



A research framework for analysing eBusiness models

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Abstract

As eBusiness is moving towards maturity, research interests shift to the investigation of opportunities for market exploitation of eBusiness technologies. As a result, the debate around business models naturally becomes more topical. However, while many researchers and practitioners are contemplating business models, there is an alarming lack of theoretical tools in the literature to structure and codify knowledge in the area. This paper draws on an extensive review of the literature to propose an analytic framework that decomposes the area of business models into eight research sub-domains. The proposed framework is then applied to organize and critically review existing research under each sub-domain as well as to define an agenda of future challenges on business model research. The framework can benefit future research by allowing researchers to better concentrate their efforts and place their contributions in an overall context, thus assisting in building a coherent body of knowledge in the challenging research domain of business models.

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Introduction

The literature on business models is ever growing. While business model research has traditionally belonged to the agenda of organizational management, the challenges posed by eBusiness technologies and their applications 'force' researchers to focus their attention more specifically to eBusiness models (Gordijn & Akkermans, 2001b; Papakiriakopoulos *et al.*, 2001; Weill & Vitale, 2001; McGann & Lyytinen, 2002; Osterwalder & Pigneur, 2002; Vassilopoulou *et al.*, 2003), also referred to as Internet business models (Afuah & Tucci, 2001), business models on the Web (Rappa, 2003), B2B and B2C business models (Alt & Zimmermann, 2001; Elliot, 2002), business models for eBusiness (Petrovic *et al.*, 2001), business models in electronic commerce (Mahadevan, 2000; Bartelt & Lamersdorf, 2001), or more generally business models for electronic markets (Timmers, 1998).

Regardless of the term used, most agree that the accelerating growth of eBusiness has raised the interest for transforming traditional business models or developing new ones that better exploit the opportunities enabled by technological innovations. One of the major impacts of eBusiness on traditional business practices has been the multiplication of possible business configurations, which increases the complexity and difficulty of decisions to be made by managers. The increase of choices has rendered the design and implementation of business models a rather complex and difficult task.

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The motivation for studying business models naturally varies depending on the research background of the investigators, their chosen methods of analysis, and the study objectives. Some of the most prominent and often cited objectives for investigation on business models include the following:

1. to understand the key elements and mechanisms in a specific business domain, as well as their relationships (Osterwalder & Pigneur, 2002),
2. to communicate and share the understanding of a business model among business or technology stakeholders (Gordijn & Akkermans, 2001b),
3. to design the information and communication systems supporting the business model (Eriksson & Penker, 2000),
4. to experiment with innovative business concepts in order to determine if current business models can easily adapt to them (Eriksson & Penker, 2000) and assess the viability of new business initiatives (Weill & Vitale, 2001),
5. to change and improve the current business model (Eriksson & Penker, 2000; Osterwalder & Pigneur, 2002).

In order to comprehend the contribution and propositions of each study on business models, the reader has to be aware of the researchers' perspective, which is partly determined by the context and the objectives of their investigations. The implicit lack of an underlying common framework of discussion and interpretation of

research on business models has motivated the literature review of this paper.

Drawing on the lack of a unified way of organizing research in the area of business models, this paper presents the results of a comprehensive literature review having a two-fold purpose: (a) to examine extant research and classify it under an analytic framework and (b) to use the resulting framework as a vehicle for identifying knowledge gaps and proposing future research directions. The main contribution of this paper includes a new theoretical construct, in the form of an analytic framework, which provides cognitive organization of business model concepts. While quite a few academics have realized the increasing complexity in the area, and have thus raised the need for putting an order in the growing bulk of business model studies and concepts, no explicit research has been devoted towards this goal to date. The construction of the analytic framework has resulted from collecting, reviewing, and integrating previously disparate streams of research on business models, such as research from the field of IS, strategy, and business management (Table 1). By bringing together research from a variety of scientific disciplines examining business models, we aim at indicating the theoretical foundations of the business model concept, and thus setting the groundwork for the definition of sound theoretical propositions for future research.

The following section outlines the methodology followed for the literature review. The next section proposes a novel analytic framework categorizing current research

Table 1 Reference subject areas of business model research

<i>Subject areas</i>	<i>No. of studies</i>	<i>Primary sources</i>	<i>References</i>
eBusiness	14	Academic Books Conferences (e.g. Bled Conference, International Conference on Electronic Commerce) Journals (e.g. <i>Electronic Markets</i>) Internet	Timmers (1998); Afuah & Tucci (2001); Alt & Zimmermann (2001); Gordijn & Akkermans (2001); Weill & Vitale, (2001); Rappa (2001); Bartelt & Lamersdorf (2001); Papanikolaopoulos <i>et al.</i> (2001), Petrovic <i>et al.</i> (2001); Auer & Follack (2002); Osterwalder & Pigneur (2002); Elliot (2002); Krüger <i>et al.</i> (2003); Winter (2003); McGann & Lyytinen (2002)
Strategy	8	Journals (e.g. Harvard Business Review, Strategic Management Journal, California Management Review) Academic Books	Mahadevan (2000); Tapscott <i>et al.</i> (1998; 2000); Hamel (2000); Linder & Cantrell (2000); Kaplan & Sawhney, (2000); Amit & Zott (2001); Applegate & Collura (2001); Magretta (2002);
Information systems	5	Academic Books Journals (e.g., European Journal of Information Systems, Information Society)	Chen-Berger (1994); Eriksson & Penker (2000); Pouloudi <i>et al.</i> (2003); Vassilopoulou <i>et al.</i> (2003); Hedman & Kalling (2003); Klueber (2000)
Other (e.g. management, economics)	2	Conference (e.g., International Conference on Management of Networked Enterprises) Journals (e.g. Industrial and Corporate Change)	Ben-Lagha <i>et al.</i> (2001); Chesbrough & Rosebloom (2001)

and knowledge on business models into eight sub-domains. In the next section on A systematic review of business models research these sub-domains are used to structure a concise review of the major studies on business models to date and in the subsequent section to identifies gaps in the literature and provide directions for further research.

Literature review methodology

The methodology followed for the review included two primary phases: *selection* and *analysis*. The selection phase aimed at identifying and selecting research studies on business models, so as to assembly a comprehensive collection of publications representing the main current body of knowledge in the area. The analysis phase then involved a careful scrutiny of publications to recognize patterns of commonly addressed research themes. Figure 1 illustrates the main phases and activities of the research method.

