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Critical design and evaluation factors of mobile business models: "Road block" eradicators for mobile networks operators

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Abstract

Purpose – The purpose of this paper is to define critical design and evaluation factors of business models (BM) for mobile network operators (MNOs) in general, and more specifically for mobile data services.

Design/methodology/approach – This paper follows a qualitative approach. Aiming to identify critical design factors for mobile BMs, this research, as a part of larger research, examines three real-life cases related to mobile data service BM design and engineering. These cases are Orange Business Services (OBS); Apple's iPhone services and applications, and NTT DoCoMo's i-mode service.

Findings – In this paper, the authors provide a framework for designing and developing Market-Aligned, Cohesive, Dynamic, Explicit, and Unique BMs with Fitting Network-Mode, which, if adopted by MNOs, would ensure their long-term success by improving the sustainability and innovation capabilities of their BMs. These critical design factors address different spheres of the mobile business: "Cohesion" and "Explicitness" are operator-oriented, whereas "Market-Alignment," "Dynamicity," "Uniqueness," and "Fitting Network-Mode" are industry-oriented.

Research limitations/implications – Although the paper provides in-depth analysis of three case studies in the context of mobile telecommunications, the authors cannot claim that the developed framework can be generalized to all services in the mobile telecommunications industry. Further validation through empirical testing is preferred and this could be done in future research.

Practical implications – The developed framework is of value to MNOs as it provides them with a holistic approach for designing and also evaluating successful BMs over time. This is because the developed framework defines critical design factors for BMs in the contexts of their environments.

Originality/value – The domain of BMs is still emerging within the field of information systems. The majority of prior studies either tackled the issue of BM definition or provided taxonomies and classifications of this concept. The originality of this paper comes from the fact that it takes further steps in developing the concept by providing a comprehensive framework which encapsulates critical design and evaluation factors of mobile BMs.

Keywords Business model, Design factors, Mobile business, Mobile network operators

Paper type Research paper

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1. Introduction

The extant literature in information systems (IS) and its related fields exemplifies the importance of the business model (BM) concept to the success of companies (Self-reference 4), particularly those driven by Information and Communication Technologies (ICTs). Every organization has its own BM, simply described as a "logical story" (Magretta, 2002) or a "blueprint" (Chesbrough and Rosenbloom, 2002) explaining the "way of doing business" (Hamel, 2000), so that it can achieve its strategic goals and objectives. Each organization's BM is unique. For example, Orange, Vodafone, T-Mobile, and O2 are all companies competing in the UK's mobile business industry, but each performs in a fundamentally different way; every operator has its own "style."

As their viability is time-dependent, BMs must evolve and change continuously over time to stay successful. Realizing the importance of this change phenomenon in the modern ICT business world, researchers have delineated the domain of digital BM change, for example Pateli and Giaglis (2006) and Voelpel *et al.* (2004). Subsequently, they have provided IT-centered companies with evolution techniques, contingency approaches, and BM change methodologies. Nonetheless, there is very little known about prerequisites for their success or workability. For example, little is known as to whether these methods are effective if a company's technological and organizational architecture is rigid, or the whole work system is closed. Similarly, little is learned about whether these approaches are feasible when digital business layers are fragmented, or knowledge about the underlying logic of business is implicit. Hence, we need to understand the types of requirements or critical design factors that need to be considered within technology companies' BMs that would facilitate their BM change process to sustain and innovate. We use mobile network operators (MNOs) to illustrate these design feature requirements. We label them "Road Block Eradicators" to designate their usefulness to BM design and change. We assume the appropriateness of using MNOs as a working model since they belong to one of the technological industries most characterized by uncertainty and rapid change.

In the remainder of this paper, an introduction to the BM concept is provided, including its primary dimensions and constructs, and a discussion of sources and drivers of change in the mobile industry. However, we place more emphasis on MNOs to illustrate the phenomenon. Next, we discuss the innovation concept with respect to mobile BMs and we identify different kinds of innovation and their links to BM change. We also outline the methods employed in this research and lastly, we discuss a framework for the critical design factors of mobile BMs and present our conclusions.

