required* for the synthesis of a business model for E-Commerce (See Appendix C for questionnaire). Generally respondents consider all of the seven DCs to be at least *Low Required* as there were very low response rate of *Not Required* for this question (as shown on Table 5.10 and Figure 5.11). DCs of **Message**, **Purpose**, **Meaning**, & **Value** were all considered by 89% or more of the respondents to be either *Required* or *Highly Required*. Equal proportions of respondents considered these four DCs *Highly Required* (i.e. >40% response rate each), except for the DC **Meaning** wherein on 19% identified as *Highly Required*.

**Table 5.10 Results of DCs Variable from Question 15**

Data Components	N	Highly Required (1)	Required (2)	Lowly Required (3)	Not Required (4)	Mode
Message	33	48.4%	41.9%	9.7%	0.0%	1
Purpose	33	40.0%	53.3%	6.7%	0.0%	2
Meaning	33	19.4%	77.4%	3.2%	0.0%	2
Value	33	45.2%	48.4%	3.2%	3.2%	2
Attribute	33	12.9%	64.5%	16.1%	6.5%	2
Class	33	9.7%	58.1%	29.0%	3.2%	2
Package	33	16.1%	54.8%	25.8%	3.2%	2

Outliers included **Class** and **Package**, where the overall response rate was 87% and 81% respectively of participants who considered these DCs were either only *Required* or *Low Required*. The DC **attribute** had even distribution of responses over all the four quadrants.



**Figure 5.11 Respondents' Opinion for Data Components**

**g) Application Components (ACs)**

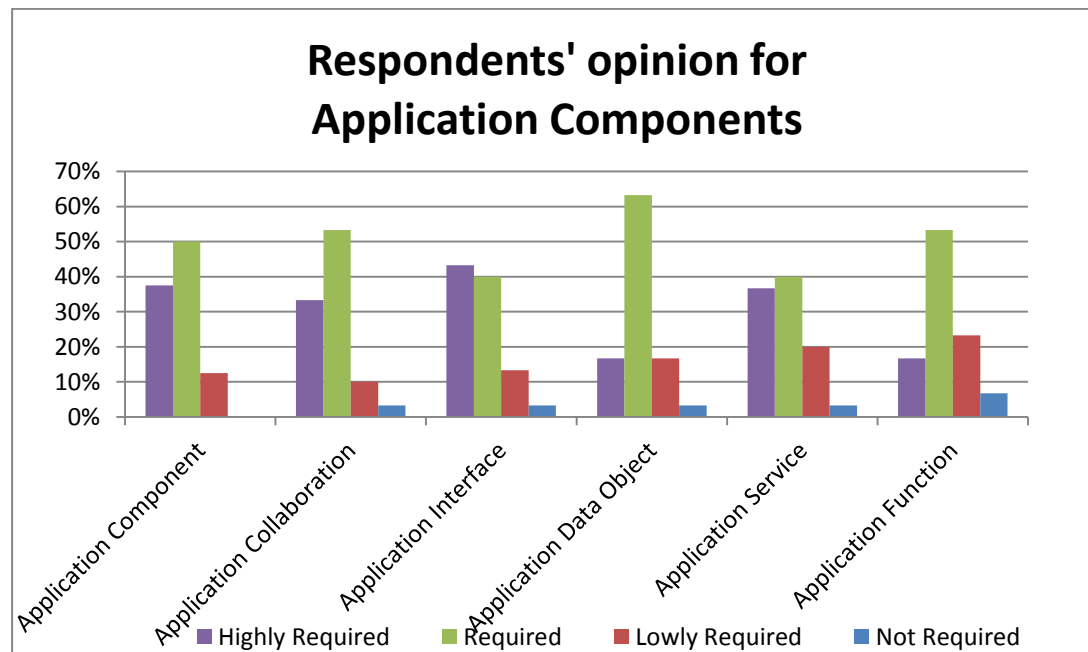
In question (16), respondents were asked to indicate which Application Components are *Highly Required*, *Required*, *Low Required*, or *Not required* for the synthesis of a business model for E-Commerce. Generally, we observe a very dispersed distribution of responses for all six ACs indicated on the survey (as shown on Table 5.11 and Figure 5.12), with most respondents indicating that all ACs are either *Highly Required* or *Required*.

**Table 5.11 Results of ACs for Variables from Question 16**

Application Components	N	Highly Required (1)	Required (2)	Lowly Required (3)	Not Required (4)	Mode
Application Component	33	37.5%	50.0%	12.5%	0.0%	2
Application Collaboration	33	33.3%	53.3%	10.0%	3.3%	2
Application Interface	33	43.3%	40.0%	13.3%	3.3%	1
Application Data Object	33	16.7%	63.3%	16.7%	3.3%	2
Application Service	33	36.7%	40.0%	20.0%	3.3%	1 <sup>a</sup>
Application Function	33	16.7%	53.3%	23.3%	6.7%	2

a. Multiple modes exist. The smallest value is shown

Notable outliers in the response are the 63% response rate of *Required* for the **Application Data Object** DC, compared to a more even distribution between *Highly Required* and *Required* for five other DCs



**Figure 5.12 Respondents' Opinion for Applications Components**

We also noted a natural break in the response rate for **Application Function**, with only 69% indicating this as *Highly Required* or *Required* with the next highest DC being at 76% of responses.

## h) IT Components (ITCs)

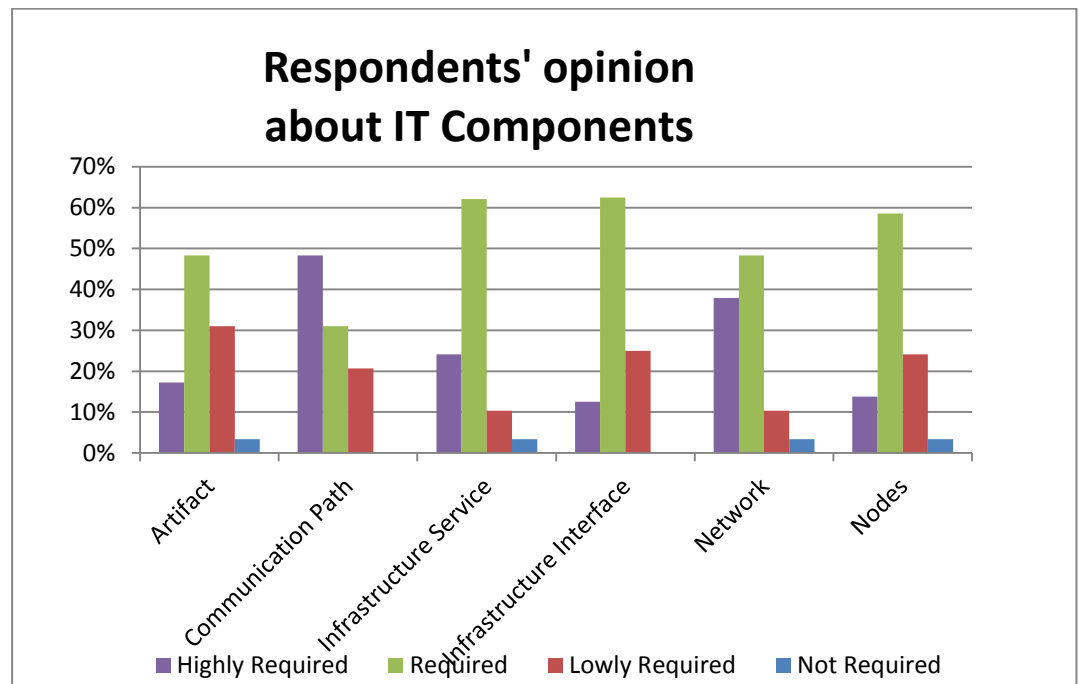
In question (17), respondents were asked to indicate which IT Components are *Highly Required*, *Required*, *Low Required*, *Not required* for the synthesis of a business model for E-Commerce (See Appendix D). Responses cluster around quadrant (2) (i.e. *Required*) as showed on Table 5.12 and Figure 5.13. There were clear outlier responses for the **Communication Path** and **Network DCs** with 48% and 38% of respondents respectively regarding these two DCs as *Highly Required*, with the next highest response rate in this quadrant comparatively being 24%

**Table 5.12 Results of ITCs Variables from Question 17**

IT Components	N	Highly Required (1)	Required (2)	Lowly Required (3)	Not Required (4)	Mode
Artifact	33	17.2%	48.3%	31.0%	3.4%	2
Communication Path	33	48.3%	31.0%	20.7%	0.0%	1
Infrastructure Service	33	24.1%	62.1%	10.3%	3.4%	2
Infrastructure Interface	33	12.5%	62.5%	25.0%	0.0%	2
Network	33	37.9%	48.3%	10.3%	3.4%	1 <sup>a</sup>
Nodes	33	13.8%	58.6%	24.1%	3.4%	2

a. Multiple modes exist. The smallest value is shown

Interestingly, the data suggests disagreement of the respondents regarding the relative importance of **Communication Path**. Whilst 48% regarded this as *Highly Required* (as noted above), 21% believed it was *Low Required*.



**Figure 5.13 Respondents' Opinion for IT Components**

### 5.5.5 Discussion of Data Analysis Results

Table 5.13 Results of the Quantitative Validation of the BMAF

Business Model Architecture								
Business Architecture					Information/Data Architecture	Application Architecture	Technology Architecture	
Organisation	Product	Service	Customer	Behaviour				
Mandatory	Business Vision	Product Description	Service Description	Target Customer	Business Processes	Message Purpose <sup>D</sup> Value <sup>D</sup>	Application Component <sup>D</sup> Application Interface Application Service Application Data Object <sup>D</sup>	Communication Path Network
	Business Strategy	Product Homogeneity <sup>D</sup>	Service Intangibility <sup>D</sup>	Customer Involvement <sup>D</sup>	Business Resources			
	Business Actors/Roles <sup>D</sup>	Type of Materials <sup>D</sup>		Customer Relationship				
	Business Collaboration			Mechanism <sup>D</sup>				
	Business Transaction <sup>D</sup>							
	Revenue Model							
Desirable	Business Principles	Product Variety	Service Perishability	Distribution Channel	Business Functions	Attribute Class Package	Application Collaboration Application Function	Artifact Node Infrastructure Interface Infrastructure Service
	Business Object	Product Life Cycle <sup>M</sup>	Demand fluctuations		Business Activities <sup>M</sup>			
	Business Relation	Lead time required for made-to-order products <sup>M</sup>			Business Events			
Optional	Revenue Sources <sup>M</sup>	Offering (Reasoning, Value Level, Price Level) <sup>M</sup>	Labour Intensity <sup>D</sup>	Customer Buying Cycle <sup>D</sup>	Business Location Business Rules <sup>D</sup>			



Table 5.13 summarises the respondents' classification of the components of the Business Model Architecture - as *Mandatory*, *Desirable*, or *Optional* - comparing with the classification proposed in chapter 4. Components of the architecture which were classified by the survey respondents and significantly different from the classifications in the proposed framework are indicated by superscript, with lettering for the classification of that component by the respondents. For example, the proposed framework classifies *value proposition* as a *Mandatory* feature of the organisation component of the business model architecture, whilst the majority of the survey respondents classified this component as *Desirable* as indicated by the superscript 'D'. Of the 54 components analysed, there was a statistically significant similarity between the proposed framework's classification and the respondents' classification for 34 components, and there was a statistically significant divergence for 20 components.

## **5.6 Conclusion**

This chapter presented the quantitative validation of the proposed framework utilising a statistical analysis of a bespoke online survey questionnaire targeted towards both the academic community and active practitioners. This work sought to corroborate the framework's business model definition, the relationship between business model and business strategy, and the business model architecture and the constituting components. Whilst we did observe statistically significant outcomes on certain elements of the framework as highlighted in the tabular results, there are also divergences between the framework and the survey responses in other key areas. These areas are investigated in the next chapter where the proposed framework was applied into two real world case studies in order to evaluate and refine the framework further.

## **CHAPTER 6. QUALITATIVE EVALUATION OF THE PROPOSED FRAMEWORK**

### **6.1 Introduction**

The aim of this chapter is to evaluate the application of the BMAF using qualitative research methods. In particular, two case studies are used to test and evaluate the validity and the applicability of the framework a) to reconstruct a traditional business model to e-business model, and b) to construct a new e-business model. At the same time the case study evaluation exercise examines the framework's structure and content in order to help eliminate inconsistencies. At the end, the last form of the evaluation consists of interviews with the case studies' stakeholders in order to evaluate how well the BMAF performs its objectives. The findings help to revise and finalise the framework.

### **6.2 Evaluation of the Proposed Framework using *Case Studies***

The case study is a widely accepted research method in the field of information systems. According to (Palvia, *et al.* 2003) case study research in information systems provide a vehicle for an in-depth examination of exposure to the phenomenon of interest; like the implementation of an application or a new technology over time in a single organisation. Through this process, researchers can capture reality in greater detail with the analysis of more variables than is typically restricted in survey or experimental research (Myers & Avison, 2002). It can be particularly useful for practice-based problems where the experience of the actors is important and the context of action is critical (Saunders, Lewis, & Thornhill, 2012).

