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Technology innovation-induced business model change: a contingency approach

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Abstract

Purpose – To construct and test, through its application to a real case study, a methodology that generates contingencies for the evolution of a company or an industry's reference business model (BM) under the impact of a technology innovation.

Design/methodology/approach – The paper draws on theoretical predicaments of organizational development and scenario planning as well as more recently published works (2001-2004) on BM design and change in order to build the primary steps of the methodology. A contingency approach is applied for selecting among alternatives the most suitable future BM. The usefulness and applicability of the provided methodology are proved through a real case study that concerns changing the exhibition's industry reference BM under the impact of a mobile innovation.

Findings – The proposed methodology is primarily useful in cases where a strategic manager wishes to draw and assess not one totally new BM but a set of scenarios that reflect alternative configurations for its current BM evolution. Such a methodology needs to be complemented with a contingency framework for guiding the selection of the scenario that better suits the internal and external environment of the company.

Research limitations/implications – It is expected that related theories, such as the theory of Industrial Organization and the theory of Network Economics, also need to be examined under the light of BM change to identify and cross-validate factors that contribute to the design and assessment of BMs.

Practical implications – The ultimate utility of the proposed methodology is as a road-map for leading change in the value-creation logic of a firm, taking advantage of an advanced technology solution. By continuously changing their BM, and identifying new ways to deliver value to their customers, firms aspire to obtain and sustain a competitive advantage in high-velocity environments.

Originality/value – This paper fulfils an identified research gap for a structured approach towards changing the BM of a firm, which introduces a technology innovation by keeping the principles of the old (traditional) business logic and taking into account the effects incurred from the firm's internal and external environment.

Keywords Business environment, Change management, Innovation

Paper type Research paper

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IOCM Introduction

Under the influence of technology trends, most importantly information and communication technologies (ICT), many current organizational business models (BMs) are being questioned, and companies are faced with the challenge of BM change. However, creating a radically new BM is a high-risk strategy, as the probability of getting it right is acknowledged to be low (Kalakota and Robinson, 2001). Companies typically choose to focus on an improvement strategy that is less risky and extends or renews their existing strategy and BM.

Even in the case of BM evolution, however, the process is not risk-free. Arguably the complexity of the ICT landscape makes it almost infeasible for any single business entity to possess the necessary array of competencies that will allow it to provide an end-to-end solution. Thus, alliance management, revenue sharing, and transparent cooperation become critical factors for success. Those companies with the ability to create business-to-business relationships without conflicts of interest are the ones' most likely to succeed (Paavilainen, 2002). A BM must explicitly account for the need for partnership and provide the best possible answers to questions regarding the type of value that each partner will contribute based on its core competence, the distribution of revenues and profits between them, the type of service offerings, and the business structures that will be required to implement the changes (Rulke *et al.*, 2003).

Existing research on defining structured methodological approaches for BM change is rather fragmented. Most efforts are applicable only under certain business conditions, they are typically dependent on the codification used for BM components, and mostly provide a general framework rather than a stepwise methodology that can guide a BM evolution process. This paper aims to fill this gap by proposing a stepwise methodology allowing companies to design alternative scenarios for BM evolution or extension under the impact of technology innovation. The proposed methodology constitutes the result of research that synthesizes and improves existing literature in the area by combining it with insight gained through a real-life case study in a multinational setting. The methodology is based on the identification of scenarios that depict possible changes to the current value chain and BM of an industry. Scenario-based BM development is the primary novel characteristic of the methodology, in line with recent research that argues in favour of scenarios as an efficient strategy design method in uncertain and complex business environments (Mylonopoulos et al., 2002; Kulatilaka and Venkatraman, 2001). Further to scenario planning, the proposed methodology is also complemented by a novel contingency approach that draws on organizational theories to propose firm-specific and industry-related factors that can act as metrics for choosing among scenarios.