2. Background theory: BMs

The BM concept is a recent addition to the literature of ISs (Self-reference 4) and researchers have been challenged to examine its underpinnings such as its definition and components, and have drafted taxonomies to categorize BMs in use within different industries. Linking BM and organization change theories has been of interest to researchers in delineating the domain of BM change. Although there is little consensus about the groundwork of the BM theory, this significant concept has become a significant reason, perhaps, even the main reason, behind success or failure of an organization. Barack Obama, president of the USA, attributed the auto industry crisis to "unsustainable business models" in use by automobile companies, and argued that their BMs "failed to adapt changing times" (BBC News, 2008). Referring specifically to the mobile industry, the success of NTT DoCoMo's i-mode in Japan has been principally credited to its innovative and well-designed BM (Ballon, 2007).

We suggest that it is fundamental first to consider the definition and primary constructs of the BM concept. These definitions vary and researchers have placed emphasis on different aspects of the concept. The BM has been described as a way in which organizations, along with their stakeholders (business actors) create value for their customers and/or to each party involved (Magretta, 1998; Osterwalder *et al.*, 2005). This view highlights the value creation and proposition dimension of the BM concept. Another view places emphasis on the value architecture branch of the business model tree, and portrays the concept as architecture for the organization, including its assets, products, services, and information flow (Timmers, 1998; Venkatraman and Henderson, 1998). The cross-company (inter-organization) perspective represents a third perspective from which the BM concept has been examined. Researchers have illustrated the concept as a way in which an organization enables transactions through the coordination and collaboration among parties and multiple companies (Gordjin and Akkermans, 2003; Haaker *et al.*, 2006). A final view is that a BM is a way in which organizations generate revenue (e.g. Linder and Cantrell, 2000). By linking the aforementioned views, the BM concept can be described as reflection of management's hypothesis about what customers want, how they want it, and how the enterprise can organize to best meet those needs, get paid for doing so, and make a profit (Teece, 2010).

Description of the BM concept from these different viewpoints has left its related knowledge fragmented. To address this issue and to clarify the concept, Self-reference 4 attempted to synthesize and integrate the literature using two different methods. Based on these efforts, they introduced four interrelated dimensions (V^4 BM Framework) of the BM concept as follows:

- Value proposition: a description of the core products/services that a digital organization offers, or will offer, and the value elements that intend to add value to the offering, as well as the nature of targeted market segment(s) (individuals and business customers) together with their wants and needs.
- Value architecture: a broad plan that specifies all necessary core technological and organizational arrangements (tangible and intangible) in terms of resources and their configurations, as well as core competencies that a digital organization is equipped with in order to be able to deliver its offering in a competitive manner.
- Value network: a description of the necessary core collaboration and cooperation a digital organization conducts and maintains with related businesses in its value system including a description of all core actors. Further, it depicts the types of communication channels (interfaces) the organization constructs to enrich the relationships with its customers.
- Value finance: a description of the core arrangements needed to ensure the economic viability of the offering which includes costing and pricing methods. It also describes the way in which an organization aims to generate revenue from the offering and how this revenue is broken up across different stakeholders.

We regard the BM as a conceptual, intermediate layer aligning business strategy with its ICT-enabled business processes including ISs. However, clarifying the dimensions of the BM is a useful base for our case discussion on MNOs, and particularly for developing the mobile BM change requirements, which are exemplified as a BM Design framework and discussed later in the paper.