Selection phase

The selection phase is critical, since decisions made at this stage undoubtedly have a considerable impact on the validity of the literature review results. The phase started with an initial exploration for publications relevant to business models. The search process was implemented on several sources, the most important of which have been academic books, digital research libraries (such as ScienceDirect, JSTOR, and InterScience), and the Internet. The search mechanism included identification of keywords, such as eBusiness models, process models, revenue models, and modelling. As result, an initial set of 40

research studies deriving from multiple resources and relating to a variety of reference disciplines, such as strategy, information systems and management, was collected. This set was then screened to select the most significant research studies, based on the *quality of the publication source*, its *relevance to business model research*, and its *citation frequency*. The *quality of the publication source* has been assessed based on several journal-ranking lists (Mylonopoulos & Theoharakis, 2001; Bharati & Tarasewich, 2002; Harzing, 2003). The selected papers/articles' *relevance to business model research* has been determined by the context of reference to business models. Most of the selected papers had the 'business model' term as part of their title or included in the keywords area or even discussed thoroughly from a theoretical perspective in at least one section of the paper. The final screening criterion included the *citation frequency*. This was roughly assessed for each research study based on the approximate percentage of the initial set of 40 papers and articles providing a reference to it. This last criterion has been mainly used as a secondary criterion affecting rather than guiding the decisions made in the screening phase (since it obviously refers only to older papers that had a chance to be referenced in newer works; for more recent articles, citation frequency has not been used as a screening criterion).

Part of the review process was to identify the reference disciplines of business model research, that is, the research perspectives under which researchers discuss business models. The most important reference disciplines have been found to be *eBusiness*, *Strategy*, and *Information Systems*. This activity fired a new iteration of

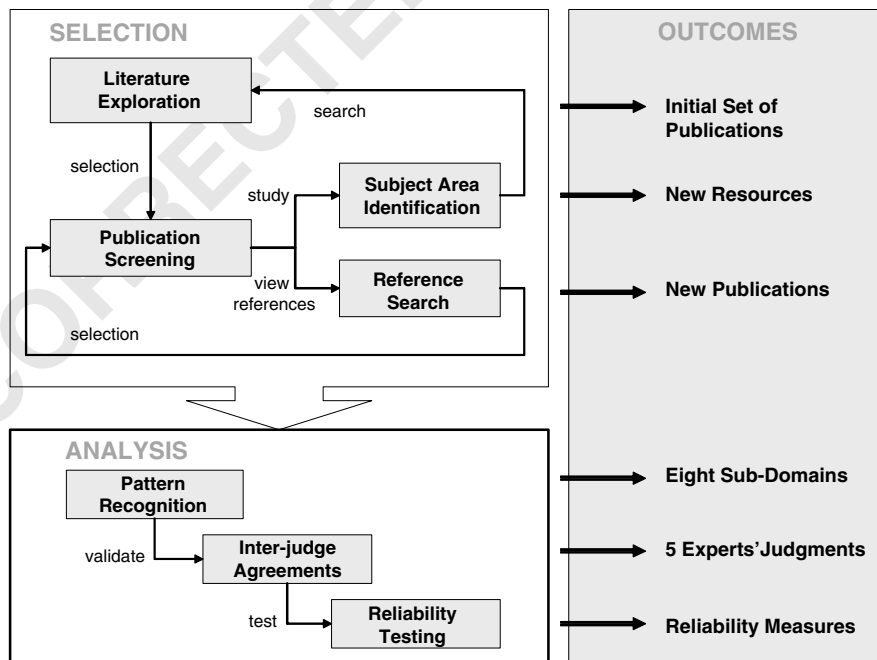


Figure 1 Literature review methodology.

Table 2 Organizing research in business models

No.	Contributions	Definitions	Components	Conceptual models	Design methods & tools	Taxonomies	Change methodologies	Evaluation models	Adoption factors
1.	Chen-Berger (1994)				✓				
2.	Timmers (1998)	✓				✓			
3.	Mahadevan (2000)		✓			✓			
4.	Tapscott <i>et al.</i> (1998) Tapscott <i>et al.</i> (2000)	✓				✓	✓		
5.	Hamel (2000)		✓					✓	
6.	Linder & Cantrell (2000)	✓	✓			✓	✓		
7.	Kaplan & Sawhney (2000)		✓			✓			
8.	Eriksson & Penker (2000)	✓			✓				
9.	Chesbrough & Rosembloom (2002)		✓						
10.	Clueber (2000)	✓	✓						
11.	Afuah & Tucci (2001)		✓				✓	✓	
12.	Alt & Zimmermann (2001)		✓			✓			
13.	Gordijn & Akkermans (2001a, b)	✓		✓				✓	
14.	Weill & Vitale (2001)	✓	✓			✓		✓	
15.	Rappa (2001)	✓				✓			
16.	Amit & Zott (2001)	✓							
17.	Applegate & Collura (2001)		✓			✓			
18.	Ben-Lagha <i>et al.</i> (2001)				✓				
19.	Bartelt & Lamersdorf (2001)					✓			
20.	Papakiriakopoulos <i>et al.</i> (2001)						✓		
21.	Petrovic <i>et al.</i> (2001) Auer & Follack (2002)	✓	✓				✓		
22.	Osterwalder & Pigneur (2002)	✓	✓	✓					
23.	Magretta (2002)	✓	✓						
24.	Elliot (2002)	✓							✓
25.	McGann & Lyytinen (2002)	✓							✓
26.	Pouloudi <i>et al.</i> (2003) Vassilopoulou <i>et al.</i> (2003)								✓
27.	Krüger <i>et al.</i> (2003)		✓						
28.	Winter (2003)			✓					
29.	Hedman & Kalling (2003)		✓	✓					

publications exploration focused on well-known publication outlets of the above disciplines. In total, the exploration of publications in the above reference disciplines has yielded 12 additional publications.

In parallel, selected papers were reviewed in terms of included references to other research studies. As a result, a significant number of new publications were identified and provided input for a new iteration of the screening activity.

This iterative cycle of exploration and screening has produced a final set of 29 key research studies, which constitute the basis for the literature review and critique in this paper. Table 1 summarizes these studies and identifies their sources and reference disciplines.