Background theory incorporated in this paper involves analysis and critique of prevailing theoretical approaches to BM changes. The section that follows the background theory outlines the proposed methodology for BM evolution under the influence of technology innovation. The methodology is complemented by a set of firm-specific and industry-related contingency factors that affect the feasibility and likelihood of success of alternative BMs under different industry settings. The paper continues with applying the proposed methodology and contingency approach in a case study of the exhibition industry, where the introduction of a mobile application, named mobile exhibition guide, is used to draw scenarios for BM change. Finally, the

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paper concludes by putting forward implications of our findings for practitioners and future researchers.

Background theory

While the necessity and complexity of business change have long been documented in the literature, it is only recently that researchers have started focusing their attention on BM change and its specificities (Pateli, 2002). Petrovic et al. (2001) and Auer and Follack (2002) have proposed a methodology for BM change that is based on the three learning stages of Senge and Sterman (1994) as well as a number of system theories, such as system dynamics. The methodology includes seven steps, grouped into three stages, for moving from the current to the future BM (Table I).

In a similar vein, Kulatilaka and Venkatraman (2001) suggest an options approach for designing an IT strategy and defining BMs based on the capabilities of the firm and the evolving conditions in the marketplace. This approach provides a company with flexibility in adopting new technology and changing its BM. Based on this approach, Kulatilaka and Venkatraman (2001) propose the following three steps to invest in new technology:

- (1) Assess opportunities for change and consider ways to exploit these opportunities.
- (2) Acquire options, which includes mixing options reflecting the likeliest opportunities and the future scenarios for the company and the marketplace.
- (3) Act on options, which involves deploying additional capabilities, restructuring the company, reassessing its partnerships, and generally making the necessary adjustment to its BM in order to gain the advantage of the option's promised opportunities.

Following a different path, Pramataris et al. (2001) employ a set of analytical tools to facilitate BM change under the influence of digital interactive television in the advertising industry. They present their work in the form of a sequence of ten steps, each of which makes reference to both the data-collection method and the theoretical/analytical constructs employed (Table II).

Although all these methods provide valid starting points for addressing BM change, they all share a common drawback: they are quite monolithic, in the sense that they provide a strict linear sequence of steps that an organization should follow, when

Stage	Steps	
Understand	a. Identify the BM from different angles b. Identify the key factors of the BM	
	c. Model the core reinforcing and balancing feedback loops d. Expand the BM to the full network	
Identify technology's influence	 e. Identify the influence of the internet on the BM's variables f. Recognize and interpret possibilities for changing the problem situation 	
Change	g. Develop an action plan	Table I.
Source: Petrovic et al., 2001; Auer and Follack, 2002		Stages of improving BMs

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JOCM 18,2	Ten steps for the derivation of a new BM
-)	1 Examining the relationships developed by key players currently in the market
	2 Defining current business objectives for each key player
	3 Identification of current value flows in the marketplace
	4 Identification of key competitive drivers in the market
170	5 Synthesis of the current BM
110	6 Embedding the innovative technology framework into the current BM
	7 Defining the requirements for technological capability development for the existing key players
	8 Defining the mediating functions performed by the service provider
	9 Developing a new cooperation scheme in the marketplace: exploiting the existence of the new service provider
Table II.	10 Synthesis of the proposed BM
The IMEDIA	
methodology	Source: Pramataris <i>et al.</i> , 2001

approaching BM change as a result of a technology innovation. As such, these methods might be more appropriate in relatively stable industry settings, where a lower level of risk might be associated with BM change.

However, when considering more turbulent and complex contexts, such as the emerging market of mobile and wireless communications that is dealt with in the case study discussed later in this paper, such methods might not yield satisfactory results. In this paper, we advocate the use of scenarios as a more appropriate means for approaching BM change. Scenario planning (Bloom and Menefee, 1994; Godet, 2001) has long been used in management science and is acknowledged to support more flexible decision-making and less risky strategic positioning against alternative "futures".

In the following section, we discuss a methodology for incorporating scenarios in BM change design efforts.