3. MNOs: drivers of change and BM innovation

According to Teece (2010), BMs are critical in market economies given that transaction cost is important, customers have multiple choices, competition is high and there is also heterogeneity amongst customers and suppliers. MNOs are key players in the telecommunications industry (the "telecom industry"). These hi-tech businesses attempt to continuously utilize emerging cellular and telecommunication technologies to propose value to their heterogeneous customers that exceeds those of their rivals. The telecom industry is one of the major, dynamic, and competitive industries where the business environment is turbulent and uncertain. It is the new digital economy where change in ICT businesses including the mobile industry is no longer additive, but discontinuous and abrupt (Voelpel *et al.*, 2004). The different sources and drivers of change in the mobile industry, the concept of mobile BM innovation along with its types, and the change requirements or "prerequisites" (i.e. road block eradicators) of mobile BMs are discussed in the following sections.

3.1 Drivers of change

The telecom business is witnessing a revolution, and different factors are influential for different mobile operators. Change in mobile business can be triggered by any situational factor. This includes internal aspects such as organizational culture, structure, and architecture, as well as external aspects such as new technologies and innovations, regulations, social, and cultural norms, the financial situation and market competition. However, since operators have less control over external drivers of change, they will most likely have the greatest impacts and implications. Therefore, in this section, we look more closely at regulations, markets, and technology as primary external factors driving change in the mobile industry.

(1) Evolution of ICTs and disruptive innovations.

The mobile business is undergoing a critical revolution, mainly driven by innovative technologies in cellular networks and telecommunications. Recent technological advances have brought enormous changes to the way mobile businesses are conducted. The practical consequences are the redesign of existing mobile BMs, more apparent now that telecommunications is shifting from an industry that was all about voice, to one that is mostly data-centered (Dodourova, 2003; Self-reference 5). Cellular technology generations, particularly those starting from the Global System for Mobile Communication (GSM) to 3G Universal Mobile Telecommunication System (UMTS) and beyond, are continuously enhancing the quality of existing data services and offering new services. The convergence of these technologies is enabling mobile users to communicate richer information with unprecedented levels of flexibility and convenience.

Anticipated revenue growth has meant that the majority of mobile operators around the globe have either deployed, or are in the process of deploying, 3G+ networks to enable their business to provide 3G+ services. However, this phenomenon also implies the restructuring of the mobile operators' entire organization, as well as the reconfiguration of their value systems including actors' roles and their interrelationships (see Self-reference 6).

On the other hand, the emergence of disruptive technologies such as ad hoc and self-organized networks (WLANs) presents a threat to cellular technologies (Campanovo and Pigneur, 2003). These disruptive networks could utilize the 802.11 hot spots (Wi-Fi), which are access points offering Internet access in public places

with the potential to cover the globe. This represents another trigger to MNOs to change their BMs to adapt to the surrounding turbulent hi-tech business environment.

(2) Regulations and legislative business rules.

In an increasingly regulated telecom industry (Maitland *et al.*, 2002; Self-reference 5) governmental policies, regulations (and deregulations), and competition rules aim to reduce market dominance and ensure evolution of a self-sustaining competitive market structure. For example, deregulation and internationalization have radically changed the European telecom industry (Peppard and Rylander, 2006). Price regulations such as those related to interconnection charges and retail prices affect both profits and business.

Internationally, regulations could play a bi-directional role since they can slow down or hasten the change of BMs. Liberalization enables market expansion and competition, while strict entry regulations could lead to market dominance. Regulations along with their effects differ from market to market; and may require mobile operators with international expansion objectives on their agenda, to change their BM to match new market rules and regulations. Even within one market, MNOs have no choice but to adhere to these changing regulations through redesign of their existing BMs.

(3) Mobile market: customers and competitors.

Globalization is tearing down legacy telecom barriers and forcing monopolistic national carriers to compete globally. Moreover, the noticeable progress of many countries toward telecom liberalization is significantly increasing market power leading to strong competition. This has changed the business rules of the telecom industry, for instance, cellular infrastructure deployment is no longer a major problem, but co-operating in a much more complex system (i.e. the value network) to launch services efficiently and effectively is much more of a concern.