Given the conceptual stance adopted for the design of the proposed framework and the nature of the research question on *how to build the business model architecture of a company for B2B EC*, it is believed that the case study approach is the appropriate research strategy for this topic. In this research, case study is considered from the point of view of a method a) to test and evaluate the validity and the applicability of the developed framework to real-world case, and b) at the same time to examine the framework's design in order to help eliminate inconsistencies.

A key feature of the design of case study research is the number of cases included in a project. Multiple cases are preferable when the purpose of the research is to describe phenomena, develop and test theories. Generally speaking it is better, i.e. more valid and generalisable, to include multiple cases, though there are instances where a single case is instructive (see e.g. Lee, 1989). Multiple cases also permit cross-case analysis, a necessary feature for widespread generalisation of theories.

In this research, therefore, the case study approach is used to describe the application of the BMAF in small-medium companies. Over a 3 months period, two case studies were conducted; a) real-world case study (a paramedical company established in 2009), and b) a real-world case study at the early of its creation (a new business for selling natural skincare products).

The first was in the *2S Paramedical Equipment Ltd* ([www.2Sonline.gr](http://www.2Sonline.gr)), a company based in Greece (Athens). It specialises in orthopaedics and paramedical products, where the BMAF was used for the reconstruction of company's traditional business model to an e-business model for B2B EC. Section 6.2.1 presents the application of BMAF for *2S Paramedical Equipment Ltd*. The second case study was based on the business idea of two young entrepreneurs where they used the BMAF to construct an e-business model for selling *natural skincare products (NSP)* like natural soaps and a range of skincare products. Section 6.2.2 shows the synthesis of *NSP* e-business model structured according to BMAF.

The data collection techniques used in this application exercise were questionnaire, semi-structured interviews and group discussions with the key stakeholders, and secondary data source analysis. Data collection was done through both secondary and primary sources. Primary data sources included key informants for each case study. In the case of *2S Paramedical Equipment Ltd*, primary data was collected using an extended questionnaire (see Appendix D) into 3 phases, and having personal interviews with the company's directors (owners) and employees. Secondary data sources mainly covered different sources (website information, technical documents, and company reports) and provided an essential preparation for the questionnaire design and for the interviews. Similar to the *natural skincare products* case study, an extended questionnaire was used in 3 phases for the synthesis of components of the new e-business model. After the completion of each phase, a group discussion was conducted with the project's stakeholders for further discussion and clarification of the e-business model's components.

The analysis of data firstly dealt with the description of each case based on the data collected via the different instruments. Secondly, an analysis was done of similar and different patterns in each case study. It is the author's contention that the descriptions of the case studies allow one to gain insights into the specific context. Finally, considering that this research study is composed of two different case sites, it was necessary to search for patterns in all the cases. This enabled the researcher to develop a strong body of evidence from the cases.

### **6.2.1 Case Study: 2S Paramedical Equipment Ltd**

*2S Paramedical Equipment Ltd* ([www.2Sonline.gr](http://www.2Sonline.gr)) is relatively new (founded in 2009) company based in Greece (Athens) that specialises in orthopaedics and paramedical products aiming at supporting and helping on improving the living conditions of peoples with health issues. It is a small to medium enterprise that employs 13 persons and it is managed by the 2 owners. It collaborates with domestic and international suppliers as well as outsourcing manufacturers mainly in China, Turkey, and India. The company has a continuous growth due to the high quality and innovation of the products as well as great attention to maintaining competitive pricing and high customer support service. It operates in a combination of B2C and B2B arenas, focusing more on the B2B sector. Currently (December 2013), it has around 50 individual customers (mainly orthopedic patients) and 550 business customers (retail stores as well as hospitals, nursing homes, special rehabilitation clinics, medical and chemical laboratories), all throughout in Greece.

#### **a) Stage 1: Description of 2S Paramedical Equipment Ltd Current Business Model**

Initially, the stage 1 of the BMAF was applied in order to describe the current business model architecture of the company. Using the BMA concepts, the current business logic of the company and its business process model were decomposed into components, including the components of the information system and the information technology used by the company. Components were captured based on the four architectural domains of the BMAF:

## **BUSINESS ARCHITECTURE**

### **Organisation Components**

- **Business Vision:** *2S Paramedical Equipment Ltd*'s vision is to be a leading supplier of various, branded under the 2S brand, medical and paramedical devices and equipment, covering as many medical specialties as possible, both in the wholesales and in the retail sector.
- **Business Strategy:** *2S Paramedical Equipment Ltd*'s strategy aims to: a) closely manage all company functions from R&D and procurement to sales and customer satisfaction, b) monitor the market closely, c) favour all business partnerships that can help the company to grow, d) invest in R&D and the development of new products according to the market needs, and e) favour sales expansion and prepare a strategy for exports.

- **Business Principles:** *2S Paramedical Equipment Ltd*'s principles are around the following targets and fundamental values:
  - Innovation and high quality products that support and help in improving the living conditions of peoples with health issues.
  - Competitive pricing of products
  - High customer support service
  - Integrity and Honesty
- **Business Actors and their Roles:** *2S Paramedical Equipment Ltd* consists of the following internal business actors:
  - Management Team (2 owners) which is responsible for the strategic, tactical and operational decisions of the company.
  - Logistics & Procurement team (2 employees<sup>\*</sup>) which is responsible for stock management, orders' fulfillment (as in orders preparation, quality control and shipping) and all procurement tasks;
  - Sales team (3 employees) which is responsible for all sales related tasks as well as new business development;
  - Marketing and R&D team (3 employees<sup>\*</sup>) which works for new products design and for all product management and communications marketing tasks;
  - Accounting team (2 employees<sup>\*</sup>) which is responsible for overall company finances, accounting and taxes;
  - Customs officer who is responsible for all imports and related customs tasks);
  - Technical Support team (2 employees<sup>\*</sup>) which is responsible for after sales and technical support.

*\*some people have more than one roles, so e.g. same person is doing accounting and logistics, and one person who works as R&D also works in the technical team.*
- **Business Collaboration:** *2S Paramedical Equipment Ltd* has relationships with the following external business partners: a) International Suppliers namely manufactures in many countries where the company is outsourcing the manufacturing of the goods (designed by the company's R&D department and as requested by the customers'

feedback); b) Domestic Suppliers (some products are manufactured by domestic factories); c) Shipping companies (international and domestic).

- **Business Transaction.** *2S Paramedical Equipment Ltd* operates in a combination of B2C and B2B arenas, focusing more on the B2B sector.
- **Value Proposition.** In *2S Paramedical Equipment Ltd*, clients get reliable and tested products in affordable prices. State of the art and reliable medical products and devices in value-for-money pricing. All quality assurance is run by *2S Paramedical Equipment Ltd*, technical and after sales support is provided, all relevant product certifications are in place.
- **Revenue Model:** *2S Paramedical Equipment Ltd* operates in a combination of B2B and B2C arenas, focusing slightly more on the B2B sector. *2S Paramedical Equipment Ltd* has three revenue models
  - **Wholesale sales** – this is the most important one covering 60% of the company’s annual revenue. Sales are repetitive in wholesales, but not in terms of a contract. The company has recurring customers, which buy from the company as the need arises.
  - **Participation in tenders** is also an important source of income for *2S Paramedical Equipment Ltd* as it applies to very big orders. It covers 30% of the annual revenue. Tenders always involve a contract. Sometimes the contract refers to a one-off procurement, sometimes to a yearly procurement schedule, sometimes more depending on the client’s needs and budget.
  - **Retail Sales** - 10% of the annual revenue.

The company is working on enhancing retail business as of 2014.

- **Revenue Sources:** the company has no other sources of revenue.

### **Product Components**

- **Product Description:** *2S Paramedical Equipment Ltd*’s products are medical and paramedical devices and equipment designed to aid in the diagnosis, monitoring or treatment of medical conditions.
- **Product Variety:** *2S Paramedical Equipment Ltd* offers a variety of medical and paramedical devices and equipment (i.e. orthopedic devices, rehabilitation equipment, hospital furniture and equipment, homecare devices and equipment, laboratory disposables and devices etc).

- **Product Life Cycle:**
  - i) Products are either designed by the company's R&D department or found readymade in the international market and/or as requested by the customers' feedback.
  - ii) All products are manufactured by factories (in many countries where the company is outsourcing the development of the goods) according to the company's designated designs and under the company's brand. Even if the company hasn't designed a product from scratch, they run quality assurance and they make possible alterations or/and enhancements.
  - iii) Some products are customised (by outsourcing factories and some local small factories) for individual retail clients as well as B2B clients when this is necessary.
  - iv) Products are packaged in the company's premises, after final quality control has been applied (by the quality assurance manager). Boxes, stickers, leaflets and user manuals are provided for the packaging phase (by the logistics personnel).
  - v) Products are delivered (by *2S Paramedical Equipment Ltd* directly or shipping companies or courier companies) to the clients and they are assembled when this is necessary by *2S Paramedical Equipment Ltd's* technical team.
  - vi) The company provides after sales technical support services for all the products. Products come complete with a specified period warranty. So as long as warranty is valid, company fixes problems, provides technical support or even replaces faulty items (if it is proven that a problem is due to manufacturing malfunction and not user mistreatment).
- **Product Homogeneity:** Most of the products (i.e. splints for various body parts, wheelchairs, medical beds) offered in retail are standardized. *2S Paramedical Equipment Ltd* provides customised solutions for individual retail clients as well as B2B clients when it is required.
- **Type of Materials:** *2S Paramedical Equipment Ltd* is outsourcing the manufacturing of its products in selected factories in different countries; materials are specified by the manufacturers, not by *2S Paramedical Equipment Ltd*.

- **Lead time required** 90% of the times delivery of products to *2S Paramedical Equipment Ltd's* clients is within 48 hours all over Greece. The company keeps adequate stock of all products in order to be able to fulfill fast delivery. If some products are specially designed or if an order is too big (that the existing stock can't cover) then lead time can be longer, up to 4 months (back2back to the lead time given by the outsourcing factory).
- **Offering** Products are in inelastic demand due to the health issues they offer solutions for. Good quality and variety of various products, addressing different health issues, make the products valuable to the customer. Products have higher quality (better material and manufacturing details) than the competition. Doctors (opinion leaders) trust them due to durability and results. Price-wise products follow the idea "value for money" combining moderate pricing with good quality.

#### **Service Component(s)**

- **Service Description** *2S Paramedical Equipment Ltd* provides after sales technical support services for all the products. Products come complete with a specified period warranty. So as long as warranty is valid, company fixes problems, provides technical support or even replaces faulty items (if it is proven that a problem is due to manufacturing malfunction and not user mistreatment)

#### **Customer Components**

- **Target Customer:** *2S Paramedical Equipment Ltd* aims at attracting the following target customers:
  - In B2C, all paramedical as well as orthopedic patients.
  - In B2B, all medical products retail stores as well as hospitals, nursing homes, special rehabilitation clinics, medical and chemical laboratories.
- **Customer Involvement:** Customers are looking for good deals (good quality products in affordable prices). Customers need products' availability, fast delivery, pre-sales and after-sales support, product training and knowledge support, quick response to problems and solutions provisioning.



- **Customer Relationship:** *2S Paramedical Equipment Ltd* pays careful attention to its relationship with its customers. It keeps a detailed database of over 500 customers – even of those who bought something from the company only once – which it uses to distribute newsletters (by email or fax) for the new products and offers of the company. Furthermore, special cross-sell and/or up-sell newsletters are sent to clients after analysing their buying patterns and behaviours. Phone calls are also highly utilised for communication with clients as well as personal visits (sales personnel), as many customers-mainly individual consumers - are not used to check emails.
- **Distribution Channel:** *2S Paramedical Equipment Ltd* offers and markets its products to its customers through five different distribution channels:
  - Direct one2one sales as the name suggested *2S Paramedical Equipment Ltd* sells its product person-to person where members of sales team provides direct personal presentation, demonstration, and sale of products to individuals. Orders are usually placed in person or via phone – phone is also used to place reorders.
  - Tenders - *2S Paramedical Equipment Ltd* participates in tenders for very big orders. Tenders are approached in a per-case scenario, and if the requirements are such that the company can fulfill, then the company participates.
  - Big procurement for businesses - Sometimes the contract refers to a once-off procurement, sometimes to a yearly procurement schedule, sometimes more. Depends on the client's needs and budget.
  - Web promotion - *2S Paramedical Equipment Ltd* website ([www.2Sonline.gr](http://www.2Sonline.gr)) plays an important role in the promotion, information diffusion, and products description and presentation.
- **Mechanism:** *2S Paramedical Equipment Ltd* provides information about its products through detailed catalogs. Copies are distributes to the customers and an electronic copy is available on the company's website.

## Behaviour Components

- **Business Functions**

- Management Team provides management and administrative support for the strategic, tactical and operational decisions.
- Marketing and R&D team is responsible for new products design and for all product management-communication marketing tasks.
- Sales team is responsible for all sales related tasks with existing customers as well as gaining new customers.
- Logistics & Procurement team is responsible for stock management, orders' fulfillment (as in orders preparation, quality control and shipping) and all procurement tasks
- Accounting team is responsible for overall company finances, accounting and taxes.