Analysis phase

The analysis phase has been important for deducing useful conclusions regarding the history, current status, as well as future trends of business model research. A careful review of the items resulting from the selection phase resulted in identifying eight sub-domains of

research in the area of business models: (1) *Definitions*, (2) *Components*, (3) *Taxonomies*, (4) *Conceptual Models*, (5) *Design methods and tools*, (6) *Adoption factors*, (7) *Evaluation models*, and (8) *Change methodologies*. The next section specifies the nature and purpose of research in each sub-domain, while the forthcoming section provides a review for each sub-domain's research studies.

The specification of the above eight sub-domains is neither intuitive nor exhaustive. Instead, they have been specified based on an inductive approach of pattern identification against the multiple research approaches and views included in the set of 29 key publications. To validate the pattern identification process, the initial mapping of studies to the eight sub-domains was followed by a validation test that took place in a laboratory environment. More specifically, the test aimed at indicating the reliability of the authors' mapping of the selected research studies to the eight sub-domains (Table 2). Thus, it did not provide any proof for the exclusiveness and adequacy of the initially specified business model categories. However, it does prove that

the proposed classification framework, which constitutes the main theoretical proposition of this paper, has been derived in a theoretical reasonable way, and thus can be considered as valid and reliable.

The validation test was based on the Proportional Reduction in Loss (PRL) reliability measure proposed by Rust & Cooil (1994). The method is applicable when a researcher wants to assess the consensus between judges who are asked to code a number of items into mutually exclusive qualitative categories. The test was conducted by five judges ($N=5$), all of them being academics knowledgeable in the area of business models. Each judge was given an instruction sheet, which included a description of the eight domains, and an answer sheet in which judges were asked to map the views expressed in the 29 reviewed studies against the eight sub-domains identified by the researchers. Judges were asked to perform the same mapping independently of each other and of the researcher (Rust & Cooil, 1994).

The PRL measure assumes values between zero and one, with higher values indicating higher data reliability. A minimum of value 0.7 (70%) is required to indicate acceptable reliability for exploratory work, which describes most of the work published in academic journals, while a more stringent threshold of 0.9 (90%) can be considered as the minimum acceptable PRL value for advanced practice (Rust & Cooil, 1994). In this research's test, the inter-judge agreement, calculated as the proportion of the total pair-wise agreements to the total pair-wise decisions for classifying the research views to one of the eight proposed categories, reached 0.53. This means that the five judges have made over half identical assignments of the provided research views across the eight possible categories. This value of inter-judge agreement is associated with a PRL value of 0.95 (i.e. reliability level of 95%), which is quite satisfactory for the purposes of the current literature review (Cooil & Rust, 1995).

An analytic research framework for business models

The primary outcome of the literature review is a validated instrument that classifies business model research into eight sub-domains. Next the scope of research in each sub-domain is briefly discussed. Table 2 illustrates the extent to which the 29 research studies, finally included in this literature review, have pursued research on each of the eight sub-domains.

- (a) *Definitions* Research in this domain concerns defining the purpose, scope, and primary elements of a business model, as well as exploring its relationships with other business concepts, such as strategy and business processes. As illustrated in Table 2, definitions constitute a strong focus of business model research.
- (b) *Components* Research in this domain is concerned with analyzing the business model concept to further

decompose it into its fundamental constructs. The specification of business model components ranks second in research popularity, as shown in Table 2. However, business model components assume the leading position when only recent studies are considered. This is somewhat expected and indicates a maturation of research in the field that naturally shifts from earlier definitional research to more detailed ontological analyses.

- (c) *Taxonomies* Research in this domain relates to possible categorizations of business models into a number of typologies based on various criteria. The primary purpose is to produce a list of generic business model types that can then be analysed based on their unique features. A relatively significant portion of work, deriving mainly from early authors, has been performed in this field.
- (d) *Conceptual models* Research in this domain aims at organizing information about a business model around a number of different perspectives. While research on components focuses on identifying the constituent elements of a business model, research in this sub-domain focuses on identifying and describing the relationship between these elements in an abstract but rational way. As part of research in this field, a number of possible representational formalisms (usually graphical) for visualizing the main elements of a business model, as well as their inter-relationships, under a specific aspect, have been produced. This is a domain of growing research interest, as demonstrated by the increasing number of publications in the field.
- (e) *Design methods and tools* Research in this field concerns the development and use of methods, languages, standards, and software (e.g., simulation tools), typically referred to as *business modeling tools*, to automate and leverage the process of designing a business model. Although research interest in this sub-domain has been identified relatively early, it still remains as a timely research challenge, possibly due to the clear need of organizations to design, experiment, and change business models in an easy and cost-effective fashion.
- (f) *Adoption factors* It involves research on factors that affect the organizational adoption of business models, as well as research on socio-economic implications of business model innovation. Compared to other sub-domains, a relatively smaller segment of the research community is pursuing this type of research.
- (g) *Evaluation models* This domain is concerned with identifying criteria for either assessing the feasibility, viability, and profitability of new business models or evaluating them against alternative or best practice cases. This is also a relatively recent research domain with few researchers having pursued focused work on it.

(h) *Change methodologies* This domain includes research efforts that focus on formulating guidelines, describing steps, and specifying actions to be taken for either changing existing business models or choosing new ones to adapt to a business or technology innovation. This is also a relatively new area with intense interest for further investigation but only a few studies currently addressing it.

Although most authors investigate upon more than one sub-domain, most studies remain rather isolated and self-contained. Researchers and practitioners from the business field usually take their own perspective on investigating and contributing to a specific sub-domain (components, conceptual models or others), often without taking into consideration existing research in other related areas. For instance, in recent years, there has been an intense research stream towards building conceptual models. However, when illustrating business models, only parts of the conceptual model, mainly the value flows and the business players, are usually depicted. The remaining information is usually implied or even totally ignored. However, this information is also important for communicating the right business model to the right people.

A systematic review of business model research

This section presents a comprehensive review of existing research on business models, structured around the eight sub-domains of the research framework. This discussion intends to meet an explicit need in the area for codifying existing knowledge and identifying challenges for future research. The potential benefits of doing so, through the development of a research analytic framework, are better illustrated in the final section of this literature review, where the future implications for researchers and managers are discussed.

Definitions

Although defining a business model has naturally been among the first tasks of early researchers in the area, the concepts surrounding the definition of a business model have been subject to debate lately. For example, Porter argues that the definition of a business model *'is murky at best. The business model approach to management becomes an invitation for faulty thinking and self-delusion'* (Porter, 2001). Magretta adopts a more mediocre stance towards business models, albeit remaining critical towards their applications and use, by stating that *'the fault lies not with the concept of the business model but with its distortion and misuse'* (Magretta, 2002).