The structure of the telecom industry is shifting from an "autocratic" state to a more "democratic" one where a more complex and open system including extensive collaboration, communication, and co-ordination are prevalent. In response, telecom companies have been compelled to overhaul their BMs and repackage themselves. Consequently, only healthy telecoms have been successful while the "lemons" have had to leave the industry since their BMs were not able to accommodate the changes. Some companies have accommodated mergers, acquisitions, and different types of strategic alliances to sustain their businesses. Companies adopting appropriate BMs have seized opportunities associated with this technological revolution and enhanced their market positions. For instance, while O2 (formerly BTCellnet) and Vodafone are seen as the big players, they no longer dominate the UK mobile market (Ofcom, 2008). On the other hand, the needs of mobile users are transforming over time. Kim *et al.* (2008) argue that mobile users' needs have changed from homogenous to heterogeneous, and that mobile users are no longer consuming, but presuming. This significant transformation on the customer side may entail a significant change to the BMs of mobile businesses. Otherwise, mobile operators, along with their value network actors, will create cellular services which fail to match the needs of mobile users.

3.2 Mobile BM innovation

Before discussing BM innovation, it is significant first to distinguish it from BM change. Although they share similarities, transforming from existing BMs to new ones, BM "change" and "innovation" are different. They are initiated by different motives, cover a different scope, and also have different requirements and implications. We regard BM change as a "compulsory to survive" process. Mobile operators change their status quo to cope with the rapid changing environment since adaptation to change drivers and forces is essential to remain successful. Any new BM adopted may only be "new" to the organization, but not to the industry. The underlying reason for such a change is to sustain an operator's economic value rather than to enlarge it.

On the other hand, BM innovation is a "discretionary change" in which a mobile operator introduces a new paradigm or a way of doing business not only to its organization, but also to the mobile industry. It is the discovery of a fundamentally different BM that aims to increase economic value either by attracting new customers, increasing the traffic generated by the existing ones (Markides, 2006), or reducing costs and ensuring efficiency within different BM dimensional arrangements. One such example is changing the pricing scheme of the cellular services provided to comply with new regulations without capturing more economic value: this is considered a BM change. However, if this move allows an MNO to augment its economic value, then it will qualify as an innovation.

BM innovation is usually initiated by a novel idea that is fully transformed into practice based on a business plan. BM innovation does not necessarily require a radical overhaul of the BM in action. BM innovation could be due to the provision of a new product or service, or it might come from discovering a new way of delivering an existing product or service. Developing new pricing methods represents another source of BM innovation. It may also come from practising new types of relations with value network actors or even new ways of managing such relations.

As technology is part of the "value architecture" dimension of the BM, we suggest that mobile BM innovation symbolizes an umbrella that also covers technological innovation aspects. Principally, technological innovation revolves around capturing value from an organization's technological resources. In view of that, technology companies develop and acquire new technologies (disruptive technologies) that emerge to surpass the performance of the earlier ones (Christensen, 1997). However, technological innovation has become a challenge to MNOs. While MNOs were the main drivers behind the development of standards for 2G systems, system manufacturers were pushing for the establishment of standards for 3G systems (Grundstrom and Wilkinson, 2004). Subsequently, MNOs no longer have profound technical knowledge about the systems they use; and have become less able to innovate in technological aspects. To react as technology innovators, MNOs need to allocate sufficient funds for research and development (R&D).

4. Research methods

Aiming to identify critical design factors for mobile BMs, this research, as a part of larger research (see Self-reference 1), examines three real-life cases related to mobile data service BM design and engineering. These cases are Orange Business Services (OBS) (see Self-references 5, 8); Apple's iPhone services and applications (see Self-references 2, 6), and NTT DoCoMo's i-mode service (see Self-references 3, 7) as shown in Table I.