- **Business Processes**

- Management team focuses on activities associated with the planning, organising, directing, and controlling of the company.
- Marketing and R&D team performs *marketing research* and *demand analysis* activities
- Sales team takes orders from the customers and communicates the information to the warehouse to make sure about what needs to be shipped to the customers at the requested date. It also conducts activities like *sales targets*, *market segmentation*, etc).
- Logistics & Procurement team focuses on product management activities (*product specifications*, *requirements sheet*, *product evaluation*) and procurements activities (*manufacturing*, *procurement of the required products*). Its main activity is to communicate with external manufactures to make purchases in long term contracts and in large quantities (i.e. whole containers).
- Accounting team performs *finance*, *accounting* and *HR* ongoing activities and overlooks all functions and give and take feedback in order to keep the company in working order.

- **Business Rules:** *2S Paramedical Equipment Ltd's* products follow the rules and controls of the CE regulations. Company processes follow the ISO 9001 and ISO 13485 directives. Other local rules and regulations apply in different cases.

## APPLICATION ARCHITECTURE

- **Application Component:** a) Enterprise Resource Planning (ERP) system; b) VAT Information Exchange System, c) Barcode System
- **Application Service**
  - ERP system is the “heart” of the company. All needed information for the company to function and perform sales is stored and managed by this system.
  - VAT Information Exchange System checks the validity of VAT-numbers.
  - Barcode System is used for the stock management.
- **Application Interface:**
  - ERP System performs the following functions: Buying, Inventory, Ordering/Selling, CRM tool, Accounting.
  - VAT Information Exchange System checks the validity of VAT providing a unique consultation number that is used to prove to the country tax administration that a given VAT number at a given time resulted in a given validation reply.
  - Barcode System helps to check in/out the products keeping track and record movements, to fix assets identifying assets and generating reports, to monitor transfers and deliveries of packages, to manage the warehouse processes.
- **Application Data Object:**
  - ERP System stores the following: Customer Details, Order Details, Sales Details, Suppliers Details, Stock details per product code according to products’ special categorizations, Payment Details, Accounting details according to buying invoices.
  - A tax system provides a unique code that is printed on each sales document (i.e. invoice) resulting in a given validation reply.
  - Barcode System provides a special barcode label for each product.

## INFORMATION/DATA ARCHITECTURE

Table 6.1 presents the information/data architecture’s components of the ERP System used by *2S Paramedical Equipment Ltd*

**Table 6.1 Information/Data Architecture Components of 2S Paramedical Equipment Ltd**

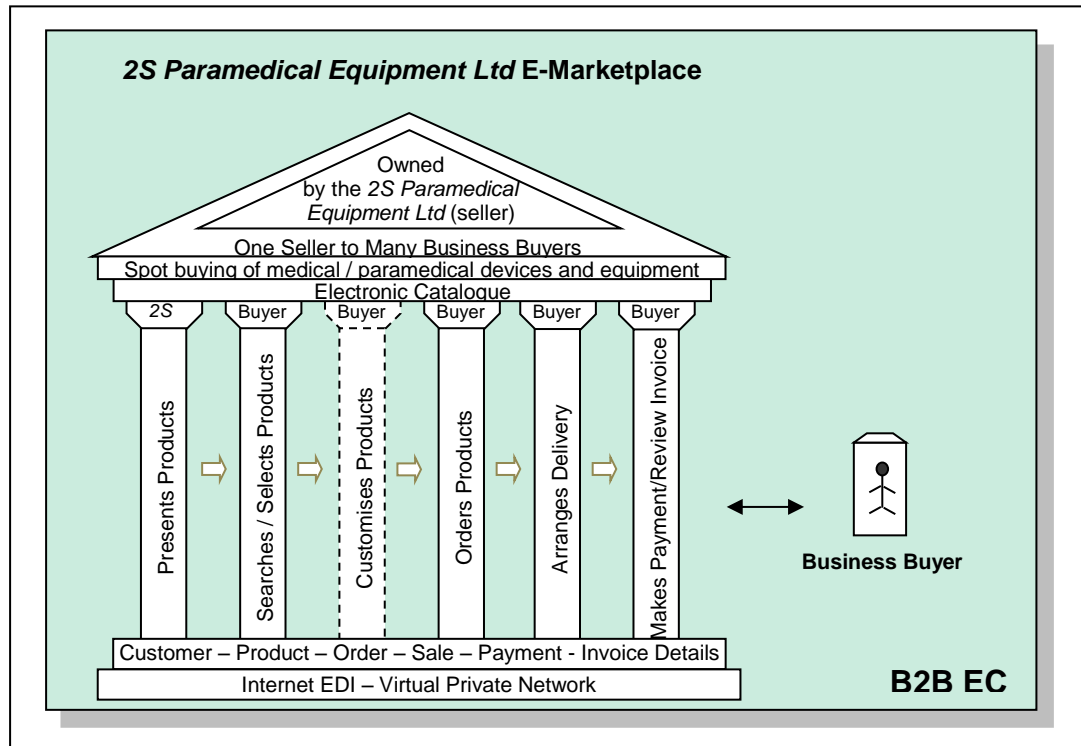
<b>Message</b>	<b>Purpose</b>	<b>Attribute</b>	<b>Class</b>
Customer Details	To provide information regarding the business customer	Company Code Company Name Company Address Company City Company Post Code Company Country Company Telephone Company Fax Company Email	<i>Customer</i>  Add Modify Delete Search View
Contact Details	To provide information regarding the contact details of the person that makes the orders on the behalf of the business customer	Contact Number Contact First Name Contact Surname Contact Responsibility Contact Telephone Contact Fax Contact Email	<i>Contact</i>  Add Modify Delete Search View
Product Details	To provide information regarding the product	Product Code Product Name Product Type Product Description Product Feature Product Warranty Duration Product Selling Price Product Max Delivery Time Product Min Delivery Time	<i>Product</i>  Add Modify Delete Search View
Stock Item Details	To provide information regarding the items in stock	Stock Item No Stock Item Bar Code Stock Item Size Stock Item Position Area Stock Item Position Shelf	<i>Stock Item</i>  Add Modify Delete Search View
Order Details	To provide information regarding the orders	Order No Order Date Product Code Product Name Product Type Product Feature Product Selling Price Quantity Required Delivery Time	<i>Order</i>  Add Modify Delete Search View
Manufacturer Details	To provide information regarding the manufacturers	Manufacturer Code Manufacturer Name Manufacturer Address Manufacturer City Manufacturer Post Code Manufacturer Country Manufacturer Telephone Manufacturer Fax Manufacturer Email	<i>Manufacturer</i>  Add Modify Delete Search View
Invoice Details	To provide information regarding the invoices	Invoice Number Invoice Date Company Name Quantity Price VAT Discount Total Cost	
Payment Details	To provide information regarding the payments	Payment Date Payment Method Payment Amount	<i>Payment</i>  Add Modify Delete Search View
Employee Details	To provide information regarding the employees	Employee Code Employee Name Employee Address Employee City Employee Post Code Employee Country Employee Telephone Employee Fax Employee Email	<i>Employee</i>  Add Modify Delete Search View

## TECHNOLOGY ARCHITECTURE

- **Network/Nodes:** Company has a local area network (LAN) that it is structured by the following nodes:
  - 1 SQL server
  - 5 client stations
  - 2 printers
  - 1 fax machine
  - 1 tax machine
  - 1 barcode machine
- **Infrastructure Interface/Service:** Each node performs a particular function, providing a service and **artifacts** in the company's LAN:
  - 1 SQL server runs the ERP system
  - 5 client stations (PCs) are connected to the server and using the EPR system, as well full windows functionality for email, documents, xls etc.
  - 1 tax machine that works between one client PC and one printer, providing tax authority validation to certain documents before they are printed, like invoices etc.
  - 1 barcode machine is connected to one client PC corresponding with the inventory ERP function and producing barcodes for all company's products
- **Communication Path:** Connection between nodes is arranged using a *star network topology*; every client station (5 PCs) and peripheral (2 printers, 1 fax machine, 1 tax machine, 1 barcode machine) is connected to the SQL server.

**b) Stage 2: Analysis of 2S Paramedical Equipment Ltd Current Business Model**

Based on an analysis of the above evidences, an e-business model for B2B EC was suggested for 2S Paramedical Equipment Ltd. This is a *seller oriented marketplace* where the company will offer a private e-store from which business customers can make spot purchases fulfilling immediate needs. An abstract view of this e-business model is presented using the BMA representation technique (Greek temple) in figure 6.1.



**Figure 6.1 2S Paramedical Equipment Ltd e-business mode for B2B EC**

2S Paramedical Equipment Ltd's products will be presented in electronic catalogues, where buyers will can search and select from a list of products; buyers will have the opportunity before place the order to customise some products – based on their needs – by determining the special design specifications of the selected products. Different type of business buyers will view different catalogues and price lists, for example, a large business buyer or a recurring one will get customised catalogues and buy the same products at a better price than a small or new consumer. Buyers will have the opportunity to arrange a delivery of small or non customised orders within 48 hours; delivery of too big orders or orders with products that required customisation will be a delivered within less than 4 months period. A secure and reliable payment mechanism will be provided for electronic payments; once the payment has been processed, the buyer will be able to review purchase over an electronic invoice. 2S Paramedical Equipment Ltd's B2B online system will operate using an Internet based EDI through a Virtual Private Network.

### 6.2.2 Case Study: Natural Skincare Products (NSP)

The second case study was based on a newly set up business by two young entrepreneurs who decided to use the BMAF in setting up their company with me as a consultant. In particular, they use the framework to construct an e-business for selling natural soaps and a range of skincare products made only by natural aromas/ingredients. In this case, the stage 3 of the BMAF was applied where the *mandatory visualisation* of BMAF was used for the synthesis of the e-business model. The result of this stage was to define the mandatory components, their objectives, roles and elements:

#### BUSINESS ARCHITECTURE

##### Organisation Components

- **Business Vision:** *NSP* aims to produce large amounts of products in the future and to sign contracts with larger supermarkets that will be interested in handmade natural products.
- **Business Strategy:** *NSP*'s strategy aims a) to create a user friendly website for advertising and selling the products; b) to sell to local markets creating a mobile shopping centre stand that will display all the products. Brochures will be offered in order for the customers to get better informed about the products and the way that products are made.
- **Business Actors and their Roles** At the beginning stage the two young entrepreneurs will be the internal business actors of the project. They will be responsible for a) the ordering of the materials, b) the production of natural products, c) the sale of the products, d) the overall legal issues, accounting and taxation activities.
- **Business Collaboration:** *NSP* will have extended relations with other two external business partners: a) a similar business based in Romania which will supply the required tools (cutters, moulds, etc.) required for the production stage; b) ingredients providers (suppliers) which they will supply 100% natural ingredients at a convenient price.
- **Business Transaction:** *NSP* will operate a combination of B2C and B2B arenas; it will initially target to sell its products to individuals consumers and eventually to extent into selling to businesses.
- **Revenue Model:** The main revenue model of *NSP* business will be commerce and retail and at the same time advertising will be playing an important role in the revenue generating process.

- **Value Proposition:** *NSP* will offer guaranteed hand-made and 100% natural - skin and environmentally friendly - products at an affordable price which will delight customers.

### **Product Components**

- **Product Description:** *NSP* will sell natural - no added chemicals - products like natural soaps and a range of skincare products made only by natural and / or certified organic ingredients.
- **Product Variety:** *NSP* will sell a variety of products like soaps, bath salts, scrubs, skin care, and balms, hand cream. Products will vary, having different aromas and colours, at the same time packaging will be different depending on season or on the order time (holiday present, gift, etc.)
- **Product Homogeneity:** Most of the *NSP*'s products will be standardised, but some products will be customised depending on the customers' needs or preferences of aromas, colours, gift set, size, packaging.
- **Type of Materials:** *NSP*'s will manufacture all the products using natural active ingredients (like essential oils) derived from medical herbs, food ingredients, natural actives (such as natural antioxidants).

### **Service Component(s)**

- **Service Description** *NSP*'s will provide online customer service giving advice and tips about how to use the products for better results, as well as to answer any of the customers' questions that might arise.

### **Customer Components**

- **Target Customer:** *NSP*'s Target customers will be mainly people who are concerned about toxic ingredients in skincare products and they are looking for products based on natural and / or certified organic ingredients.
- **Customer Relationship:** *NSP* aims to develop long powerful relationships with its customers a) to make them not just to understand the products but to be excited with their quality and affordable prices, b) to satisfy their need giving them value at the same time; c) to ensure that



they will come back for more purchases, bringing new customers with them, d) to stay connect with them, *NSP* will distribute e-mail newsletters that will i) advertise the existing and new products including tips and advice for the best use of the products, ii) inform about the sessional offers and sales, iii) encourage customers to visit *NSP*'s mobile shopping centre at the local markets and eventually at supermarkets. Also, in order to enhance the communication with customers and to evaluate the quality of the products, *NSP* will distribute e-mail questionnaire asking from the customers to provide feedback about the products.

- **Mechanism:** *NSP*'s products will be displayed in electronic catalogues on the company's website, where buyers will be able to search and select from a list of products.