A scenario-based methodology for BM change

This section outlines the proposed methodology for BM evolution under the influence of a technology innovation. The discussion of the proposed methodology is made through a description of the primary steps and their contribution towards the final goal, which is the design of a set of alternative future BMs in the form of scenarios. Having resulted from a systematic work on synthesizing existing literature, the proposed methodology combines the following features:

- It is based on the three-phase model advocated by Petrovic *et al.* (2001) and Auer and Follack (2002) (Table I).
- It follows the approach of Kulatilaka and Venkatraman (2001) for defining scenarios as an intermediate step between the design of the current and future BMs.
- It uses and revises several steps of the iMEDIA methodology (Pramataris *et al.*, 2001) for the design of a future BM (Table II).

However, the proposed methodology also extends the existing research in the field by incorporating two novel features. First, the design of future BMs is based on the identification of a set of scenarios for alternative cooperation schemes among the involved

parties. Second, the methodology includes an analysis of the resulting BMs in terms of components, following the BM framework proposed by Pateli and Giaglis (2003).

The methodology consists of three phases, which are further decomposed into six steps. Figure 1 shows the steps of the methodology in correspondence with the three key phases identified in the BM evolution process. In what follows, we briefly discuss the primary mission and anticipated result of each phase and describe the steps included in it.

Phase I: understand

The first phase is concerned with a detailed analysis and documentation of the existing BM. Such analysis is required to gain an in-depth understanding of the current situation and establish benchmarks against which technology innovation impacts can be assessed. The need to anchor business change efforts on carefully documented models of the existing situation is well grounded in change management literature (Davenport and Stoddard, 1994).



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Figure 1. A scenario-based methodology for BM change Step 1. Document the current BM. The initial step of the methodology includes depicting the current business environment with the aid of a BM analysis framework, such as those proposed by many researchers in the field (Gordijn and Akkermans, 2001; Weill and Vitale, 2001; Osterwalder and Pigneur, 2002; Hamel, 2000; Pateli and Giaglis, 2003). The final outcome is a BM construct that can be used for understanding the key elements of a specific BM and their relationships, communicating and sharing the understanding of the business between business and technology stakeholders, specifying valid requirements for technology innovation, and identifying options for changing and extending the current BM.

Phase II: identify technology's influence

This phase is concerned with assessing the impact of technology innovation on the current BM. The anticipated result is the identification of possibilities for evolution or extension of the current BM. This phase includes the following steps.

Step 2. Assess the influence of technology innovation. This step includes an identification of the benefits and impacts that a given technological solution brings to key elements of the BM and a specification of the changes imposed on the current BM's structure. Such analysis is important so that changes can be better planned to fully exploit the capabilities of the proposed technology innovation.

Step 3. Identify missing roles. 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. As argued earlier, no organization is expected to have the necessary competencies to provide end-to-end services on its own. Therefore, organizations will need to enter into cooperations and alliances, typically with high-tech firms that bring in the necessary competencies in managing and exploiting the technology components of the future BM. This step calls for a systematic approach towards identifying the missing competencies so that the right partnerships can be formed.

Phase III: change

This phase is concerned with the design and description of the future BMs. This phase ends at visualizing the new BM through the design of the transformed value network. The steps included in this phase are as follows.

Step 4. Define scenarios. Having identified and justified the need for one or more new roles, this step includes defining a set of scenarios, each of which proposes a different cooperation scheme and way of distributing responsibilities between new and existing players in the new business environment. This step is key to the methodology as it enables organizations to "experiment" with alternative BM propositions, explore their implications, and proceed cautiously towards the design of the future BMs. Minimizing the risk associated with partnership management, for example, is hypothesized to lead to less risky and more successful BM change.

Step 5. Describe the new BMs. Based on the scenarios identified at the previous step, this step revisits the current business situation as illustrated in the current BM (Step 1). This step aims to describe one or more BMs by indicating the value provided by each player in the future model, as well as defining financial and communication flows among players.

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Step 6. Evaluate the impact of changes. This step is not included in prior works in the area. However, it is considered necessary to conclude the proposed BM description by estimating the impact of the transformed BM on the structure and dynamics of the markets concerned. This step effectively links the methodology to subsequent change implementation programs (which are outside the scope of this paper), as it defines the metrics by which alternative BMs will be evaluated.