Researchers have historically come up with several definitions that attempt to explain what the essence and purpose of a business model is. The initial and perhaps most often cited definition of this category is provided by Timmers (1998), also followed by Weill & Vitale (2001), who conceive a business model as the description of key components defining a business idea, including *products*

and services, actors, roles, information, revenues, and benefits. In more abstract terms, Linder & Cantrell (2000) define a business model as *'the organization's core logic for creating value'*, while Magretta (2002) simply views it as a *'story that explains how an enterprise works'*. Nevertheless, she also proceeds to distinguish business models from the concept of strategy by arguing that, while business models describe how the pieces of a business fit together, they do not factor in one critical dimension of performance (namely competition) as strategy does.

In the same vein, Osterwalder & Pigneur (2002) conceive the business model as the missing link between strategy and business processes. More specifically, they consider a business model as the *'conceptual and architectural implementation (blueprint) of a business strategy (that) represents the foundation for the implementation of business processes and information systems'*. Compared to Timmers (1998) and Weill & Vitale (2001), they introduce new elements, such as the *network of partners* and the *relationship capital*. These are even more emphasized by Tapscott *et al.* (1998) who encompass into their definition not only the organization itself but also its *'fellow travelers'*. These are also referred to as *'business webs (b-webs)'* to denote *'distinct systems of suppliers, distributors, commerce service providers, and customers that use the Internet for their primary business communications and transactions'* (Tapscott *et al.*, 2000).

The review in the area has indicated that, while some researchers perceive the business model as a purely business concept that explains the logic of doing business for a firm (Timmers, 1998; Linder & Cantrell, 2000; Petrovic *et al.*, 2001; Rappa, 2003), others consider it as a link between strategy, business processes, and information systems (Nilsson *et al.*, 1999; Osterwalder & Pigneur, 2002). In other words, business models are not conceived as a purely management-related concept, but embrace a broad spectrum of organizational activities, from the operational (processes) to the strategic level. Moreover, given the evolution of networked organizations and the growing adoption of eBusiness, the definition of business models has been extended to include inter-organizational activities, roles, and elements as well.

Components

Research here focuses on decomposing business models into their atomic elements, typically referred to as *components, functions, attributes, or pillars* (Afuah & Tucci, 2001; Petrovic *et al.*, 2001; Rayport & Jaworski, 2001; Weill & Vitale, 2001; Auer & Follack, 2002). The prevalent approaches followed for defining business model components are:

- *Top-down analysis and hierarchical decomposition* Decomposing a business initiative from the more general to the more concrete levels of analysis and identifying primary components for each analysis level (Weill & Vitale, 2001). Also, decomposing a business model into

sub-models that link together in a hierarchy (Linder & Cantrell, 2000; Petrovic *et al.*, 2001) or identifying major components of a business model and decomposing them to sub-components (Hamel, 2000; Osterwalder & Pigneur, 2002).

- *Matrix analysis* Defining vertical and horizontal dimensions of business model analysis (Alt & Zimmermann, 2001). The vertical dimensions concern core components, which communicate key information about the business models, while the horizontal dimensions are used to set the contextual framework in which the business model is implemented (for example, market structure, technology maturity, regulation regime, and so on).
- *Value analysis* Categorizing components based on their degree of importance (or value addition) (Kruger *et al.*, 2003). Following this approach, some components are considered as core, found in every business model, while others are considered to be complementary, and are thus defined only when applicable.

Regardless of the approach followed, the review has indicated that there seems to be a relative consensus between researchers when it comes to identifying the constituent elements of a business model. The following components are apparent in almost any research study in this sub-domain: mission (strategic objectives), target market (scope and market segment), value proposition (product/service offering), resources (capabilities and assets), key activities (intra- and inter-organizational processes), cost and revenue model (cost and revenue streams, pricing policy), value chain/net (alliances and partnerships). While there is extensive research conducted towards identifying and analysing the key components of business models, limited research has to date been conducted towards identifying the logical flow of value between components, that is, the order in which each component is defined and how it affects the values of other components. For instance, the first step in discussing a business model concerns stating its 'mission'. The description of target market and value chain/net configuration within this component is naturally expected to align with the values assigned to 'target market' and 'value chain/ net configuration' components. In a similar vein, the definition of value proposition affects the specification of 'resources' offered and 'activities' undertaken by each partner in the business model configuration. Further research towards identifying this logical interconnection of components would lead to defining guidelines, or even structured methodologies, for successful definition of business models.

Taxonomies

A great deal of research has been devoted towards developing typologies of business models by classifying them under a set of criteria, such as pricing policy or customer relationship model. Taxonomy frameworks

differentiate on two factors: *Classification Criteria* and *Objects Classified*.

As far as the classification criteria are concerned, there are various approaches in the literature. For example, business models are classified based on revenue and position in value chain (Rappa, 2003), functional integration and degree of innovation (Timmers, 1998), core activities and price-value balance (Linder & Cantrell, 2000), economic control and value integration (Tapscott *et al.*, 2000), sourcing parameters (Kaplan & Sawhney, 2000), and business subject and behaviour (Bartell & Lamerdoff, 2001).

As far as the objects classified are concerned, the literature is also characterized by a rather confusing diversity. Sometimes real-life business initiatives (such as Amazon or eBay) are classified (Rappa, 2003; Timmers, 1998), despite the fact that they typically combine multiple atomic business models. Other authors prefer to present taxonomies of atomic business models that can then be incorporated into a real-life business initiative (Weill & Vitale, 2001).

The growth and diversity of eBusiness have increased business model choices. The large number of taxonomies has resulted from the need of researchers to classify business models, so that their study and analysis are made easier. However, the underlying need for a holistic and exhaustive taxonomy of the various types of business models is yet to be satisfied.

Conceptual models

The fragmentation of research that was observed in the previous sub-domains is also evident when reviewing research on conceptual models. The primary purpose of a conceptual model is to specify dimensions of business model analysis, identify the main components that are relevant to each dimension, and provide an illustration for each level. Two alternative directions of research can be noticed:

- In the first approach, researchers choose to focus on a specific level of analysis, which is discussed in depth, usually complemented by the proposition of appropriate textual or graphical representation formalisms. Conceptual models, in this case, take the form of a business model *ontology*, which encompasses the concepts, relationships, and terms used when describing a business model (Jasper & Uschold, 1999).
- Conversely, in the second stream of research, all levels of business model analysis are identified and the conceptual models aim at providing an integration mechanism between these levels. Each level is typically discussed in terms of the components that it includes. Integration is achieved through the specification of relationships and interfaces between levels and their components.