## **Behaviour Components**

- **Business Processes**
  - *General management* process will provide management, and administrative support activities associated with legal issues, finance and accounting, planning, public and government relations).
  - *Marketing and Advertising* process will focus on activities to inform existing or potential buyers about the products including promotion to local market and website advertising.
  - *Procurement* process will conduct activities for ordering and obtaining materials from the suppliers, evaluating the quality of and the cost of the materials.
  - *Manufacturing* process will perform activities associated with the main work – the conversion of the natural ingredients into the finished products, namely into *NSP*'s natural skincare products.
  - *Sales/Order* process will process customer online orders by arranging the product's customisation, packaging and labelling the delivery, and finally dispatching the order to the customer.
  - *Customer Service* process will perform support service activities for the customers after the purchase of the products, including online customer support.

## APPLICATION ARCHITECTURE

- **Application Component:** *NSP* e-commerce system will consist of a web application and a database.
  
- **Application Interface:** *NSP* e-commerce system will perform the following functions:
  - User Login,
  - New Users Registration,
  - Product Searching,
  - Customisation,
  - Ordering/Selling,
  - Delivery Arrangement,
  - Electronic Payment,
  - Invoice Creation,
  - Order Tracking.
  
- **Application Data Object:** *NSP* e-commerce system will store the following:
  - User Details,
  - Customer Details,
  - Products Details,
  - Customer/Order Details,
  - Delivery Details,
  - Payment Details,
  - Accounting details (invoices),
  - Materials Details,
  - Suppliers Details.

## INFORMATION/DATA ARCHITECTURE

Table 6.2 presents the information/data architecture's components of the *NSP* e-commerce system.

**Table 6.2 Information / Data Architecture of NSP e-commerce system**

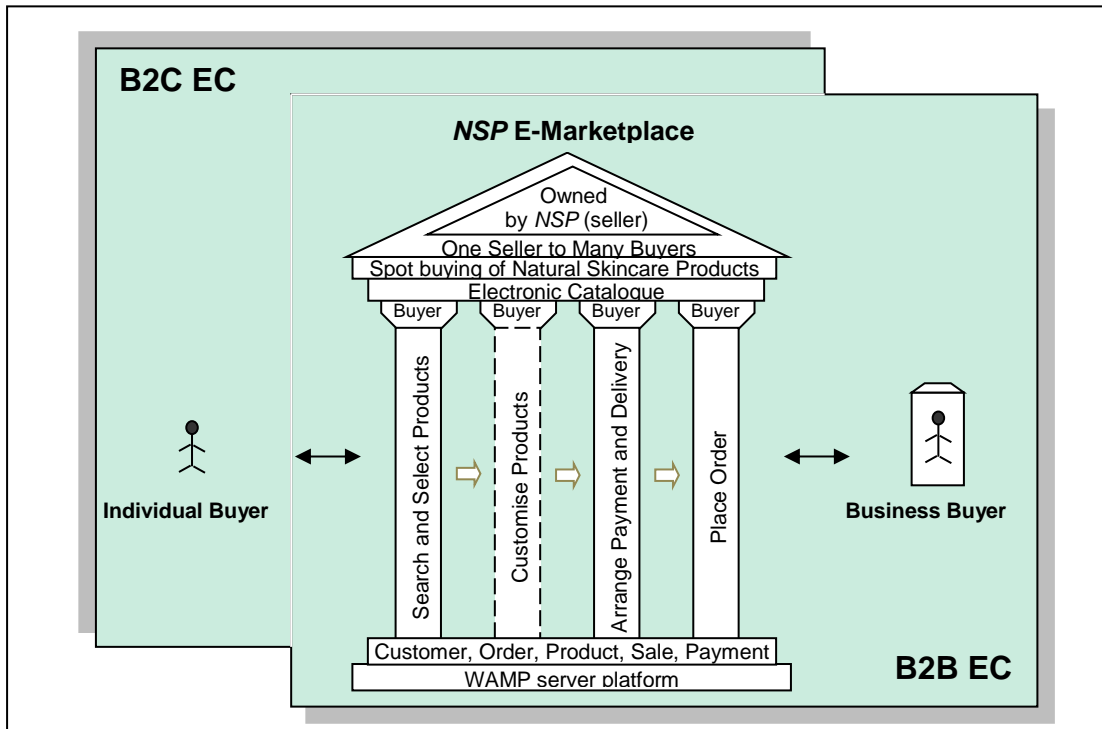
<b>Message</b>	<b>Purpose</b>	<b>Attribute</b>
User Details	To provide information regarding the user login details	User Username User Password
Customer Details	To provide information regarding the customer	Customer Code Customer Name Customer Address Customer City Customer Post Code Customer Country Customer Telephone Customer Fax Customer Email
Product Details	To provide information regarding the product	Product Code Product Name Product Type Product Description Product Size Product Selling Price Product Max Delivery Time Product Min Delivery Time
Order Details	To provide information regarding the orders	Order No Order Date Product Code Product Customisation Features Product Selling Price Quantity Required Delivery Time
Delivery Details	To provide information regarding the delivery	Delivery Code Delivery Duration Delivery Date Depart Delivery Date Arrive Delivery Name Delivery Address Delivery City Delivery Post Code Delivery Country Order No
Payment Details	To provide information regarding the payments	Payment Date Payment Method Payment Amount Order No
Invoice Details	To provide information regarding the invoices	Invoice Number Invoice Date Customer No Order No Quantity Price VAT Discount Total Cost
Supplier Details	To provide information regarding the supplier	Supplier Code Supplier Name Supplier Address Supplier City Supplier Post Code Supplier Country Supplier Telephone Supplier Fax Supplier Email
Material Details	To provide information regarding the materials required for the manufacturing of the products	Material Code Material Name Material Type Material Description Material Size/Quantity

## **TECHNOLOGY ARCHITECTURE**

A *Windows, Apache, MySQL, and PHP* (WAMP) server will be used to host the web application within a local machine. By using WAMP server, PHP will be used to develop the web application and MySQL to create the database of the system.

## Representation of *NSP* e-business model for B2C EC and B2B EC

In this case the abstract view of the e-business model is presented in Figure 6.2 using the BMA representation technique. This particular representation aims at giving a high level structure and understandable overview presenting the significant elements of the *NSP* e-business model.



**Figure 6.2** *NSP* e-business model for B2C EC and B2B EC

*NSP seller oriented marketplace* will be a public e-store offering its products initially to individual buyers (B2C EC) and in future to business buyers (B2B EC). Buyers will have the opportunity to make spot buying of products at any time. Products will be displayed in electronic catalogues arranged by product type, where buyers will search and review from a list of products, and eventually select using an electronic shopping basket. Buyers will have the option to customise some products depending on their needs or preferences of aromas, colours, gift set, size and, packaging. Before placing the purchase order, the electronic shopping basket will list all the products selected by the buyer for review; from here the buyer will proceed to the check out process where delivery arrangement and online payment will be handled. Buyers will have the option to pay by credit/debit card, PayPal or EFT (Electronic Funds Transfer); after the payment they will receive an automatic email invoice/confirmation of order. After placing an order buyers will be also to log in and track the location and the status of their orders. The *NSP* online system will record the Customer, Product, Order, Sale, and Payment details and it will operate using a WAMP application server platform.

### 6.2.3 Analysis of the Findings and Modification of the Framework

In terms of validity and applicability, by using the BMAF to describe the current business model of the *2S Paramedical Equipment Ltd* reveals the instantiation of the framework to represent the business model of a real-world business, demonstrating its fidelity with real word phenomena and its understandability. It confirms its ability to display the big picture of a business model as well as its ability to transparently display the different aspects of a business model. As *2S Paramedical Equipment Ltd*' directors commented the application of the framework facilitated them to analyse the structure of the business model, and to identify areas that required further analysis and possible changes in order to go online. It gave the opportunity to visualise the e-business model for B2B EC, and in the meantime to define the structure and required components including the key stakeholders.

In the case of the *NSP* project, BMAF helped its stakeholders to clearly define the mandatory aspects of the new business model, confirming its ability to construct an e-business model. Initially, it made clear the business logic of the business, in particular the links between the business's revenue model, the value proposition, the distribution channel, the target customer for who the company will offer its value proposition. Secondly, it created an architectural view of the company's e-business model, defining the mechanism for selling the company's products, the type of business transactions between the company – the buyers of its products, the relationships of the company with its customers after the sale. Thirdly, it facilitated to definition of the business process model of the company, and particularly the business processes for the accomplishment of the business goals and satisfaction of the business commitments. Finally, the functions of the e-business application and its information/data structure were designated including also aspects of the technical infrastructure required for the online operation.

In terms of the framework structure and content, improvements and modifications were required to the BMA conceptual notation. In particular, the text definitions for the concepts *Business Rules* and *Customer Involvement* were revised (see table 6.3) in order to provide better understanding to the terms. The initial definition of *Business Rules* was quite generic and emphasis had been given on the behavior and consequences of the business rules to a business. The new definition provides a detailed description, explaining business rules' intention including also examples of the forms that rules can take in a business.

**Table 6.3 Business Rules Revised Definition**

<b>Business Rules</b>	<b>Initial Definition</b>
	Complex business logic demands that a process selects one of several alternative activities, or discriminate the information upon which it acts. This is expressed in the form of rules that affect activity selection (branching and repeating) and govern message consumption.
	<b>Revised Definition</b>
	Business Rules define or constrain some aspect of the business. They can take the form of policy, procedures, standards, responsibility levels, authorisation and delegation mechanisms. They are intended to assert business structure or to control or influence the behaviour of the business. They expressed at the atomic level -- that is, they cannot be broken down any further

Similarly, in the case of the *Customer Involvement* term (see table 6.4), the initial definition was rather short and it had focused on the customer involvement from the service provision point of view only. The revised definition explains the term in details and considers the aspects of customer involvement related with the product or service of a business.

**Table 6.4 Customer Involvement Revised Definition**

<b>Customer Involvement</b>	<b>Initial Definition</b>
	Customer involvement - Most service provision requires a high degree of interaction between client and service provider .
	<b>Revised Definition</b>
	Customer involvement refers to degree of information processing or extent of importance that a customer attaches to a product or service. Each customer has an underlying motivation in the form of needs and values. While involvement will arise when the object (product, service or promotional message) can help to meet the perceived needs, goals and values that were important. Meeting these needs is perceived to be varied or not the same from one situation to others

Further minor changes were carried out to the classification of the BMA concepts into the three architectural visualisations-*mandatory, desirable, optional*-for the construction of e-business model. Table 6.5 and 6.6 mentions the changes between the initial content of the visualisations and the revised one. As we can see in table 6.6 *Product Life Cycle* and *Offering* were moved to the *mandatory* visualisation, and *Labour Intensity to the desirable* visualisation. During the *NSP* project, it was concluded that by describing early the *Product Life Cycle* concept facilitates the project’s stakeholders to understand earlier the stages of the business process model associated with the product life cycle. At the same time, examining the *Product Life Cycle* concept leads a new business to research and plan early making decisions about the promotion, development, and innovation of the product. Similarly, it was found that *Offering* works as part of the mandatory component *Value Proposition*, as it captures key aspects of the product like

the reasons of the product's value, the price level of the product, the product's differentiation from competitors' product.

**Table 6.5 Initial Proposed Architectural Visualisations**

Business Model Architecture								
Business Architecture					Information/Data Architecture	Application Architecture	Technology Architecture	
Organisation	Product	Service	Customer	Behaviour				
<i>Mandatory</i>	Business Vision	Product Description	Service Description	Target Customer	Business Processes	Message Purpose Value	Application Component  Application Interface  Application Service  Application Data Object	Communication Path  Network
	Business Strategy	Product Homogeneity	Service Intangibility	Customer Involvement	Business Resources			
	Business Actors/Roles	Type of Materials		Customer Relationship				
	Business Collaboration			Mechanism				
	Business Transaction							
	Revenue Model Value Proposition							
<i>Desirable</i>	Business Principles	Product Variety	Service Perishability	Distribution Channel	Business Functions	Attribute Class Package	Application Function  Application Collaboration	Artifact Node  Infrastructure Interface  Infrastructure Service
	Business Object	Product Life Cycle	Demand fluctuations		Business Activities			
	Business Relation	Lead time required for made-to-order products			Business Events			
<i>Optional</i>	Revenue Sources	Offering (Reasoning, Value Level, Price Level)	Labour Intensity	Customer Buying Cycle	Business Location  Business Rules			

**Table 6.6 Revised Architectural Visualisations**

Business Model Architecture								
Business Architecture					Information/Data Architecture	Application Architecture	Technology Architecture	
Organisation	Product	Service	Customer	Behaviour				
<i>Mandatory</i>	Business Vision	Product Description	Service Description	Target Customer	Business Processes	Message Purpose Value	Application Component  Application Interface  Application Service  Application Data Object	Communication Path  Network
	Business Strategy	Product Homogeneity	Service Intangibility	Customer Involvement	Business Resources			
	Business Actors/Roles	Product Life Cycle		Customer Relationship				
	Business Collaboration	Offering (Reasoning, Value Level, Price Level)		Mechanism				
	Business Transaction							
	Revenue Model Value Proposition	Type of Materials						
<i>Desirable</i>	Business Principles	Product Variety	Service Perishability	Distribution Channel	Business Functions	Attribute Class Package	Application Function  Application Collaboration	Artifact Node  Infrastructure Interface  Infrastructure Service
	Business Object	Lead time required for made-to-order products	Demand fluctuations		Business Activities			
	Business Relation				Business Events			
<i>Optional</i>	Revenue Sources		Labour Intensity	Customer Buying Cycle	Business Location  Business Rules			

### 6.3 Evaluation of the Proposed Framework using Interviews

After the application of the BMAF in the above case studies, the third form of the qualitative evaluation was achieved through interviews with those that used the framework, namely the directors of the *2S Paramedical Equipment Ltd* and the two new businessmen of *NSP*. Semi-structured interviews aimed to evaluate how well the BMAF performs its objectives as well as to get feedback from the participants about the experience of using the framework. Interviews were structured by six open questions which each exploring an area of the framework (questions and answers are presented in Table 6.7). The first question was to capture interviewees' opinion for the BMA conceptual notation including the proposed text definition for each concept. Question 2, 3 and 4 focused aimed to find out if in the interviewees' opinion each BMAF's stage is suitable a) for describing the business model, b) for analysing the current business model, c) to synthesising an e-business model for a company. Question 5 aimed at discussing the three architectural visualisations (*Mandatory – Desirable – Optional*) proposed in stage 3 of BMAF. The last question asked interviewees to express their opinion about the BMA Representation Technique (Greek Temple) used for the abstract view of the new business model of each case.