Although the aforementioned steps define a well-grounded methodology for BM change under the impact of technology innovation, they are by no means sufficient on their own to guide the BM design effort. Effectively, what is missing is an analysis of how organizations should pick and choose, from the scenarios developed, the one that will become the future BM. To this end, the methodology needs to be complemented by a contingency approach allowing for comparative evaluation of scenarios based on firm-specific and industry-related factors.

A contingency approach for assessing scenarios

It is of course expected that, in practice, more than one BM for the exploitation of a technology innovation will be applicable in different markets depending on their unique characteristics. In this section, we contend that the final scenario that will guide the development of future BMs will be determined by a number of factors affecting the organization, both external (industry-related) and internal (firm-specific).

Recent research work on strategy theory has recognized three primary types of effects on firm performance. These include strategy, industry, and firm-asset (or resource-based) effects. This three-dimensional framework, tested under empirical data (Spanos and Lioukas, 2001), results in supporting arguments that consider both industry-related and internal (combining strategy and firm-asset) influences as significant determinants of performance (Henderson and Mitchell, 1997). Researchers have recently started to address the link between BMs and strategy theories. Hedman and Kalling (2003) propose integrating the three aforementioned strategic perspectives in the definition of a conceptual BM that includes: customers and competitors (industry), the offering (generic strategy), activities and organization (the value chain), the resource base (resources), and the source of resources and production input (factor markets and sourcing), as well as the process by which a BM evolves (in longitudinal processes affected by cognitive limitations and norms and values).

Based on this analysis, we have developed a series of factors favouring scenarios for BM development by the combination of industry-related and firm-specific factors. These factors include the following:

- (1) Industry-related factors:
 - *Industry structure*. This factor addresses whether the market in which the redesigned BM will be introduced is either monopolistic/oligopolistic or highly competitive.
 - Balance between transaction costs and costs of internal development. This factor addresses the costs of contracting partnerships with third parties to provide the technology innovation in comparison with the costs incurred in case of internal development of the required capabilities and resources (Li and Whalley, 2002).

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- *Type of players*. This factor examines whether private or public organizations dominate the market. This distinction may be declarative of the participants' motivation and strategic incentives for applying a technology innovation and thus differentiating themselves from competition.
- (2) Firm-specific factors:
 - *Strategic objectives.* This factor concerns the firm's strategic focus and the alignment between the internal strategic goals and the expectations for the impact of the technology innovation.
 - *Firm capabilities and assets.* This factor contributes to the assessment of the firm's position in the market and the identification of the market segments that it targets. Current capabilities and future intentions for capability development will dictate the degree to which the firm is prepared to internalize or outsource certain technology-dependent activities.

In order to increase the understanding of the use and utility of such a contingency approach, as well as validating and extending the proposed methodology for BM evolution, the next section discusses a real-life case study, involving the commercialization of a mobile application, named mobile exhibition guide, by players in the exhibition and information technology industries.

Case study: effects of mobile business in the exhibition industry

Description of the mobile exhibition guide

The validity and utility of the proposed method, as well as the implications of scenario planning for BM change, have been tested through a multinational case study conducted simultaneously in Greece and Finland. The study was part of a research project supported by the European Commission that aimed to exploit the technological opportunities arising from evolution in the areas of wireless networks and indoor positioning technologies to support the professional exhibition industry in a context-aware manner. The project's goals were to enhance visitors' experience in terms of interaction and functionality in an information-rich environment such as an exhibition show; improve business communications and promotions within the exhibition; extend promotional effectiveness after the exhibition; and assist and support exhibition management by offering real-time location information about people inside the exhibition area. To this end, the project developed a mediation software platform, namely a mobile exhibition guide, running currently on PDA devices but with plans to include smart-phone devices later.

Based on a number of user behavioural requirements drawn from visitors, exhibitors and organizers (which are documented in more detail in Fouskas *et al.*, 2002), the mobile exhibition guide is designed to provide the following services (Table III), listed per type of user.