Analysing real-life case studies is well recognized in the field of ISs as it allows researchers to capture knowledge from practice and is useful in building theories. According to Yin, when the focus of the research is on a contemporary phenomenon with

Case study	Data collection method	Data analysis techniques	References
Orange Business Services (OBS)	Semi-structured interviews and secondary sources such as extensive documentation review and observation.	Content analysis	See self-references 5 and 8
Apple's iPhone services	Available literature and secondary sources	A retrospective analysis using deductive reasoning approach	Self-references 2 and 6
NTT DoCoMo's i-mode service	Available literature and secondary sources	A retrospective analysis using deductive reasoning approach	Self-reference 3 and 7

Table I.
Case studies

some real-life context, the case study method is preferred. In line with Yin, Benbasat *et al.* argue that for practice-based problems, the case study method is regarded as a convenient well established IS research method. The nature of the current research questions fulfilled all of these criteria. Moreover, the use and analysis of real-life cases is considered a highly appropriate method for answering "how" and "why" questions, and such questions are similar to those tackled in this research as it aims to define critical design factors for mobile BMs and to answer how and why only a few mobile data services are effective in practice, while the majority are struggling. Further, it has also been argued that an approach based on multiple cases is advantageous since it facilitates capturing greater detail; and improves the validity of the findings through the ability of undertaking comparisons and cross-case analysis.

Data for OBS were collected through a variety of techniques including semi-structured interviewing, extensive documentation review, and observation. In the semi-structured interviews the interview agenda was used with 15 interviewees (see Table II); i.e. managers and professionals working within Orange-Jordan. Included were three specialist employees to gain additional operational information and knowledge. Interviews were taped and each lasted on average about 60 minutes. The research utilized direct/indirect observation in addition to Orange-Jordan internal business data such as archival documents, business and annual reports, organizational charts, presentation materials, and proposals. We also drew on external secondary data such as its web sites. Having all interviews data and other secondary data in hand, the transcribed data of the 15 interviews went through preparation and editing process to make it ready for analysis purposes. The resulted textual data was then qualitatively analyzed. The main objective of the analysis was to transform data into findings, but more importantly was to explore the critical design factors of mobile BMs. The analysis procedure starts with dividing textual data into segments or comments. Afterwards, segments were coded based on their semantics. Recurring and similar segments were then aggregated into themes which represent the critical design factors of

Managerial level	Number of respondents
Chief officer, Senior manager	4
Department manager	5
Division manager	3
Employee (specialist)	3
Total	15

Table II.
The respondents of OBS case study

mobile BMs. The emerging themes were later examined based on their intensity, depth, and specificity with the phenomenon of interest. Indeed, additional emphasis given to comments that were frequently repeated or refuted by the interviewees.

For iPhone and i-mode, data were collected using available literature and secondary sources. Hence, the research utilizes existing literature in addition to organizational and business data in the form of statistics, published reports, consulting agencies' documents and reports, research databases such as Mintel, available case studies, research articles, and company annual reports as well as their web sites. A deductive reasoning approach was applied to the collected data to identify the critical design factors that would facilitate BM change and innovation developments in the mobile telecommunications sector. According to Johnson-Laird, "reasoning is a process of thought that yields a conclusion from precepts, thoughts, or assertions" (p. 110), and that reasoning is deductive when considering that the truth of the premises positively establishes the truth of the conclusion. Hence, the employed reasoning approach here is deductive as we suggest that the truth of premises in the analyzed cases leads to the truth of the identified critical design factors of mobile BMs. The deduction technique is useful for the identified purpose as the research follows a process of reasoning (arguing) to infer a general critical design factors based on individual cases and examples including bits of evidence and other rules of inference.

5. Results and discussion: the "road block" eradicators: mobile BM design framework

As we have seen, technology companies in general, and more specifically MNOs, evolve and change their BMs either by defensive actions in order to cope with the rapid changing environment, or by aggressive moves exploiting opportunities to enlarge their economic shares through innovation. We examine the critical design factors that would improve the sustainability and innovation capabilities of mobile operators' BMs.