**Table 6.7 Interviews' Questions and Answers**

Question Areas	Questions and Summary of the Answers
<b>BMA Conceptual Notation</b>	<p><b>1) How understandable is the BMAF's conceptual notation including the text definitions?</b></p> <p><i>"Most of the definitions were clearly defined and understandable for me; thus it was easy to describe them; only few terms were not clearly defined, eg business objects could mean a number of things"</i></p> <p><i>"BMAF's conceptual notation including the text definition for each concept was very understandable, and helped to answer the questionnaire easily; only for business resources, there were too many things that could be said about these categories.... and I couldn't really find the time to answer in details in all 5 general categories (e.g specify skills, knowledge, attitudes and experiences of humans)"</i></p> <p><i>"Text definitions were understandable but effort and further research required to respond the questions"</i></p> <p><i>"BMAF's conceptual notation worked as a guide to find and understand the components of our e-business model; it would be difficult to understand all these terms without the text definitions – I have not a strong business background"</i></p>
<b>Stage 1 of BMAF</b>	<p><b>2) How the does BMAF help you to describe the current business model of your company?</b></p>



	<p><i>"It took quite a lot of time and work to describe the current business model using the BMAF concepts, but it was very helpful"</i></p> <p><i>"It was the right way to describe the components of the company's business model, everybody understood them, it was like we were speaking the same language"</i></p>
<b>Stage 2 of BMAF</b>	<p><b>3) Does the BMAF help you to identify the possible options for changing the current business model to an e-business model, and to analyse what changes are required?</b></p> <p><i>"the framework helped to better set the priorities; however, at the end of the day there was very little time for analysing the changes required; it will be a task for the next stage"</i></p> <p><i>"It helped to create the generic view of the company's e-business model, and to think about the possible changes"</i></p>
<b>Stage 3 of BMAF</b>	<p><b>4) How does the BMAF help you to synthesise the e-business model of your company?</b></p> <p><i>"Initially it was difficult to understand the significance of all these BMAF concepts, but things made sense when I considered their role and seen their connections; it was like putting together pieces in a puzzle, in a logical way in order to come up with the desired solution"</i></p> <p><i>"So far we have only created the BMA - Mandatory Visualisation, thus not sure for the final outcome. It has helped to create the generic view of the company's e-business model, and to visualise aspects of business process model as well as of the e-business application-It works like a prototype."</i></p>
<b>Three Architectural Visualisations</b>	<p><b>5) How workable and useful is the synthesis of the e-business model using the three proposed architectural visualisations?</b></p> <p><i>"Although the Mandatory Visualisation has been applied at this stage, it looks like architectural visualisations are workable and useful, they provide a step-by-step process for the synthesis of the e-business model"</i></p> <p><i>"Only BMA - Mandatory Visualisation has been created, I am not sure"</i></p>
<b>BMA Representation Technique</b>	<p><b>6) How workable and useful is the BMA Representation Technique?</b></p> <p><i>"I think something like this representation is the foundation for the design of e-business model; before you set up an e-business, you have to have something like this at the generic high level"</i></p> <p><i>"I cannot imagine representing all different components, it will be a mess. It is presenting things in a simple way that is certainly the most important"</i></p> <p><i>"It helps to define the certain components of the e-business model, but not to model the business process of online business"</i></p>

Interviews showed a number of mixed things. The directors of the *2S Paramedical Equipment Ltd* were quite comfortable with applying the BMAF to describe their company's business model. It was an easy and sufficiently clear process for them that helped to understand the business better and to identify the areas for change. BMAF conceptual notation and the text definitions created for common understood language enabled the communication between all the stakeholders. On the other hand, they found that it is a long process, more time and work is required in order to apply all the stages of the BMAF and to reconstruct the business model of the company.

For the young new *NSP* entrepreneurs it was difficult to understand the purpose of defining all the proposed components; they were initially reluctant and thought that some components were not necessary. Thus justification and clarification were required to be given during the discussion sessions. However, they found most of the text definitions understandable and remarkably helpful for the construction of their e-business model. They are relatively positive that the stage 3 of BMAF is a step-by-step approach that can guide successfully the synthesis of the components required for the e-business model.

Of course the above mentioned evidences are based simply on the opinions of only four interviewed users of the BMAF; further interviews in future research will help to capture more opinions and to understand further the performance and usefulness of the BMAF.

#### **6.4 Conclusion**

This chapter presents to the reader the qualitative evaluation of the BMAF using qualitative research methods. The validity and the applicability of the framework was tested and evaluated with the description of *2S Paramedical Equipment Ltd* business model and with the synthesis *NSP* e-business model. After the application of the BMAF to the above two case studies, semi-structured interviews were carried out with stakeholders in order to evaluate the understandability and usefulness of the framework.

Summarising the findings of this qualitative evaluation exercise the following conclusions were drawn:

- BMAF helps to define the business logic of the e-business, to create the architectural view of the company's e-business model, and to define the business process model as well as aspects of the e-business application and its technical infrastructure;

- BMA conceptual notation and the text definitions can be used as a common understood language enabling the communication between all the project's stakeholders;
- BMAF provides a step-by-step approach that can guide in a logical way the synthesis of e-business model's components;
- More than 3 months are required for the construction of an e-business model.

## **CHAPTER 7. CONCLUSION, CONTRIBUTION & RECOMMENDATIONS FOR FURTHER RESEARCH**

### **7.1 Introduction**

This chapter summarises and concludes the procedures, findings, and contribution of the research. Section 7.2 presents the conclusions of this thesis. The significance and the contribution of this research are discussed in section 7.3 and the limitations of this study in section 7.4. Finally, in section 7.5, directions for further work are recommended taking the results of this work as a starting point.

### **7.2 Conclusions**

The main conclusion of this work is that the research aim has been achieved. The research questions presented in chapter 1 have been answered and the research objectives have been achieved developing and evaluating the proposed framework for the architecting of e-business models, especially those used for Business to Business Electronic Commerce (B2B EC). The detailed conclusions are presented in the following paragraphs corresponding to each objective:

The initial objective of this research aimed *to elucidate the architecture of the existing business models used for B2B EC*; in summary this study:

- Suggested four architectural domains and ten compulsory components for the description of the business model architecture used for B2B EC (presented in chapter 4, section 4.4).
- Proposed a representation technique with an abstract and simple form to represent the core architectural components of e-business models used for B2B EC, adopting a single architectural approach (presented in chapter 4, section 4.5).
- Evaluated the findings and the proposed technique using the ten compulsory components as criteria for the classification of the business models used for B2B EC (presented in chapter 4, section 4.5).

The second objective *was to develop a business model architecture conceptual notation for the description and design of the e-business model for B2B E-Commerce*. This work developed a conceptual notation using a critical process of creating new knowledge by evaluating and standardising the existing knowledge; thus this work:

- Classified and rationalised initially the existing concepts from five different literature areas (Enterprise Architecture Framework & Enterprise/Architecture Description Languages, Modelling Languages, Enterprise & Business Model Ontologies, and Business Modelling Frameworks), including the ten compulsory components for the description of the business model architecture used for B2B EC (presented in chapter 4, section 4.7).
- Proposed business model architecture (BMA) conceptual notation based on the findings of the classification and rationalisation; and by adding further concepts for the integration of the notation. Suggested a precise unambiguous text definition for each concept and provided guidelines for the behaviour of each concept as well as their inter-relationships (presented in chapter 4, section 4.6).

The third objective was to define *the process for developing an e-business model for B2B E-Commerce*. Briefly, this work:

- Evaluated Business Modelling frameworks (over the last 13 years) used for development and design of an e-business model using a set of criteria to measure the strengths and the weaknesses of the existing work.
- Justified the role of the BMA conceptual notation in the development of an *e-business* (presented in chapter 4, section 4.2 and 4.7).

The fourth objective covered the aim of this work, namely *to develop a framework for the architecting of e-business models used for B2B E-Commerce*. This work:

- Defined initially three principles that the proposed a business model architecture framework (BAMF) addressing: a) *Conceptualisation*, b) *Representation/Visualisation*, c) *Construction and Reconstruction* (as discussed in chapter 1).
- Proposed three stages for the reconstruction of traditional business model to e-business model (presented in chapter 4, section 4.8).
- Proposed the design of three architectural visualisations namely *mandatory*, *desirable*, and *optional* for the construction of e-business models using the proposed business model architecture (BMA) conceptual notation (presented in chapter 4, section 4.8.3).

The last objective addresses *the validation of the proposed framework which was carried out using mixed research methods*; in particular this work:

- Conducted an electronic survey using experts in the field and practitioners to validate the design of the proposed business model architecture framework (BAMF): namely the role, the structure, the content of BMA, and the three architectural visualisations-*mandatory*, *desirable*, *optional*-for the construction of e-business model (presented in chapter 5, section 5.5).

- Applied the proposed business model architecture framework (BAMF) to two real world case studies to test and evaluate its validity and the applicability (presented in chapter 6, section 6.2).
- Carried out interviews with the case studies' stakeholders in order to establish how well the proposed business model architecture framework (BAMF) performs its objectives. (presented in chapter 6, section 6.3).
- Revised and refined the proposed business model architecture framework (BAMF) in particular the three architectural visualisations-*mandatory*, *desirable*, *optional*-for the construction of e-business model following the insights gained from the model validation stage (presented in chapter 6, section 6.2.3).

### 7.3 Original Contribution

The contribution of this research work is discussed with respect to current academic thought and current industry practice as an approach of standardisation. The research extends previous theoretical work on business model development and proposes a novel conceptual notation of business model architecture.

Business Model Architecture (BMA) adds value by going one step further; it does not concern simply the business logic of a company for value creation but the whole architecture of a business model considering aspects of the business process model, the software application and the technological infrastructure. Introducing a new crucial role in the development of e-business, BMA can be affected by the e-business strategy and it can affect the development of e-business application.

The developed (by this research) BMA conceptual notation has the specifications for an efficient and complete theoretical tool; it identifies the architectural domains and describes the architecture components of business models. It works as a technique for the representation of the current situation and for the visualisation of future targeted outcomes presenting all the pieces required for the synthesis of a business model. In the final analysis, the aims of different stakeholders (managers, business/IT consultants, IS designers) are to develop an e-business with multiple, dynamic and complex elements, and therefore need to be equipped with efficient and complete tool while avoiding reinventing the wheel.

The new framework (BMAF) using the BMA conceptual notation proposes a systematic process for development of an e-business. It enables the stakeholders like managers, business/IT consultants, IS designers, new entrepreneurs a) if they cannot

define an e-business model to define it, b) if they don't have one, to construct one, c) if they have one and it is not working successfully to reconstructed/adapt to accommodate changes.

The BMA holistic approach provides flexibility to BMAF; it can also be used for the construction and reconstruction of e-business models for all branches of Electronic Commerce. It is suitable for Business to Consumers (B2C) EC where the customer in an individual consumer, Government to Consumers (G2C), Government to Business (G2B), etc.

The results of the survey have also shown through statistical analysis of the responses from experts from academia and from practitioners from the business community that the BMA conceptual notation is understandable and useful, and it can be used as the basis for the construction of an e-business.

The findings of the application of the BAMF to two real world case studies proved the validity and applicability of the framework a) to define the business logic of the e-business, b) to create the architectural view of the company's e-business model, and c) to define the business process model as well as aspects of the e-business application and its technical infrastructure. Also, it confirmed the usefulness of the BMA conceptual notation as a common understood language used by the stakeholders in order to enable the better communication between them.

#### **7.4 Limitations of the Study**

The limitation of this study is that business model architecture, especially for electronic commerce, is still in a relatively immature stage as compared to other established branches of business and computing. Thus there was a small sample size in terms of the number of respondents for the online survey, but still the data collected was very valuable as it came from researchers and experts from the academic and the business community. Also, the above mentioned evidence are based simply on the opinions of only four interviewed users of the BMAF; further interviews in future research will helps to capture more opinions and to understand further the performance and usefulness of the BMAF.