The introduction of such technological capabilities is bound to fundamentally transform today's prevailing BM in the exhibition industry. Hence, industry stakeholders (most notably, exhibition organizers) have initiated a debate regarding the changes to be introduced in the current *modus operandi* of the industry and the partnerships that need to be developed in order to exploit the benefits of the mobile exhibition guide. To this end, the methodology discussed in the previous section has been employed to guide the BM evolution design effort.

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Visitor services	Exhibitor services	Organizer services	A contingency
Online and on-site registration	Online content management (products, stands)	Information on profile and preferences of visitors	approach
Personalized and location-aware navigation plan	Exchange of "virtual business cards" with visitors	Online content management of information (profile, whilition info)	
Routeing advice	Real-time information and history statistics on visitor behaviour	Common and targeted announcements to exhibitors and visitors	175
Exchange of "virtual business cards" with exhibitors "Bookmark" stands and exhibits for receiving more information Interaction within a user group Receiving targeted messages (offers, announcements) from exhibitors and	Promotion of their exhibits via targeted spots Notifications to organizers in emergency cases	Real-time information on visitors' position History statistics on visitor flows and behaviour Online feedback from visitors	
organizers Message board for communication with other visitors			Table III.Mobile exhibition guide's services per user

Application of the proposed method

Step 1: document the current BM. The first step was to document the current business situation in order to define realistic business requirements for the design of the mobile application and to outline the business environment in which it will be introduced. This analysis included a detailed description of industry norms, types of stakeholders involved, partnerships, revenue-sharing agreements, and so on. Owing to space limitations, only the analysis of roles is presented herein.

The key roles identified in the exhibition business environment include:

- (1) Hall owners, who provide the physical infrastructure.
- (2) *Organizers*, who provide the service platform for efficient interaction between the exhibitors and the visitors.
- (3) *Exhibitors and parallel event organizers*, who use exhibition events as marketing tools.
- (4) *Visitors and event participants*, who receive the services of exhibitors and organizers.
- (5) *Support service providers*, who make available various services to organizers including security, cleaning, and electronic equipment.
- (6) *Media partners* providing media coverage of the event and publicity to organizers and exhibitors.
- (7) Sponsors providing capital in return for leveraging their brand.

The primary business relationships of this model are shown in Figure 2 (the numbers indicate types of flows among roles, the analysis of which goes beyond the scope of this paper).

Step 2: assess the influence of technology innovation. This step included a definition of the benefits arising from the introduction of the mobile application to the concerned



parties, and a discussion of the elements of the current BM that are most likely to change due to technology innovation (mEXPRESS D6.1, 2003). A list of potential benefits of using the mobile exhibition guide to the primary stakeholders of the exhibition industry is presented in Table IV.

This step also aims to identify those elements of the current BM which will be most affected by the technology innovation. Based on the theoretical investigations in the area of technology innovation and also a series of discussions with key stakeholders, mainly the exhibition organizers participating in the project, several effects of this

	Exhibition players	Benefits	
	Hall owner	New value-added service offered through their premises Ability to use the installed technology infrastructure for offering other wireless services	
	Organizer	Online collection of feedback from visitors Ability to collect online data on visitors' profile and behaviour in the form of anonymous statistics Dynamic segmentation of visitors based on their profile and behaviour Ability to collect data on exhibitors' performance Better management of exhibition space and people	
	Exhibitor	Effective marketing and management of exhibitions using the statistical data produced by mEXPRESS Access to anonymous data on visitors' profile, preferences and behaviour in order to improve their understanding of their customers Effective targeting and promotions New channel for promotions and offer making Possibility of applying dynamic pricing mechanisms based on real-time	
Table IV. Expected benefits for the key players in the exhibition industry	Visitor	statistics Effective spotting of suppliers/products of interest Efficient navigation in the exhibition hall space Load-saving from transferring material in digital rather than paper format Increased convenience in the overall visiting experience	

technology innovation on the current BM's elements have been specified and are briefly described in Table V.