Following the first approach, Gordijn & Akkermans (2001a, b) identify three levels of analysis: the *strategic* level, which targets board-level management, the *value*

exchange level, which is primarily addresses the needs of business analysts, and the *operational* level, which is more related to the needs of system developers. Their research focuses on the value exchange level to build an eBusiness ontology called *e³-value ontology* (Gordijn & Akkermans, 2001b). Following a similar approach, Osterwalder & Pigneur (2002) propose the *eBusiness model ontology* (e-BMO) that formalizes the elements, relationships, vocabulary, and semantics of a business model. Their e-BMO is structured into several decomposition layers with increasing depth and complexity. The first level of decomposition concerns the four main pillars of a business model, which are thought to be 'product innovation', 'customer relationship', 'infrastructure management', and 'financials'. These concepts are then further decomposed and associated to each other through bilateral relationships. Moreover, the analysis of each component should draw on theories from diverse scientific disciplines, such as relationship marketing (for the 'customer relationship' pillar), economics (for the 'financials' pillars), strategic management (for the 'infrastructure management' pillar), and innovation management (for the 'product innovation' pillar).

Hedman & Kalling (2003) follow the second approach and propose a conceptual business model that integrates perspectives from strategy, IT management, and industrial organization. The inter-relationships between business models and strategy are also conceptualized and discussed by Winter (2003), who distinguishes two types of models (the *business network model* and the *business strategy model*), each of which employs a different modelling technique for its illustration.

The review has highlighted the need to pursue interdisciplinary research towards building a scientifically rigorous conceptual model able to communicate codified but complete information about its underlying business model, and also leaving space for more focused analysis on specific parts of it. Although initial works have attempted to codify business models through ontological analysis (Osterwalder, 2004), there is still a long way to go towards finalizing this work and systematizing our knowledge into business model semantics.

Design methods and tools

Building methods and developing tools for designing business models have been of intense interest since the embryonic stages of business model research. The reason is that a pictorial design is arguably the best means to communicate information and achieve in-depth insight. The major stream of research in this sub-domain has historically addressed the development of process modelling and simulation tools (Malone *et al.*, 1999). However, the focus of attention has started to shift lately. In conjunction with parallel work on conceptual models, as well as in the standardization of modelling methods and tools (e.g., the Unified Modeling Language (UML), and eXtensible Markup Language (XML)), a great deal of business model research has focused on designing

methods and tools for formulating conceptual models and automating the design task (Osterwalder, 2004).

In one of the earlier studies, Chen-Berger (2003) has developed a knowledge-based support tool for business modelling with IBM's Business System Development Method (BSDM). Later, Eriksson & Penker (2000) have explained how UML diagrams can be used to build business models in an effort to bridge the communication gap between managers and system analysts. Their contribution includes both a design method, including specific phases and steps, and a toolkit, containing a different set of UML diagrams for each phase.

Similarly, a research team from the Ecole des HEC (Université de Lausanne) (Ben-Lagha *et al.*, 2001) has constructed an XML schema, called eBML, consisting of elements that represent the vocabulary of a model and the relationships between the elements. eBML can be used to encode business models in order to assess, share, compare, and explore them. This XML schema is later transformed to an improved version, referred to as Business Model Modelling Language (BM²L), and is used to transfer the Osterwalder's Business Model Ontology from the conceptual to the implementation level (Cooil & Rust, 1995).

The observed shift from simple design tools representing the primary elements of a business model to more sophisticated design methods aligns with the shift of research from analysis of business model components to conceptual models. While research in this field is still rather immature, it presents significant prospects for further work. There is spacious window of research, mainly from scholars and practitioners in the Information Systems field, towards formalizing, with the aim of illustrating, the components of a business model, such as the mission statement, the target market, and the key activities – which to date remain at the level of verbal descriptions only.

Adoption factors

The motivation behind research on key factors that can impact, positively or negatively, business model adoption has been to contribute, to identify, and to assess promising business models under different organizational contexts. This motivation is similar to the one driving research on evaluation models. However, while research on evaluation models focuses on *ex post* analyses, research on adoption factors aims at providing criteria for *ex ante* analysis of business models and thus can guide, rather than assess, business model success.

In 1999, Elliot initiated an international study on success factors for Internet retailing based on a research model that he developed in 1997 (Elliot, 2002). The primary objective of the study was to build a generic theoretical framework that could be applied towards investigating the customer and organizational adoption of technological innovations. The study was built upon the development and use of a research model identifying four primary categories of factors that affect the adoption

of B2C e-Commerce (Elliot, 2002): *Environmental, Organizational, Innovation, and Consumer*. Subsequent to the study, the above model was revised and extended to incorporate new factors under each category. The research validated not only the factors from all categories, but also their integration ability, since some factors seemed to be applicable across categories.

Pouloudi *et al.* (2003) propose a framework consisting of key factors that promote or inhibit eBusiness model adoption. Factors are grouped into five thematic areas: *technology, organizational, industry, individual, and societal*. Their framework considers the above factors as complementary perspectives that jointly affect eBusiness model adoption. Current research work is focused on identifying, testing, and validating the list of factors (Vassilopoulou *et al.*, 2003). While discussing the dynamics of eBusiness models, McGann & Lyytinen (2002) refer to a number of environmental factors that influence the evolution of eBusiness models. These factors are split into *institutional* and *diffusion* ones.

The study of current research in this sub-domain can inform critical decisions to be made during the design of a business model and can provide input for the definition of an evaluation framework. Moreover, several categories of factors can be transformed into business model elements, while some others can be used to provide successful implementation conditions. Defining a structured approach for achieving such a transformation from adoption factors to business model elements and successful implementation conditions can motivate further research in the field.

Evaluation models

The motivation here is similar to the one driving research on adoption factors. However, while research on adoption factors aims at providing criteria for *ex ante* analysis of business models, research on evaluation models focuses on *ex post* analyses and thus aims to assess, rather than guide, business model implementation. The definition of assessment criteria is naturally dependent on the purpose of evaluation. Four primary evaluation purposes have been identified: *benchmarking* with competitors in business model terms; *assessment* of alternative business models for possible implementation; *risk identification* for a firm pursuing business model innovation; and *evaluation* of an innovative business model in terms of feasibility and profitability.