#### **7.5 Recommendations for Further Research**

It is recommended that further validation of the BMAF will be beneficial in order to establish its generality. In particular, action research is recommended within different

business sectors to construct a large number of e-business models in order to continuously evolve the proposed BMAF.

Continuous collaboration with researchers and experts from the *business modelling* academic and business community is required, in order to collect more quantitative and qualitative responses and in order to further evaluate the BMAF statistically over a longer period.

The two case studies reported in Chapter 6 can be monitored over time to further refine and customise their respective e-Business and feedback from practice to the construction and refinement of theoretical models.

Extension of the proposed BMA conceptual notation to a business model architecture language for modelling an e-business; with graphical notation to represent the concepts, and their behaviour and relations is another avenue for further research.

Extension of the proposed BMAF to handle fully the development of e-business, from the formulation to e-business strategy to the development of an e-business application is a further area for future study. In more mature phases of this process integrated measurement will be able to enable continuous improvement and optimisation. Insights from longitudinal studies would provide opportunities for developing maturity and performance estimation and measurement.



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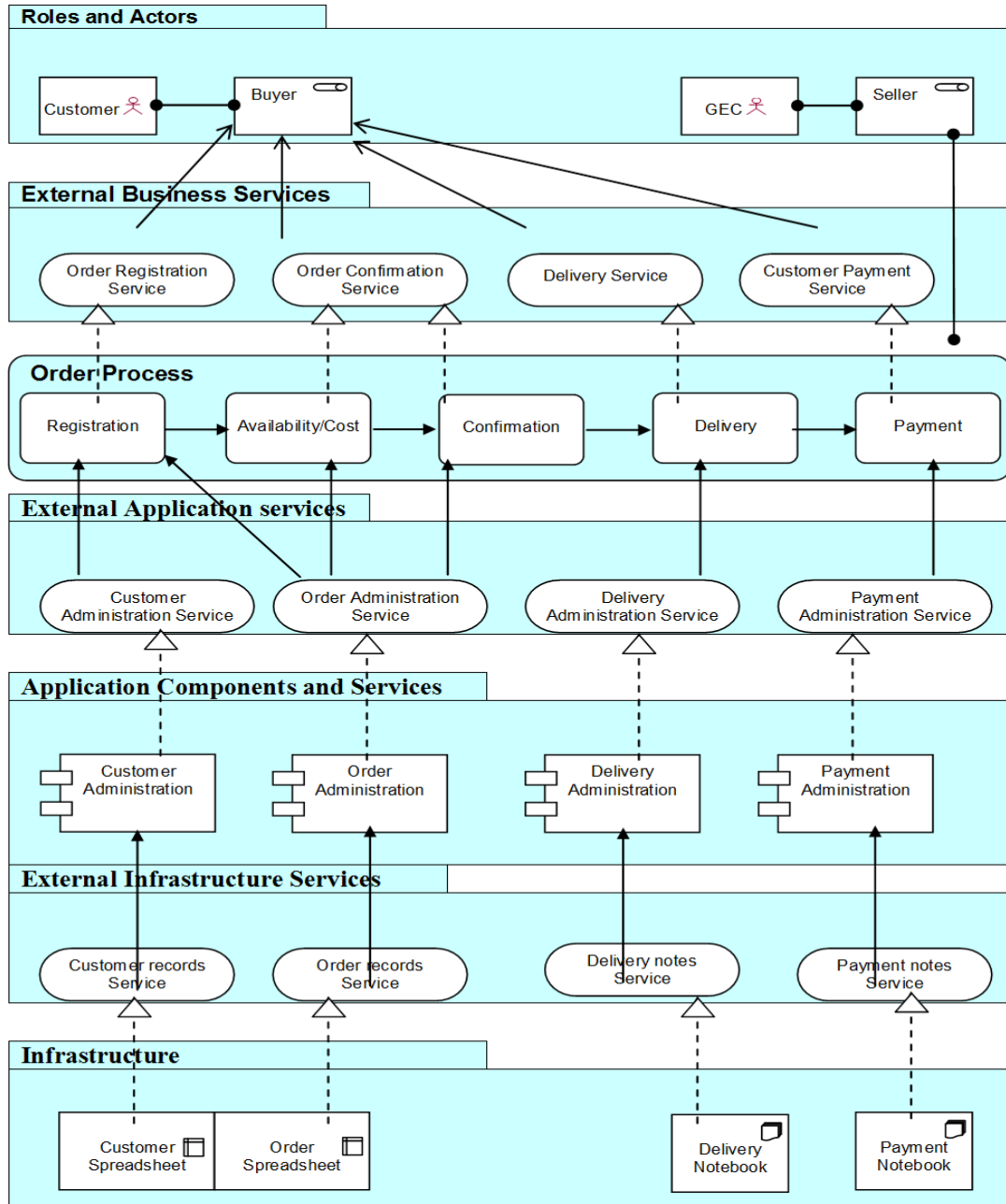
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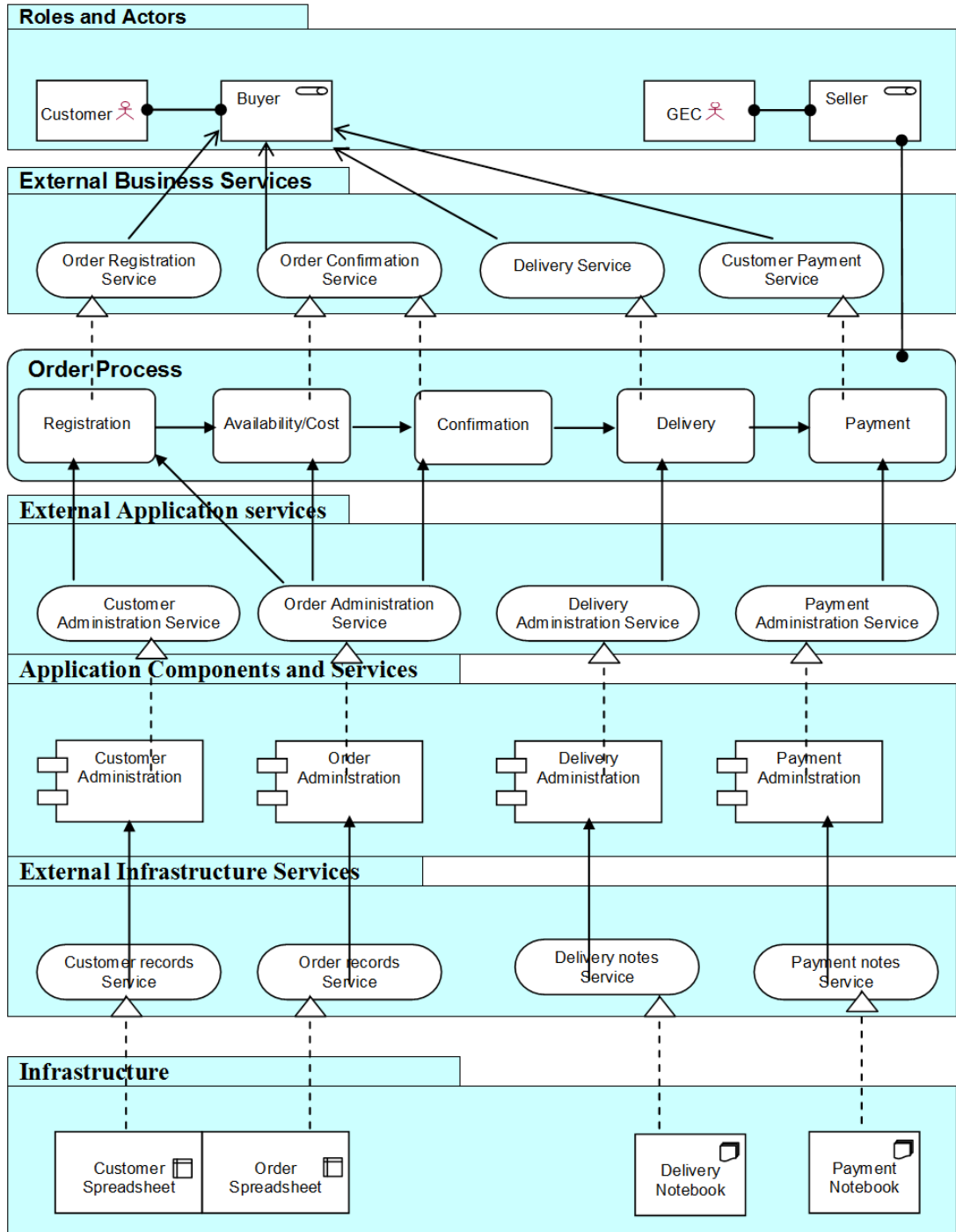
## **APPENDICES**

## APPENDIX (A): USE OF THE ENTERPRISE ARCHITECTURE MODELLING LANGUAGE “ARCHIMATE”

For further understanding of the ArchiMate”, it was applied to model the ordering process of a SME.







## **APPENDIX (B): PILOT QUANTITATIVE RESEARCH QUESTIONNAIRE**

### ***Survey invitation***

Dear Sir/Madam,

I am writing to invite you to participate in a brief survey aimed at validating the findings of a research project about Business Model Architecture for E-Commerce. I hope you'll be able to share your insights with us.

The questionnaire (found on the following website) is anonymous. We estimate that it should not take more than 30-45 minutes.

*[Web Link](#)*

We are happy to send you a summary of our findings, if you provide us with contact details.

Thanking you in anticipation.

Nickos Paltalidis

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PhD Student  
London Metropolitan University

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***1<sup>st</sup> page of online questionnaire***

**Thank you for considering participation in this survey.**

The goal of the present study is to validate the findings of the research and so to revise the proposed product of this research.

The survey will ask about your opinions about key concepts used in the field of Business Model Architecture. There are no right or wrong answers.

**The questionnaire will take approximately 30-45 minutes to complete.**

All responses and any identifiable information provided will be held confidentially and will be stored on computers that are password protected.

Participation in this study is entirely voluntary. If you choose to participate you are free to withdraw from the study at any time.

The project has received ethical approval from the Ethics committee of London Metropolitan University.

**Thank you very much for helping us with this research project participation!**

# Questionnaire

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## SECTION A: Personal Details

1. Name (optional):
2. Job Title:
3. Email:

## SECTION B: Specialisation Details

### 4. Which industry best describes your company?

- |  |  |
|--|--|
| a) Agriculture, forestry, fishing or hunting | i) Mining, quarrying, or oil and gas extraction    |
| b) Arts, entertainment, or recreation        | j) Professional, scientific, or technical services |
| c) Construction                              | k) Retail  |
| d) Education                                 | l) Real estate / Rental and leasing                |
| e) Finance / Insurance                       | m) Transportation / Warehousing                    |
| f) Health care / Social assistance           | n) Utilities                                       |
| g) Hospitality services                      | o) Wholesale trade                                 |
| h) Manufacturing                             | p) Other (please specify)                          |

### 5. Please indicate degree of your areas of specialisation.

Area of Specialisation	Very Good	Good	Satisfactory	Minimal
Business Analysis				
Business Model Architecture				
Business Strategy				
Business Transformation				
Business Process Improvement				
E-Business and E-Commerce				
Enterprise Architecture				
Software Engineering				
Web Design -Web Development				
Other (please specify)				

## SECTION C: Business Model

6. Which of the following statement most appropriately reflects your opinion for Business Model definition:

a) *Business model is the architecture for the product, service and information flows, including a description of the various business actors and their roles, and a description of the potential benefits for these actors, and a description of the sources of revenues.*

b) *Business model spells out how a company makes money by specifying where it is positioned in the value chain.*

c) *Business model is the description of the value that a company offers to one or several segments of customer; and the architecture of the firm and its network of partners for creating, marketing and delivering this value and relationship capital, in order to generate profitable and sustainable revenues streams.*

7. Please indicate the degree to which you agree or disagree with the following statement for Business Model:

*A **business model** consists of a group of components that their structure and relationships are led by the business strategy; namely business strategy defines the objectives, the roles and the behaviour of these components*

a) **Strongly Agree**      b) **Agree**      c) **Disagree**      d) **Strongly Disagree**

Please give a brief explanation / comment/clarification for your choice


## SECTION D: Business Model Architecture

8. Please indicate the degree to which you agree or disagree with the following statement:

***Business Model Architecture** describes all the components fit together and create a business model. These components are grouped into four thematic sections referred to as **architecture domains**-these four types of architecture that are commonly accepted as subsets of enterprise architecture.*

***Business Architecture** defines the whole business idea, strategy, organisation, product/service, customer/market, key business processes.*

***Data/Information Architecture** describes key information flows and characteristics within a business area.*

***Application Architecture** provides the application systems to be deployed, their interactions, and their relationships to the core business processes of the organisation.*

***Information Technology Architecture** provides the “technical architecture” needed for the operation of the model.*

a) Strongly Agree	b) Agree	c) Disagree	d) Strongly Disagree
Please give a brief explanation / comment/clarification for your choice			
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9. Please indicate the degree to which you agree or disagree with the following statement:

*In the case of constructing an e-business, Business Model Architecture acts as an abstract representation of the e-business strategy and as a pattern (design) for the development of the e-Business Application*



a) Strongly Agree	b) Agree	c) Disagree	d) Strongly Disagree
Please give a brief explanation / comment/clarification for your choice			
<hr/>			
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## SECTION E: Business Model Architecture for E-Commerce

10. Please indicate which of the following Business Organisation components are required to be considered in synthesising a business model for E-Commerce.