Step 3: identify missing roles. The roles identified in Step 1 have been found inadequate to supply the competencies needed to support the mobile application. More specifically, the need for one or more new player(s) accomplishing the following groups of activities was recognized:

- *Infrastructure installation and maintenance*, including functions for defining the requirements for, installing, and maintaining the networking and positioning infrastructure, as well as any other hardware required to support the mobile mediation platform.
- *Software configuration and support*, including functions for configuring and administrating the mobile software application.
- *Content syndication, management and delivery.* Syndication refers to "selling the same information to many different customers, packaging it with other offerings in uniquely valuable ways, and then redistributing it" (Werbach, 2000). In this case, syndication concerns packaging the information produced, such as statistical reports, with other offerings, such as visitors' profiles, and then customizing it to the requirements of different users such as exhibitors and organizers.

Step 4: define scenarios for alternative BM configurations. Based on a diverse distribution of responsibilities and roles between the existing and/or new players, a number of change options, considered hereinafter as scenarios, were generated. Simply defined, a scenario is a description of a possible or probable future for either an organization or a whole industry (Bloom and Menefee, 1994). Scenarios can be quite broad in scope, thus describing actors, market trends and pricing strategies, and aiming at guiding future organizational strategies, policies and activities. Scenarios are not forecasts or predictions. They are only possibilities of the future (Van der Heijden, 1996). Based on scenarios, decision- and strategy-makers are able to better formulate their innovative business ideas in future environments.

The scenarios that are described hereinafter concern alternative configurations of players belonging in the exhibition industry, but also in the ICT industry for commercializing the mobile exhibition guide in the future. These scenarios have been defined in a number of brainstorming sessions with the participation of all project participants and structured interviews with key actors and domain experts of the exhibition industry. Based on this analysis, two final scenarios were developed for further consideration:

(1) The market maker (MM) scenario. This scenario concerns the development of a partnership between an independent body – a third party – and one or more hall owners, playing in common the role of the mobile exhibition service provider (m-ESP). These two bodies make some sort of partnership (most likely an outsourcing agreement) to jointly provide mobile exhibition services. They then provide the service to exhibitions. Organizers, in turn, can provide the service to exhibitors that typically pay an increased booth rental price and are in turn able to provide value-added services to visitors.

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JOCM 18,2	Major effects of the mobile application	Description of changes on BM elements
	Enhanced value proposition	For organizers: facilitation of exhibition management and collection of value-added data, such as the location data for persons within the exhibition
178		For exhibitors: extending promotional effectiveness during and after the exhibition by targeting their customers; ability to collect anonymous data from organizers on visitors' behaviour
		For visitors: ability to control the push of information and advertising material; receiving contextual information based on their location and interests
	Redefinition of market scope	The services offered by the mobile application are anticipated to target more technology-familiar visitors as well as exhibitors belonging to high-tech industries
	New actors/roles and	The installation and operation of the mobile software and
	redistribution of	infrastructure require some special capabilities that none of the
	responsibilities	existing players possesses. Therefore, there is a need for new roles being responsible for the technical and operational management and current of the mehile platform
	Redefinition of relationships	As the roles and responsibilities are redistributed between the existing and the new players belonging to the exhibition or the ICT industry, new types of partnerships or inter-organizational relationships are
		expected to develop
	Increase of actors' capabilities and assets	<i>Hall owners</i> : obtain an advanced infrastructure to be used for the provision of the mobile exhibition services and other location-based services
		Organizers: acquire access to a pool of anonymous data regarding visitors and exhibitors <i>Exhibitors</i> : request and gain access to a segment of these data, which is useful for assessing their performance in the exhibition and
		improving their future appearance
	New cost structures and	<i>Visitors</i> : acquire an additional capability for managing their visit The cost of providing the mobile application is charged to the actor who have the technology and service platform and provides it or rents
		it to other service providers. The main parameters of this cost are: the cost of software development and support; and the cost of hardware purchase, installation and maintenance. Further cost parameters
		who use it. To balance this cost, new revenue sources appear, such as increase of fixed price paid by exhibitors for the booth rental, increase in ticket price paid by visitors, sponsorships, price of special mobile
		auverusing services for exhibitors, and price of information to
	New way of conducting key activities	Several key activities and market processes of the current BM are subject to change as a result of their delivery through the mobile platform. Specifically, the preregistration and registration processes are conducted via laptop or PDA from anywhere at any time.
Table V. Effects of the mobileapplication on the BM of		Customer requests are sent in real time through either visitor's PDA or exhibitor's laptop. Promotions and advertising are also made online and in real time, while the online collection of data and feedback replaces the time-consuming process of market research during and
the exhibition industry		after the exhibition