To measure the potential of a business model, Hamel (2000) has identified four factors that determine a business model's wealth potential: *efficiency, uniqueness, fit, and profit boosters*. In a narrower evaluation sense, Gordijn & Akkermans (2001b) assess the economic feasibility of a business model, based on assessment of the incoming and outgoing values (benefits vs costs and risks) for each actor involved. The use of what-if scenarios can then enable companies to carry out sensitivity analyses for the business model with respect to various financial parameters. The major deficit of this approach

lies on the difficulty to express value flows in monetary terms in most cases.

Other researchers have followed similar approaches in developing evaluation models. For example, Afuah & Tucci (2001) define three levels for measuring the performance of a business model: *measures of profitability, profitability prediction, and business model component attributes*. Similarly, Weill & Vitale (2001) refer to key factors that have an influence on the profitability and viability of eBusiness models: *level of ownership, firm's access to key information, and conflicts*.

Summarizing, the review has revealed that the evaluation model sub-domain is among the less mature areas of business model research. The majority of the criteria proposed draws from general theory and is mostly driven by financial indicators that are very difficult, if possible at all, to measure in all cases.

Change methodologies

The necessity of changing the way of doing business in order to exploit technological and innovation enablers in turbulent business environments is well established both in the literature and in practice. Nevertheless, when innovative business models are considered, research to date is yet to satisfy the need for methods that can structure a firm's change endeavour either towards adopting a new business model or extending a current one to include new dimensions.

Among the few authors researching the area, Tapscott *et al.* (2000) have identified six steps for changing a current business model to a b-web model. Naturally, the method proposed is customized to the b-web concept and thus can hardly be thought of as a generally applicable change methodology.

Following a different approach, Linder & Cantrell (2000) provide a general framework that defines a set of change models, classified based on the level of change introduced by the new business model: *realization, renewal, extension, and journey* models. The identification of four types of change models serves the organizations' need for first identifying the level of change, and thus the change model, they want to introduce and then building the organizational machinery required for executing their change model.

Petrovic *et al.* (2001) has made one of the first attempts to introduce a generic business model change methodology grounded on a well-established theoretical framework. However, the steps of their methodology are described in quite general terms, and no guidelines or advice is provided for the core part of the methodology, which is the actual implementation of change. Finally, Papakiriakopoulos *et al.* (2001) propose a step-by-step methodology for transforming a business model, responding to the need for changing the firm's technology infrastructure. Again, the utility is restricted in the sense that it applies only to technology-driven business model change, as opposed to change driven by a new market or

business opportunity. The analysis is also focused on industry level (as opposed to firm level) change.

The review has indicated that the domain of change methodologies is one of the most challenging areas for business model research in the future. This is hardly surprising as the domain is highly dependent on knowledge derived from other sub-domains and hence it cannot advance significantly unless its foundational sub-domains have produced concrete research results.

Framing a research agenda for business models

Analysis of existing research on business models has enabled identification of gaps in current knowledge and has indicated avenues worthy of further investigation. These gaps can be used to draw an agenda for future research on business models as they refer both to the individual sub-domains and, perhaps more importantly, to the intersections between them. While those observations that relate to individual sub-domains have been documented in the previous section, some more integrative aspects are synthesized in this section.

While quite a few researchers have worked towards constructing a conceptual framework for business model analysis from different viewpoints (including for example organizational, technological, strategic, and economic dimensions), a smaller amount of research has been devoted to synthesizing and specifying the interfaces between these largely diverse conceptual aspects. Nevertheless, such a synthesis could contribute towards specifying the boundaries and identity of each conceptual level, and outlining its weight of contribution to a holistic understanding of business models. Above all, bridging the gaps between conceptual dimensions would undoubtedly contribute to the development of an integrated concept of a business model. In parallel, future research could also be directed towards visualizing the conceptual layers, the components, and the interfaces between them with the aid of computer-aided methods and tools. In this case, the area of design methods and tools would also benefit.

The review has demonstrated the need for further research towards assessing business models from different perspectives. This can be achieved, for example, by using the Balanced Scorecard (BSC) approach introduced by Kaplan & Norton (1992). Thus, the evaluation of a business model can be made against financial measures (e.g. revenue growth, Return on Investment), customer measures (e.g. market share, customer satisfaction), process measures (e.g. employee productivity, service delivery), and growth measures (e.g. employee capabilities, innovation potential). This research stream requires further elaboration on the applicability of BSC for evaluating business models through empirical investigations.

Based on the literature review, the feasibility of a business model means that all actors involved in a business model can capture value from it (Gordijn & Akkermans, 2001b). Taking into consideration the nat-

ural differences in business actors' motivation and interests in a business model, future research should specify the stakeholders involved in each conceptual layer, identify their needs, wants, and objectives, and define assessment criteria accordingly. The final outcome could resemble a multidimensional construct that relates conceptual levels (e.g., organizational, financial, and technical), target groups (e.g., managers, financial analysts, and system developers), evaluation objectives (e.g., market performance, profitability, and innovation) and criteria (e.g., number of customers, return on investment, and competitive differentiation).

The need for designing viable business models and assessing the likelihood of their real-life market success under different industry and firm-specific circumstances can be greatly assisted by integrating existing disparate research efforts in the highly interdependent sub-domains of evaluation models and adoption factors. The success of a business model is naturally dependent on numerous factors such as market conditions, strategic synergies (or conflicts), competencies and assets, financial arrangements (pricing policy, revenue sharing schemes), robust technological infrastructure, effective governance schemes, and so on. Research is needed to address the interdependencies of these factors in a holistic and integrative evaluation framework.

Finally, an important stream of research concerns the development of methodological approaches towards business model evolution or transition. Taking into account the dynamic nature of business models, as well as the rapid pace of business and technological evolutions, such methodologies would meet a timely market need and may contribute to fewer failures in business model innovation than those witnessed in hype-affected high-tech markets in recent years.

Table 3 summarizes the research challenges both in atomic (individual sub-domains) and integrative (combinations of two or more sub-domains) levels.

Conclusions and implications for researchers and practitioners

This paper has presented the results of a *bottom-up review approach* for defining an analytic research framework for business models. The identification of the eight sub-domains has derived from the need to put an order in the growing body of research into business models. In a top-down approach, we could first identify the classification classes and then try to track down studies under each class. However, this approach is most appropriate for exploring mature and well-investigated knowledge areas. Thus, the bottom-up approach was considered more suitable to the unconsolidated nature of business model research. The literature review, further to its internal value in providing a lens through which current and future research on business models can be analysed, has also yielded some implications for researchers of the business model field.