Business Organisation Components	Highly Required	Required	Lowly Required	Not Required
Business Vision				
Business Strategy				
Business Principles				
Business Behaviour				
Business Actors and their Roles				
Business Objects				
Business Collaboration				
Business Relation				
Business Transaction				
Revenue Model				
Revenue Sources				
Value Proposition				

11. Please indicate which of the following Business Behaviour components are required to be considered in synthesising a business model for E-Commerce.

Business Behaviour Components	Highly Required	Required	Lowly Required	Not Required
Business Functions				
Business Processes				
Business Activities				
Business Events				
Business Resources				
Business Location				
Business Rules				

12. Please indicate which of the following Product components are required to be considered in synthesising a business model for E-Commerce.

Product Components	Highly Required	Required	Lowly Required	Not Required
Product Description				
Product Variety				
Product Life Cycle				
Product Homogeneity				
Type of Materials used in Product				
Lead time required for made-to-order product				
Offering (Reasoning, Value Level, Price Level)				

**13. Please indicate which of the following Service components are required to be considered in synthesising a business model for E-Commerce.**

Service Components	Highly Required	Required	Lowly Required	Not Required
Service Description				
Service Intangibility				
Service Perishability				
Labour Intensity				
Demand Functions				

**14. Please indicate which of the following Customer components are required to be considered in synthesising a business model for E-Commerce.**

Customer Components	Highly Required	Required	Lowly Required	Not Required
Target Customer				
Customer Involvement				
Distribution Channel				
Customer Buying Cycle				
Customer Relationship				
Mechanism				

**15. Please indicate which of the following Data components are required to be considered in synthesising a business model for E-Commerce.**

Data Components	Highly Required	Required	Lowly Required	Not Required
Message is piece of information that flows between the processes and its participants.				
Purpose is the description of functionality of a message.				
Meaning represents the informative value of a message.				
Value is the practical/functional value and the value of information or knowledge of a message				
Attribute is a data item that exist in and describe the content of a message				
Class is a collection of methods, operations and attributes that fully describe the structure and behaviour of a message				
Package is a group of organised messages				



**16. Please indicate which of the following Application components are required to be considered in synthesising a business model for E-Commerce.**

<b>Application Components</b>	<b>Highly Required</b>	<b>Required</b>	<b>Lowly Required</b>	<b>Not Required</b>
Application Component is part of an application that performs one or more applications functions				
Application Collaboration describes the interaction between the components				
Application Interface describes the functionality of a component				
Application Data Object is self-contained piece of information suitable for operation of the application component				
Application Service describes functionality that application components share with each other and the functionality that they make available to the environment.				
Application Function describes the internal behaviour of a component				

**17. Please indicate which of the following IT components are required to be considered in synthesising a business model for E-Commerce.**

<b>IT Components</b>	<b>Highly Required</b>	<b>Required</b>	<b>Lowly Required</b>	<b>Not Required</b>
Artifact is a physical piece of information that is used or produced by deployment and operation of a system. An instance (copy) of an artifact can be deployed on a node.				
Node are active processing components (e.g. servers, database servers, or client workstations) that execute and process artifacts				
Communication Path is a relation between two or more nodes, thought which these nodes can exchange information.				
Infrastructure Service exposes the functionality of a node to its environment.				
Infrastructure interface specifies how the infrastructure services of a node can be accessed by other nodes (provided interface), or which functionality the node requires from its environment				

(required interface).				
Network represents the physical communication infrastructure. This may comprise one or more fixed or wireless network links. The most basic network is a single link between two devices. A network has properties such as bandwidth and latency. It embodies the physical realisation of the logical communication paths between nodes.				

**18. If you have any other comments, or questions, please share them below.**

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*End of questionnaire*

***“Thanks” message***

**Thank you very much for helping us with this research project participation**

For questions about this project and/or to receive the findings of this survey, please contact the principal investigator Nickos Paltalidis at



## **APPENDIX (C): FINAL QUANTITATIVE RESEARCH QUESTIONNAIRE**

### ***Survey invitation***

Dear Sir/Madam,

I am writing to invite you to participate in a brief survey aimed at validating the findings of a research project about Business Model Architecture for E-Commerce. I hope you'll be able to share your insights with us.

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We are happy to send you a summary of our findings, if you provide us with contact details.

Thanking you in anticipation.

Nickos Paltalidis

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PhD Student  
London Metropolitan University

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***1<sup>st</sup> page of online questionnaire***

**Thank you for considering participation in this survey.**

The goal of the present study is to validate the findings of the research and so to revise the proposed product of this research.

The survey will ask about your opinions about key concepts used in the field of Business Model Architecture. There are no right or wrong answers.

**The questionnaire will take approximately 30-45 minutes to complete.**

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# Questionnaire

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## SECTION A: Personal Details

1. Name (optional):
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3. Email:

## SECTION B: Specialisation Details

### 4. Which industry best describes your company?

- |  |  |
|--|--|
| a) Agriculture, forestry, fishing or hunting | i) Mining, quarrying, or oil and gas extraction    |
| b) Arts, entertainment, or recreation        | j) Professional, scientific, or technical services |
| c) Construction                              | k) Retail  |
| d) Education                                 | l) Real estate / Rental and leasing                |
| e) Finance / Insurance                       | m) Transportation / Warehousing                    |
| f) Health care / Social assistance           | n) Utilities                                       |
| g) Hospitality services                      | o) Wholesale trade                                 |
| h) Manufacturing                             | p) Other (please specify)                          |

### 5. Please indicate degree of your areas of specialisation.

Area of Specialisation	Very Good	Good	Satisfactory	Minimal
Business Analysis				
Business Model Architecture				
Business Strategy				
Business Transformation				
Business Process Improvement				
E-Business and E-Commerce				
Enterprise Architecture				
Software Engineering				
Web Design -Web Development				
Other (please specify)				

## SECTION C: Business Model

6. Which of the following statement most appropriately reflects your opinion for **Business Model** definition:

a) *Business model is the architecture for the product, service and information flows, including a description of the various business actors and their roles, and a description of the potential benefits for these actors, and a description of the sources of revenues.*

b) *Business model spells out how a company makes money by specifying where it is positioned in the value chain.*

c) *Business model is the description of the value that a company offers to one or several segments of customer; and the architecture of the firm and its network of partners for creating, marketing and delivering this value and relationship capital, in order to generate profitable and sustainable revenues streams.*

7. Please indicate the degree to which you agree or disagree with the following statement for **Business Model**:

*A **business model** consists of a group of components that their structure and relationships are led by the business strategy; namely business strategy defines the objectives, the roles and the behaviour of these components*

- a) **Strongly Agree**      b) **Agree**      c) **Disagree**      d) **Strongly Disagree**

## SECTION D: Business Model Architecture

8. Please indicate the degree to which you agree or disagree with the following statement:

**Business Model Architecture** describes all the components fit together and create a business model. These components are grouped into four thematic sections referred to as **architecture domains**-these four types of architecture that are commonly accepted as subsets of enterprise architecture.

**Business Architecture** defines the whole business idea, strategy, organisation, product/service, customer/market, key business processes.

**Data/Information Architecture** describes key information flows and characteristics within a business area.

**Application Architecture** provides the application systems to be deployed, their interactions, and their relationships to the core business processes of the organisation.

**Information Technology Architecture** provides the "technical architecture" needed for the operation of the model.

- a) Strongly Agree      b) Agree      c) Disagree      d) Strongly Disagree

9. Please indicate the degree to which you agree or disagree with the following statement:

*In the case of constructing an e-business, Business Model Architecture acts as an abstract representation of the e-business strategy and as a pattern (design) for the development of the e-Business Application*



- a) Strongly Agree      b) Agree      c) Disagree      d) Strongly Disagree

## SECTION E: Business Model Architecture for E-Commerce

10. Please indicate which of the following *Business Organisation components* are required to be considered in synthesising a business model for E-Commerce.

Business Organisation Components	Highly Required	Required	Lowly Required	Not Required
<b>Business Vision</b> describes a future identity and the Mission describes how it will be achieved				
<b>Business Strategy</b> is a long term plan of action designed to achieve a particular goal				
<b>Business Principles</b> are the fundamental values and operation approach of a business.				
<b>Business Behaviour</b> is an ordering of process or functions that accomplish business goals and satisfy business commitments				
<b>Business Actors</b> are the active entities that perform business behaviour. <b>Business Role</b> describes the work that an actor performs within an organisation.				
<b>Business Objects</b> are the passive entities that are manipulated by business behaviour				
<b>Business Collaboration</b> are the relationships of an organisation with its external business actors (business partners)				
<b>Business Relations</b> are the interrelationships of entities (business actors, business objects) within an organisation.				
<b>Business Transaction</b> is the atomic unit of work in a trading arrangement between two business actors. A Business Transaction is conducted between two parties playing opposite roles in the transaction. The roles are always a requesting role and a responding role.				
<b>Revenue Model</b> describes the way company makes money. It measures the ability of a firm to translate the value it offers its customers into money and incoming revenue streams. A firm's revenue model can be composed of different revenue streams that can all have different pricing mechanisms.				
<b>Revenue Sources</b> describes other incoming money streams				
<b>Value Proposition</b> is an overall view of a company's bundle of products and services that are of value to the customer.				



**11. Please indicate which of the following *Business Behaviour components* are required to be considered in synthesising a business model for E-Commerce.**

<b>Business Behaviour Components</b>	Highly Required	Required	Lowly Required	Not Required
<b>Business Functions</b> are ongoing activities that support the business including manufacturing and production, sales and marketing, finance, accounting and human resources. Functions can be decomposed into other functions and eventually into discrete processes.				
<b>Business Processes</b> are discrete activities that have inputs and outputs, as well as starting times and stopping times. Some business process happened repetitively, while others happen occasionally or even rarely.				
<b>Business Activity</b> is a set of tasks an individual performs. This activity could be writing a sales order, taking a customer service call, or any activity that occurs in one department or functional area of the organization. Each of these tasks is defined and typically supported in an application as a set of procedures that lets individuals accomplish them in some repeatable process.				
<b>Business Event</b> is an action that results from a business activity. The event can be an interaction with an individual, the completion of a business task, or the collection of certain types of information. Although the event can take many forms, it's the lowest form of system information that can be captured.				
<b>Business Resources</b> represents all those things that are required by a business to sustain its processes and create its outcomes. Resources break down into five general categories: physical things (tangible molecular things), energy, monetary value, information resources, and various kinds of capabilities (skills, knowledge, attitudes, and experiences of humans).				
<b>Business Location</b> house resources and functions; they come in two main varieties physical and logical: Physical locations have to do with space. Logical locations include accounts, postal addresses, and network addresses.				
<b>Business Rules</b> Complex business logic demands that a process selects one of several alternative activities, or discriminate the information upon which it acts. This is expressed in the form of rules that affect activity selection (branching and repeating) and govern message consumption.				

**12. Please indicate which of the following *Product components* are required to be considered in synthesising a business model for E-Commerce.**

<b>Product Components</b>	Highly Required	Required	Lowly Required	Not Required
<b>Product</b> is anything that can be offered to a market that might satisfy a want or need. It is of two types: Tangible (physical) and Intangible (non-physical).				
<b>Product Variety</b> clarifies if a single product or a variety of products offered.				
<b>Product Life Cycle</b> The conditions a product is sold under will change over time. The Product Life Cycle refers to the succession of stages a product goes through.				
<b>Product homogeneity</b> clarifies if large amounts of standardized products are produced (mass production) or products are modified for each client or each new situation (customised).				
<b>Type of Materials</b> used for the manufacturing of the product. It is of two types: Direct materials used in making products and Indirect used in maintenance, repairs, and operations activities, and are known collectively as MROs or non-production materials.				
<b>Lead time required for made-to-order product</b> Lead time required from the placement of the order to the delivery of the product				
<b>Offering</b> captures a) the reasoning on why/what makes the product to be valuable to the customer, b) the value level of the product-how the product differences itself from one of its competitors, c) the price level of the product.				

13. Please indicate which of the following *Service components* are required to be considered in synthesising a business model for E-Commerce.

Service Components	Highly Required	Required	Lowly Required	Not Required
<b>Service</b> is the non-material equivalent of a good.				
<b>Service Intangibility</b> - They cannot be seen, handled, smelled, etc. There is no need for storage. Because services are difficult to conceptualize, marketing them requires creative visualization to effectively evoke a concrete image in the customer's mind. From the customer's point of view, this attribute makes it difficult to evaluate or compare services prior to experiencing the service.				
<b>Service Perishability</b> - Unsold service time is "lost", that is, it cannot be regained. It is a lost economic opportunity. For example a doctor that is booked for only two hours a day cannot later work those hours— she has lost her economic opportunity. Other service examples are airplane seats (once the plane departs, those empty seats cannot be sold), and theatre seats (sales end at a certain point).				
<b>Labour intensity</b> - Services usually involve considerable human activity, rather than precisely determined process. Human resource management is important. The human factor is often the key success factor in service industries. It is difficult to achieve economies of scale or gain dominant market share .				
<b>Demand fluctuations</b> - It can be difficult to forecast demand (which is also true of many goods). Demand can vary by season, time of day, business cycle, etc.				