(2) The *full service provider (FSP)* scenario. According to this scenario, the overall responsibility for both technology infrastructure support and service provision and management belongs to the hall owner, who usually also acts as exhibition organizer. Hall owners acquire the mobile exhibition guide service package (including technology infrastructure and software) from its developer; however, they do not enter into a formal partnership with them.

Drawing on the firm and industry-specific factors that were identified in the discussion of the contingency approach in the previous section, Table VI outlines contingencies for the dominance of each scenario.

Step 5: analyze the key elements of alternative BMs. The above scenarios describe alternative configurations (players and relationships) that could support the commercialization of mobile services in the exhibition industry. As such, they lay the groundwork for exhibition players, mainly exhibition centre owners and organizers, to think about alternative business ideas (models) and, under the conditions of each scenario, about how to achieve their strategic objectives. Each scenario can lead to the development of one or more alternative BMs by assigning real-world organizations to the scenario's actors and discussing in detail issues regarding the value proposition of each actor, the partnerships developed among all actors, the key resources contributed by each, their revenue-sharing agreement, etc. Hereinafter, due to space limitations for analyzing a set of alternative BMs implementing each scenario, the paper has focused on formulating two general but representative BMs, naming each one based on the scenario it implements. Only the major differentiation points of these BMs are described in the paper. Nevertheless, the following is a quite complete list of attributes, considered as differentiation points, which were analyzed, when describing the two alternative BMs in the mobile case study (mEXPRESS D6.1, 2003):

- · key players and distribution of roles and responsibilities;
- · core competence of each player in terms of valuable resources and capabilities;
- value network depicting the key players' relationships in terms of revenue and communication flows;
- value proposition of each player to the network as well as to the end-user;
- revenue model in terms of main revenue sources and the revenue sharing agreements among the key players; and
- critical success factors (CSFs) for the BM implementation.

Conditions favouring the MM scenario	Conditions favouring the FSP scenario	
 (a) High degree of competition (b) Transaction costs are lower than the costs of providing the service based on internal skills/ resources (c) Large number of private exhibition organizers (d) Organizers follow a differentiation strategy through the provision of value-added services 	 (a) Monopolistic or oligopolistic markets (b) Transaction costs are higher than the costs of providing the service based on internal skills/ resources (c) Few private or public exhibition organizers (d) Organizers follow a cost-leadership strategy under the concern of providing low-priced services 	Table VI. A contingency approach
(e) Organizers are separate entities from hall owners; hence they lack infrastructure assets	(e) Organizers own their own exhibition centre, thus possessing additional assets	for the new BM of the exhibition industry

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Exhibitors' and visitors' roles remain the same in both BMs. However, the two BMs imply different roles, and hence different competencies, regarding hall owners and exhibition organizers. Specifically, the MM BM includes a new third party that enters the exhibition industry value system through a partnership with a hall owner. In this BM, the concerned hall owner does not have the competence required to provide the mobile exhibition guide on its own, and thus the whole BM is based on a strategic alliance signed between the third party and the hall owner for the purpose of delivering value-added mobile services to the hall owners' clientele. Conversely, the FSP business model involves a hall owner of dominant strategic position, which either possesses, or is willing to obtain and develop, the resources and capabilities required for providing the mobile exhibition guide on its own.