Table 3 An agenda for future research on business models

Atomic challenges

- *Definitions* Define the essence of network-centric business models and clarify the relevance between business models and related concepts (strategy, processes, and Information Technology)
- *Components* Integrate primary and supporting elements and identify each component's contribution to a successful business model implementation
- *Taxonomies* Synthesize classification criteria and explore new areas of business model implementation (for example, mobile business models)
- *Conceptual models* Develop business model ontologies and systematize business model semantics
- *Design tools* Develop business model representational formalisms and notational constructs, explore the potential of computer-aided business model design tools
- *Adoption factors* Research into business model diffusion and successful implementation in different market, cultural, and technological contexts
- *Evaluation models* Develop model-specific evaluation criteria both for *ex ante* evaluation and for *ex post* assessment
- *Change methodologies* Research into the process and factors of business model change (extension, evolution, and innovation)

Integrative challenges

- Synthesis of multi-perspective conceptual dimensions of business models (addressing links and interfaces, identifying contribution/utility of each dimension, agreeing on definitional norms, and semantics)
- Visualization of conceptual layers and components of business models through computer-aided methods and tools (business model modelling)
- Development of abstraction layer specific modelling tools (hierarchical decomposition of business model models)
- Use of Balanced Scorecard approach for evaluating a business model against four different perspectives, which can associate with the different levels of a conceptual business model
- Development of stakeholder-dependent evaluation metrics and modelling tools
- Development of change management methodologies to guide business model evolution, transition, and/or innovation

Firstly, it has shown that the business model field has now matured to a degree that allows it to move beyond the elementary definitional studies, associated with the definitions and components sub-domains, to more in-depth analyses, associated with the design methods/tools, conceptual models, evaluation models, and changing methodologies sub-domains, which aim at providing toolkits for representing, analysing, assessing, and changing business models.

Secondly, the literature review has shown that the research community is yet to invent a common language, in terms not only of terminology but basically in terms of conceptualization, for discussing and analysing business models. As a result, while quite a few practitioners discuss business models implying revenue models, several researchers of the IS field use the business model construct as the theoretical statement of the business requirements that an information system should fulfil. The need for building and adopting a common language in the business model community is further stressed by the multi-disciplinary nature of the topic. The terms used for referring to key concepts should raise the same meaning for all business model researchers, regardless of their scientific or business background. The proposed classification framework provides a basic conceptual categorization of business model research with the view of setting the groundwork for more elaborate business model conceptualisms.

The literature review ends by prompting researchers for integrating isolated research on diverse aspects of busi-

ness models, such as business model configurations (structures) or evaluation of business models, and derives from various scientific disciplines, such as strategic management, industrial organization, and information systems, under a common conceptualization of business models. Within the last 10 years, there has been considerable research on strategic alliances, more specifically on the conditions and factors that drive the formation of alliances, alliance governance structures, dynamics and management of alliances, and alliance performance. Such research, also associated with multiple theories, such as transaction cost economics, resource-based view, network and innovation theories, can be exploited for describing, analysing or explaining from a scientific perspective the 'value chain/ net' component of business model. In a similar vein, research on modelling languages, which is conducted by IS scholars, could contribute to advanced design tools for business models' illustration. Following the same stream of thought, other types of state-of-the-art research could be associated with the remaining sub-domains of the proposed research framework. Unless such theoretical links are established, the business model field will not be able to establish itself as a distinct area of investigation, with proper links to other research domains.

Practitioners are also expected to benefit from the work presented in this paper. More specifically, managers can classify existing knowledge and practice and thus select the most appropriate theoretical toolkit for defining, describing, and communicating their organization's

business model(s). Practitioners from the business consulting area can contribute to specific under-investigated areas, indicated by the current literature review and the proposed research agenda, such as change methodologies and evaluation models. Finally, by adopting a common

framework to refer to key business model concepts, managers who negotiate on a possible strategic alliance are facilitated to argue on the value-creating business logic representing the business model, which underlines their inter-organizational collaboration.

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References

- AFUAH A and TUCCI C (2001) *Internet Business Models and Strategies*. McGraw-Hill International Editions, New York.
- ALT R and ZIMMERMANN H (2001) Introduction to special section – business models. *Electronic Markets* **11**(1), 3–9.
- AMIT R and ZOTT C (2001) Value creation in eBusiness. *Strategic Management Journal* **22**(6–7), 493–520.
- APPLEGATE LM and COLLURA M (2001) Emerging networked business models: lessons from the field. *Harvard Business School No. 9-801-172* Harvard Business School, Boston.
- AUER C and FOLLACK M (2002) Using action research for gaining competitive advantage out of the internet's impact on existing business models. In *Proceedings of 15th Bled Electronic Commerce Conference – eReality: Constructing the eEconomy*. Bled: June 17–19 pp 767–784.
- BARTELT A and LAMERSDORF W (2001) A multi-criteria taxonomy of business models in Electronic Commerce. In *Proceedings of the IFIP/ACM International Conference on Distributed Systems Platforms (Middleware 2001)*, WS on Electronic Commerce (FIEGE L, M G, and WILHELM U, Eds), Springer, Berlin.
- BEN-LAGHA S, OSTERWALDER A and PIGNEUR Y (2001) Modeling eBusiness with eBML. In *Proceedings of fifth International Conference on Management of Networked Enterprises (CIMRE)*, Mahdia, October 25–26.
- BHARATI P and TARASEWICH P (2002) Global perceptions of journals publishing E-Commerce research. *Communications of the ACM* **45**(5), 21–26.
- CHEN-BERGER Y (2003) KBST: a support tool for business modeling in BSMD. Master Thesis, Department of Artificial Intelligence, The University of Edinburgh in September 1994 Available online at: <http://citeseer.nj.nec.com/update/2139>(Accessed on: 22/07/2003).
- CHESBROUGH H and ROSENBLOOM RS (2002) *The Role of the Business Model in Capturing Value from Innovation: Evidence from XEROX Corporation's Technology Spinoff Companies* Available online at: <http://www.hbs.edu/dor/papers2/0001/01-002.pdf>(Accessed on: 27/02/2002).
- COOIL B and RUST RT (1995) General estimators for the reliability of qualitative data. *Psychometrika* **60**(2), 199–220.
- ELLIOT S (2002) Research model and theoretical implications. In *Electronic Commerce: B2C strategies and models* (ELLIOT S, Eds), pp 291–325, John Wiley, Chichester.