14. Please indicate which of the following *Customer components* are required to be considered in synthesising a business model for E-Commerce.

Customer Components	Highly Required	Required	Lowly Required	Not Required
<b>Target Customer</b> is a group of customers a company wants to offer value				
<b>Customer involvement</b> - Most service provision requires a high degree of interaction between client and service provider .				
<b>Distribution Channel</b> is a mean of getting in touch with the customer, either directly or indirectly.				
<b>Customer Buying Cycle</b> describes the process customer go through to make a purchase, from the aware of the product to advocating it after the purchase.				
<b>Customer Relationship</b> component describes the relationship a company establishes with a target customer segment.				
<b>Mechanism</b> describes the ways that company sell and customer buy				

15. Please indicate which of the following *Data components* are required to be considered in synthesising a business model for E-Commerce.

Data Components	Highly Required	Required	Lowly Required	Not Required
<b>Message</b> is piece of information that flows between the processes and its participants.				
<b>Purpose</b> is the description of functionality of a message.				
<b>Meaning</b> represents the informative value of a message.				
<b>Value</b> is the practical/functional value and the value of information or knowledge of a message				
<b>Attribute</b> is a data item that exist in and describe the content of a message				
<b>Class</b> is a collection of methods, operations and attributes that fully describe the structure and behaviour of a message				
<b>Package</b> is a group of organised messages				

16. Please indicate which of the following *Application components* are required to be considered in synthesising a business model for E-Commerce.

Application Components	Highly Required	Required	Lowly Required	Not Required
<b>Application Component</b> is part of an application that performs one or more applications functions				
<b>Application Collaboration</b> describes the interaction between the components				
<b>Application Interface</b> describes the functionality of a component				
<b>Application Data Object</b> is self-contained piece of information suitable for operation of the application component				
<b>Application Service</b> describes functionality that application components share with each other and the functionality that they make available to the environment.				
<b>Application Function</b> describes the internal behaviour of a component				

17. Please indicate which of the following *IT components* are required to be considered in synthesising a business model for E-Commerce.

IT Components	Highly Required	Required	Lowly Required	Not Required
<b>Artifact</b> is a physical piece of information that is used or produced by deployment and operation of a system. An instance (copy) of an artifact can be deployed on a node.				
<b>Node</b> are active processing components (e.g. servers, database servers, or client workstations) that execute and process artifacts				
<b>Communication Path</b> is a relation between two or more nodes, through which these nodes can exchange information.				
<b>Infrastructure Service</b> exposes the functionality of a node to its environment.				
<b>Infrastructure interface</b> specifies how the infrastructure services of a node can be accessed by other nodes (provided interface), or which functionality the node requires from its environment (required interface).				
<b>Network</b> represents the physical communication infrastructure. This may comprise one or more fixed or wireless network links. The most basic network is a single link between two devices. A network has properties such as bandwidth and latency. It embodies the physical realisation of the logical communication paths between nodes.				

## SECTION F: Comments / Questions

18. If you have any other comments, or questions, please share them below.

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*End of questionnaire*

### ***“Thanks” message***

**Thank you very much for helping us with this research project participation**

For questions about this project and/or to receive the findings of this survey, please contact the principal investigator Nickos Paltalidis at



## APPENDIX (D): QUALITATIVE RESEARCH QUESTIONNAIRE

### BUSINESS ARCHITECTURE

Organisation Concepts	Definition	Questions
<b>Business Vision</b>	<i>Business Vision describes a future identity and the Mission describes how it will be achieved</i>	1) Where do you want your business to be in the future?
<b>Business Strategy</b>	<i>Business Strategy is a long term plan of action designed to achieve a particular goal</i>	2) What are the main goals of the business? 3) What is your plan to achieve the above goals?
<b>Business Principles</b>	<i>Business Principles are the fundamental values and operation approach of a business</i>	4) What are the <i>Business Principles</i> namely the fundamental values and operation approach of a business?
<b>Business Actors and their Roles</b>	<i>Business Actors are the active entities that perform business behaviour. Business Role describes the work that an actor performs within an organisation</i>	5) Define any individual, group, organisation, company, or information system that interacts with your business. Please describe briefly the work each performs within your business.
<b>Business Collaboration</b>	<i>Business Collaboration the relationships of an organisation with its external business actors (business partners)</i>	6) Does your business have extended relations with other business partner(s) i.e. a type of collaboration? If YES, please provide details
<b>Business Transaction</b>	<i>Business Transaction is the atomic unit of work in a trading arrangement between two business actors. A Business Transaction is conducted between two parties playing opposite roles in the transaction. The roles are always a requesting role and a responding role.</i>	7) Does the company operate in the Business to Business, Business to Customer arena, or a combination, or something else? 8) Does the company's Business Transactions involve a) purchases made in long-term contracts or/and b) purchases of goods and services made as the need arises?
<b>Revenue Model</b>	<i>Revenue Model describes the way company makes money. It measures the ability of a firm to translate the value it offers its customers into money and incoming revenue streams. A firm's revenue model can be composed of different revenue streams that can all have different mechanisms.</i>	9) Which is the company's revenue model(s) that use to generate income streams? 10) Please briefly describe each revenue model. (For example, a) mention which is the most importance revenue, give a draft % figure for each; b) sales made in long-term contracts or/and made as the need arises?
<b>Revenue Sources</b>	<i>Revenue Sources describes other incoming money streams</i>	11) Does the company have other revenue sources of income? If YES, please provide details
<b>Value Proposition</b>	<i>Value Proposition is an overall view of a company's bundle of products and services that are of value to the customer</i>	12) Which is the company's value proposition, and which are its target customers?
<b>Product Concepts</b>	<b>Definition</b>	<b>Questions</b>

<b>Product Description</b>	<i>Product is anything that can be offered to a market that might satisfy a want or need. It is of two types: a) a tangible product is a physical object that can be perceived by touch such as a building, vehicle, gadget, or clothing; b) an intangible product is a product that can only be perceived indirectly such as an insurance policy.</i>	13) Does the business sale product(s)? What type of products? Please give a description of the product(s) that business sale; give examples
<b>Product Life Cycle</b>	<i>Product Life Cycle refers to the stages a product goes through.</i>	14) Describe briefly the stages of the life cycle of the company's product.
<b>Lead time required for made-to-order product</b>	<i>Lead time required from the placement of the order to the delivery of the product</i>	15) What is the lead time required from the placement of the order (made by 2S) to the delivery of the product to 2S? 16) What is the lead time required from the placement of the order to the delivery of the product clients?
<b>Offering (Reasoning, Value Level, Price Level)</b>	<i>Offering captures a) the reasoning on why/what makes the product to be valuable to the customer, b) the value level of the product-how the product differences itself from one of its competitors, c) the price level of the product.</i>	17) Why/What does make the product(s) to be valuable to the customer? 18) How the product(s) difference itself/ themselves from one of company's competitors? 19) What is the price level of the product(s)?
<b>Product Homogeneity</b>	<i>Product homogeneity Large amounts of standardised products are produced (mass production) or products are modified for each client or each new situation (customised).</i>	20) Are they standardised product(s) and/or are customised for each client or new situation? Give examples
<b>Type of Materials</b>	<i>Type of Materials used for the manufacturing of the product. It is of two types: Direct materials used in making products and Indirect used in maintenance, repairs, and operations activities, and are known collectively as MROs or non-production materials.</i>	21) Does the company manufacture the product(s)? If YES, What type of materials is required? Please specify for each product.
<b>Service Concepts</b>	<b>Definition</b>	<b>Questions</b>
<b>Service Description</b>	<i>Service is the non-material equivalent of a good. It is an intangible product involving a deed, a performance, or an effort which cannot be physically possessed. It should not be confused with the related topic of customer service, which involves any service activity that adds value to a core product.</i>	22) What type of service(s) does the company provide to its customers? a) core services(s) or b) customer service? 23) What specific service and/or customer service does the company provide? Please give a description. 24) How is it provided? 25) Who individual (employee) provide the service(s)?
<b>Customer Concepts</b>	<b>Definition</b>	<b>Questions</b>



<b>Target Customer</b>	<i>Target Customer is a group of customers a company wants to offer value.</i>	26) Which are the company's target customers? Please give a description of the profile of the customer.
<b>Customer Involvement</b>	<i>Customer involvement refers to degree of information processing or extent of importance that a customer attaches to a product. Each customer has an underlying motivation in the form of needs and values. While involvement will arise when the object (product, service or promotional messages) can help to meet the perceived needs, goals and values that were important. Meeting these needs is perceived to be varied or not the same from one situation to others</i>	27) Why customers are motivated to find/buy the business's product(s) and brand information?  28) What customer's needs, goals and values are perceived by the business's product(s)?
<b>Distribution Channel</b>	<i>A Distribution Channel is a mean of getting in touch with the customer, either directly or indirectly</i>	29) What type of distribution channel(s) does the company use to sell/buy product(s) or to provide service(s) to the target customer? Either directly or indirectly.
<b>Mechanism for Selling/Buying</b>	<i>Mechanism describes the ways that company selling/buying.</i>	30) What type of selling/buying mechanism does the company use to sell/buy product(s) or to provide service(s) to the target customers?
<b>Customer Relationship</b>	Customer Relationship component describes the relationship a company establishes with a target customer segment	31) How does the company communicate and deal with its customers after the selling/buying of product(s) or service(s) providing?  32) Does the company target to establish a strong relationship with its customers?  33) What is the company communication strategy with new and existing customers?  34) How company target to inform its customers about new products, new services, offers, discounts etc?  35) How the company get informed about customers satisfaction regarding the company's services (like sales, orders, delivery, technical support) and the regarding company's products' (quality, needs for design of new products) etc.
<b>Business Behaviour Concepts</b>	<b>Definition</b>	<b>Questions</b>

<b>Business Behaviour</b>	<i>Business Behaviour is an ordering of process or functions that accomplish business goals and satisfy business commitments.</i>	36) Present (in order that are performed) the Business Functions that helps the business to achieve both short- and long-term goals. Classify business functions into high (most severe), medium, and low (least severe).
<b>Business Functions</b>	<i>Business Functions are on-going activities that support the business including manufacturing and production, sales and marketing, finance, accounting and human resources. Functions can be decomposed into other functions and eventually into discrete processes.</i>	37) Define each Business Function, explain its target, and decompose into processes that describe how the work is accomplished.
<b>Business Processes</b>	<i>Business Processes are discrete activities that have inputs and outputs, as well as starting times and stopping times. Some business processes happen repetitively, while others happen occasionally or even rarely.</i>	38) Describe briefly each process, WHY it takes place, by WHO business actor will be performed, HOW many hours or days will be required (maximum and minimum time), WHAT will be each inputs or outputs.
<b>Business Rules</b>	<i>Business Rules define or constrain some aspect of the business. They can take the form of policy, procedures, standards, responsibility levels, authorisation and delegation mechanisms. They are intended to assert business structure or to control or influence the behaviour of the business. They usually expressed at the atomic level -- that is, they cannot be broken down any further</i>	39) What Business Rules control or influence the above business functions and/or business processes?
<b>Business Resources</b>	<i>Business Resources represents all those things that are required by a business to sustain its processes and create its outcomes. Resources break down into five general categories: physical things (tangible molecular things), energy, monetary value, information resources, and various kinds of capabilities (skills, knowledge, attitudes, and experiences of humans).</i>	40) Specify all those Business Resources that are required by to sustain the processes and create the outcomes.

## INFORMATION/DATA ARCHITECTURE

Application Concepts	Description	Questions
<b>Application Component</b>	<i>Application Component is part of an application that performs one or more applications functions</i>	41) Define any software applications, sub-applications, or information system that is used by your business, internally and externally.
<b>Application Interface</b>	<i>Application Interface describes the functionality of a component</i>	42) Describe the functions (work) that each software applications, sub-applications, information system performs.
<b>Application Data Object</b>	<i>Application Data Object is self-contained piece of information suitable for operation of the application component</i>	43) Describe the data that each software applications, sub-applications, information system stores/processes.
<b>Application Service</b>	<i>Application Service describes functionality that application components share with each other and the functionality that they make available to the environment</i>	44) Describe what business functions and processes are supported by each software applications, sub-applications, information system

## TECHNOLOGY ARCHITECTURE

IT Concepts	Description	Questions
<b>Network</b>	<i>Network represents the physical communication infrastructure. This may comprise one or more fixed or wireless network links. The most basic network is a single link between two devices. A network has properties such as bandwidth and latency. It embodies the physical realisation of the logical communication paths between nodes.</i>	45) How does the business connect to the Internet? Does the <u>ISP</u> or the company own the equipment?  46) Does the company use a network? If YES, please answer the following questions:
<b>Node</b>	<i>Node are active processing elements (e.g. servers, database servers, or client workstations) that execute and process artifacts</i>	47) How many devices are currently on the network? Please list all the devices that support the operation of the network; briefly describe the functionality of each to its environment
<b>Communication Path</b>	<i>Communication Path is a relation between two or more nodes, through which these nodes can exchange information</i>	48) Describe the topological structure of the company's network