Based on the analysis of the three case studies mentioned in the previous section, we suggest that in this turbulent, highly competitive industry portrayed by continuous rapid change, it is crucial that mobile operators design and develop Market-Aligned, Cohesive, Dynamic, Explicit, and Unique BMs with Fitting Network-Mode in order to be more successful in the long term (see Figure 1).

The aforementioned critical design factors of successful mobile BM can be further classified into two categories; operator-oriented characteristics and industry-oriented features. The operator-oriented features are "Cohesion" and "Explicitness," whilst "Market-Alignment," "Dynamicity," "Uniqueness," and "Fitting Network-Mode" are industry-oriented features related to mobile BMs. Table III summarizes the aforementioned critical design factors.

5.1 Operator – oriented critical design factors

5.1.1 Cohesion. The cohesion design factor addresses consistency and harmonization in four main vectors.

(1) BM dimensional arrangements.

Since customers' switching costs are low, mobile operators not only need to acquire customers, but also to retain them. Thus, operators have been challenged to provide quality products and services at competitive prices. Only if offerings and their associated services satisfy customers will economic value grow. However, designing a mobile BM is a multifaceted process. It entails balance

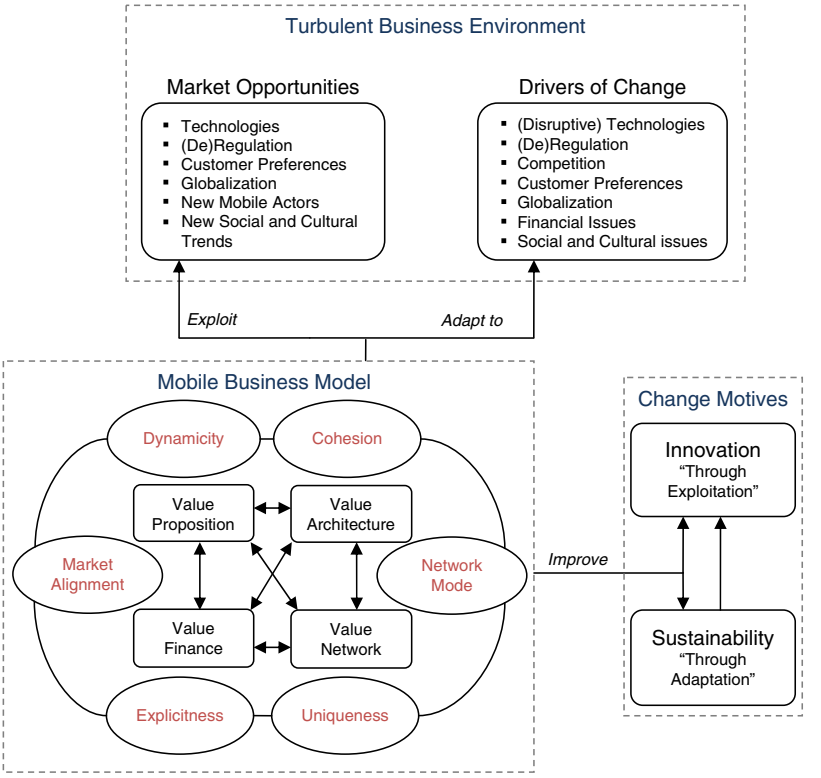

Figure 1.
The design framework of mobile business models

amongst different dimensions, interests, and requirements of various stakeholders. As highlighted earlier, mobile BMs encapsulate four interrelated dimensions: value proposition, network, architecture, and value finance. Cohesion in terms of holistic alignment and coherent trade-off among BM dimensions is essential because what is financially viable may not be viable for value proposition purposes, or may be difficult to configure and maintain, or may even be hard to acquire through the mobile value network. For example, to be able to offer its new OBS platform, Jordan Telecom Group (JTG) reorganized its organizational structure to be consistent with its strategic partner (i.e. France Telecom). Moreover, Orange has adapted OBS service nature and prices to match the requirements of its business target segment in Jordan. This adaptation of the service attributes is one of the major reasons explaining the success of this service in Jordan.