The cost factors characterizing both BMs are identical and involve a once-only implementation cost for the wireless networking and positioning infrastructure, as well as a once-only purchase cost for the software, including costs for administration and support services. However, while the MM business model is based on a revenue-sharing agreement between the third party and the hall owner, who jointly act the new roles of the m-ESP, the FSP BM is financially dependent on an investment made by hall owners for providing value-added services. Each revenue model has of course different implications for the level of investment required, the impact on final prices for exhibitors, the time required to provide the service, and the risk involved with implementation and market success.

Step 6: estimate the impact of technology innovation on the external environment. The impact of the proposed BMs for the commercialization of the mobile exhibition application was specified in terms of a number of direct or indirect effects brought to bear on the exhibition industry and mobile emerging market based on Porter's five forces model (Porter, 1985). Thus, the following changes on the exhibition industry structure were noted: introduction of technology firms in the role of advanced exhibition service providers, enhancement of exhibition services with innovative features, thus increasing barriers to entry by new players, increase of organizers' bargaining power over exhibitors, rising interest by players in the horizontal value chain (complementors or competitors) in offering complementary services (e.g. access to internet provided by Wireless Internet Service Providers, on-request access to historical data about the exhibition industry provided by an Exhibition Association). The implementation and use of a mobile exhibition guide is also expected to contribute to the growth of the mobile market by enhancing the public's familiarization with wireless and mobile technologies and applications, encouraging development of more advanced mobile applications targeted to the public, and enforcing the role of service and technology providers over the dominant mobile network operators.

Conclusions and managerial implications

This research has presented a methodology for BM change under the light of commercializing a mobile technology innovation targeted to the players of the exhibition industry. The methodology has been largely based on the identification of scenarios prescribing alternative configurations for BM development. The methodology is complemented by a contingency approach that guides the selection of the scenario that better suits the internal and external environment of a company. The methodology continues to the detailed description of one or more BMs,

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corresponding to innovative business ideas, in terms of specifying real-world players for the defined structure (scenario) and analyzing the dynamic elements of their relationships (e.g. value proposition, revenue flows, negotiation power).

The research on BM evolution, further to its internal contribution in the BM research area, and more specifically to the area of changing methodologies, has also yielded considerable implications for practitioners in the business field. The proposed BM methodology targets operating managers who work in sectors facing increased challenges from technology innovation. The ultimate utility of this methodology is as roadmap for leading change in the value-creation logic of a firm taking advantage of an advanced technology solution. By continuously changing their BM, and identifying new ways to deliver value to their customers, firms aspire to obtain and sustain a competitive advantage. Managers that can better specify their BM evolution can also assure a better competitive position for their firms in high-velocity environments.

Apart from using the proposed methodology for leading change and keeping the firm ahead of competition, the suggested scenario-based methodology can be used by managers as a strategic tool in their decision-making process. In a highly dynamic and volatile environment, managers are frequently faced with the need to take quick, but prudent decisions regarding their company's actions in the short- or even long-term time horizon. In such organizational settings, managers can use the methodology for building and assessing scenarios, which reveal opportunities and threats for firms' performance, fostered by evolution in the BM map of their sector.

Future research

On the theoretical side, there is ample space for more elaboration of the findings of this paper as well as further research in BMs' correlation with other scientific disciplines. Research on BMs has lately started to fuse with research in related disciplines, most notably theories of strategy and organizational development. We expect that related theories, such as the theory of industrial organizations and the theory of network economics, also need to be examined under the light of BM change to identify and cross-validate factors that contribute to the design and assessment of BMs.

On the practical side, further research could be directed towards extending and enriching the results presented in this paper with a financial analysis made on each scenario. Although such analysis will have limited theoretical utility, as it is of course expected that cost-benefit analyses will be heavily dependent on the unique characteristics of each case and cannot be easily generalized, it is important to note the relationship between theoretical strategic perspectives and organizational financial concerns. As mentioned earlier, the case study discussed in this paper is being concurrently developed in Greece and Finland. One of the imminent steps of the case study is to explore the scenarios developed under the peculiarities of the exhibition industry in each country. The findings are expected to yield important further validation data on the contingency model presented earlier.

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