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- ERIKSSON H and PENKER M (2000) *Business Modeling with UML – Business Patterns at Work*. John-Wiley & Sons, New York.
- Q5 GORDIJN J and AKKERMANS JM (2001a) Ontology-based operators for eBusiness model de- and re-construction. In *Proceedings of First International Conference on Knowledge Capture (K-CAP 2001)* pp 60–67, ACM Press, Victoria.
- GORDIJN J and AKKERMANS JM (2001b) Designing and evaluating EBusiness models. *IEEE Intelligent Systems* **16(4)**, 11–17.
- HAMEL G (2000) *Leading the Revolution*. Harvard Business School Press, Boston.
- HARZING A (2003) *Journal Quality List*. Tenth Edition (9 June 2004), University of Melbourne.
- HEDMAN J and KALLING T (2003) The business model concept: theoretical underpinnings and empirical illustrations. *European Journal of Information Systems* **12(1)**, 49–59.
- JASPER R and USCHOLD M (1999) A framework for understanding and classifying ontology applications. In *Proceedings of 12th International Workshop on Knowledge Acquisition, Modelling, and Management KAW'99* (GAINES B, CREMER R and MUSEN M, Eds), pp 4-9-1–4-9-20, SRDG Publications, Banff, Alberta.
- KAPLAN RS and NORTON D (1992) The balanced scorecard – measures that drive performance. *Harvard Business Review* (May–June 2000), 97–103.
- KAPLAN S and SAWHNEY M (2000) E-hubs: the new B2B marketplaces. *Harvard Business Review* **70(1)**, 71–79.
- Q6 KLUEBER R (2000) Business Model Design and Implementation for services. In *Proceedings of Americas Conference on Information Systems, Long Beach, CA, 2000*.
- Q7 KRÜGER C, SWATMAN P and BEEK K (2003) Business Model formation within the online news market: the core + complement business model framework. In *Proceedings of 16th Bled eCommerce Conference – eTransformation, Bled: June 9–11, 2003*. (CD-ROM Proceedings).
- LINDER JC and CANTRELL S (2000) Changing business models: surveying the Landscape. Working Paper, Accenture Institute for Strategic Change.
- MAGRETTA J (2002) Why business models matter. *Harvard Business Review* (May 2002), 86–92.
- MAHADEVAN B (2000) Business models for Internet-based eCommerce: an anatomy. *California Management Review* **42(4)**, 55–69.
- MALONE TW, CROWSTON K, LEE J, PENTLAND B, DELLAROCAS C, WYNER G, QUIMBY J, OSBORN C, BERN-STEIN A, HERMAN G, KLEIN M and O'DONNELL E (1999) Tools for inventing organizations: toward a handbook of organizational processes. *Management Science* **45(3)**, 425–443.
- Q8 MCGANN S and LYTINEN K (2002) Capturing the dynamics of eBusiness models: the eBusiness analysis framework and the electronic trading infrastructure. In *Proceedings of 15th Bled Electronic Commerce Conference – eReality: Constructing the eEconomy, Bled, Slovenia, June 17 – 19, 2002*.
- MYLONOPOULOS NA and THEOHARAKIS V (2001) Global perceptions of IS journals. *Communications of the ACM* **44(9)**, 29–33.
- NILSSON AG, TOLIS C and NELLBORN C (1999) *Perspectives on Business Modelling – Understanding and Changing Organisations*. Springer, Berlin.
- Q9 OSTERWALDER A and PIGNEUR Y (2002) An ebusiness model ontology for modeling eBusiness. In *Proceedings of 15th Bled Electronic Commerce Conference – eReality: Constructing the eEconomy, Bled, Slovenia, June 17 – 19, 2002* pp 75–91.
- OSTERWALDER A (2004) The business model ontology – a proposition in a design science approach. PhD Thesis, Ecole des Hautes Etudes Commerciales, Université de Lausanne.
- Q10 PAKIRIAKOPOULOS D, POULYMENAKOU A and DOUKIDIS G (2001) Building eBusiness models: an analytical framework and development guidelines. In *Proceedings of 14th Bled Electronic Commerce Conference, Bled, June 25–26, 2001*.
- Q11 PETROVIC O, KITTL C and TEKSTEN RD (2001) Developing business models for eBusiness. In *Proceedings of International Conference on Electronic Commerce 2001, Vienna: October 31 – November 4, 2001*.
- PORTER ME (2001) Strategy and the internet. *Harvard Business Review* (March–April 2001), 63–78.
- POULOUDI A, VASSILOPOULOU K and ZIOUVELOU X (2003) A societal perspective on E-Business adoption. *Journal of Information, Communication and Ethics in Society* **1(3)**, 149–165.
- RAPPA M (2003) *Managing the digital enterprise – Business models on the Web* Available online at: http://ecommerce1.ncsu.edu/business_models.html (Accessed on: 27/01/2003).
- RAYPORT JF and JAWORSKI BJ (2001) *eCommerce*. McGraw-Hill, New York.
- RUST RT and COOIL B (1994) Reliability measures for qualitative data: theory and implications. *Journal of Marketing Research* **31(1)**, 1–14.
- TAPSCOTT D, LOWI A and TICOLL D (1998) *Blueprint to the Digital Economy: Creating Wealth in the Era of eBusiness*. McGraw-Hill, New York.
- TAPSCOTT D, LOWI A and TICOLL D (2000) *Digital Capital – Harnessing the Power of Business Webs*. Harvard Business School Press, Boston.
- TIMMERS P (1998) Business models for electronic markets. *Journal on Electronic Markets* **8(2)**, 3–8.
- Q12 VASSILOPOULOU K, ZIOUVELOU X, PATELI A and POULOUDI N (2003) Examining EBusiness models: Applying a Holistic Approach in the Mobile Environment. In *Proceedings of 11th European Conference on Information Systems (ECIS) – New Paradigms in Organizations, Markets and Society, Naples, June 16–21, 2003*.
- WEILL P and VITALE MR (2001) *Place to Space: Migrating to eBusiness Models*. Harvard Business School Press, Boston.
- Q13 WINTER R (2003) Conceptual modeling of business networks and business strategies. In *Proceedings of 16th Bled eCommerce Conference – eTransformation, Bled, June 9–11, 2003*. (CD-ROM Proceedings).