(2) Organizational business layers of mobile operators (strategy, BM, ICT-enabled business processes, and ISs).

On the other hand, we suggest that mobile BMs should harness the organizational layers of mobile operators. Clear links should be made between an operator's processes including their ISs and its BM dimensional arrangements. In a similar manner, links are also needed between BM arrangements and strategy elements (e.g. goals and objectives, mission, and vision).

Category	Characteristics	Description
Operator oriented	Cohesion	This concept encompasses four aspects. First, a holistic alignment and coherent balance amongst value proposition including offering and target segments, internal/external resources and capabilities, and total cost of ownership of the services in addition to its revenue streams Second, the cohesion concept also suggests that clear links should be made between an operator's processes including their information systems and the business model. In a similar manner, links are also needed between BM arrangements and strategy elements Third, BM Cohesion indicates that the BM of a mobile network operator should be consistent with the BMs of other players participating in the service value network, if the mobile service BM is to be successful in the marketplace. Fourth, the concept also indicates that the effectiveness of new services is leveraged if they are well positioned amongst the telecom's portfolio of existing services. So new services should not be redundant or negatively affecting existing ones
	Explicitness	The business models of mobile operators may be characterized as "cognitive" knowledge that is, in most cases, "sticky" to managers' minds (i.e. tacit or implicit) Explicitness concept is related to the process of externalizing this knowledge to create an explicit business model There are three important areas of explicit knowledge for mobile business Knowledge regarding each dimension of the operator's business model. Knowledge regarding the interrelationships and interdependencies amongst mobile business model dimensions Knowledge regarding the links between the mobile business model and other organizational layers, that is, corporate strategy and technology-enabled business processes including information systems
Industry oriented	Market-alignment	For a mobile data service to be successful, it is important that its business model is aligned with market conditions The variability of environmental factors significantly affects the viability and value of mobile data services BMs Such environmental factors include size of customer-base and nature, customer requirements, social structure and culture, market opportunities, competition level, laws and regulations, and technological advances
	Dynamicity	An operator's dynamicity is represented by its flexibility and readiness to adapt to its dynamic environment. This concept is represented as follows *Scalability*: the ability of the mobile network along with its applications to expand efficiently to accommodate change *Interoperability*: the ability of the mobile network (including hardware and software) to communicate across all platforms (i.e. platform-independent) *Modularity*: modularity is determined by the ability to organize and modularize mobile system components into subsystems which can be (re)used for the same or different functions *Versatility*: to satisfy their needs, customers shift between diverse roles and use unlike mobile appliances with varied forms, requirements, and facilities over different networks and technologies. Moreover, they are billed for these services in various ways and at different times. Mobile versatility however is the key to resolve this dilemma as it addresses

(*continued*)

Table III.
Critical design factors of successful mobile business models

Category	Characteristics	Description
		the potential of a mobile operator technology to incorporate other technologies to achieve the desirable extended capabilities
		Adjustability: the ability of operators to modify and change their mobile technologies incrementally, rather than radically
	Uniqueness	The mobile business model is unique when it is significantly and positively different from those of counterparts
		A company can outperform rivals only if it can establish a difference that it can preserve
		When the business model of mobile data services is positively unique, the potential for success is highly leveraged
	Fitting network-mode	This concept indicates that partnerships and external collaboration can be distinguished as open or closed, and that each mode has trade-offs, thus requiring companies to choose the one that best suits their settings if they are to be successful in their markets
		The decision whether to follow an open or closed network model significantly affects the success of the mobile data services developed; neither a closed nor open network mode is appropriate at all times and regardless of a telecom's particular situation
		To offer innovative mobile data services, telecoms need to apply the most fitting network mode to their situation
		Open business model indicates that any internal or external party can join and suggest ideas and solutions, whereas in closed business model the company recognizes the knowledge domains needed and select parties to draw on to develop the new service effectively. There is also another model called walled-garden where only selected parties can participate and suggest ideas but other parties can also join the network if they can meet certain predefined criteria

Table III.

Apple with the iPhone, for example, has shown that telecoms needs to understand the overlap between strategy and BM and make sure that both are directed toward the same end. The iPhone structural arrangements have been fully consistent with its differentiation strategy. Apple in this context has been very deliberate in assuring outstanding quality. This is noticeable in the iPhone hardware design as well as its operating system, services, and applications. The simplicity and the employed navigation mechanism also illustrate the high quality of the platform. On the other hand, Apple's ability to achieve what it has accomplished with the iPhone has been largely supported by its powerful design knowledge and experience, strong and visionary leadership, and its existing technological resources.

OBS offers another example. The vision of Orange in Jordan is to become the integrated telecom providing fully fledged services to the region. To this end, it offers OBS as a complete solution to the business market in Jordan, aiming to fulfill the varied requirements. The BM arrangement of OBS fits Orange-Jordan strategy very well. The service integrates a large number of much needed mobile services in the market. To support this bundle, Orange-Jordan has also restructured its operations and structure in a way that matches the requirements of OBS. Integrating aspects of strategy with BMs, and linking BM arrangements with operational functions are two of the main reasons explaining the success of OBS in Jordan.

(3) BMs of value network actors.

Consistency among BM dimensions and also among organizational layers is critical to success. However, mobile operators are collaborating and cooperating with many national and international actors, such as content providers and aggregators, payment gateways, billing service, and wireless internet service providers (Self-reference 5). Consistency amongst BM actors is particularly important since conflicts in their strategic interests would probably have catastrophic effects on each player. The way Apple has consciously selected its partners for development and distribution purposes for the iPhone is one main reason for its success. Importantly, we suggest here that although cohesion affects innovation, it mainly supports the sustainability of mobile BMs.

(4) The fit between new and existing services

The effectiveness of new services is leveraged if they are well positioned amongst the telecom's portfolio of existing services. If the new service is to be innovative and effective it should not be redundant or negatively affect existing services offered in the market by the telecom. New services are effective if they have their own space within the telecom's portfolio of existing services, and if this space fulfils a need in the market, as illustrated in Figure 2.

The iPhone fits well with Apple's other products and services. The same is true of both i-mode and OBS. i-mode was a new type of service offered by NTT DoCoMo, complementing and leveraging its existing service. On the other hand, OBS for Orange Jordan is the new banner of services targeting the business market while existing services before OBS were mainly for individual users.

5.1.2 Explicitness. The BMs of mobile operators may be characterized as "cognitive" knowledge that is, in most cases, "sticky" to managers' minds (i.e. tacit or implicit). Carlile (2002) argues that knowledge is both a source of, and a barrier to, innovation since it is localized, embedded, and invested in practice. Hence, the process of externalizing this knowledge to create an explicit BM is complex, but significant (Casadesus-Masanell and Ricart, 2010). There are three important areas of explicit knowledge for mobile business:

(1) knowledge regarding each dimension of the operator's BM;

(2) knowledge regarding the interrelationships and interdependencies amongst mobile BM dimensions; and

(3) knowledge regarding the links between the mobile BM and other organizational layers, that is, corporate strategy and technology-enabled business processes including ISs.

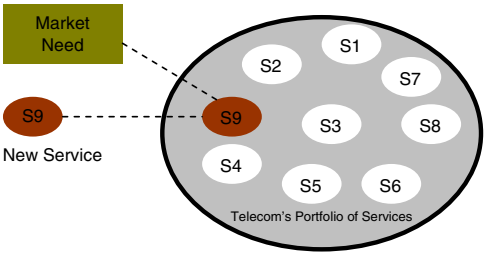

Figure 2.
The fit of new mobile data services

In addition to openness, explicit design facilitates organizational learning, since both incorporate creation of new knowledge that has the potential to influence actions. Making a mobile BM explicit is a process of mobilizing a strategic-oriented knowledge capital from "loosely coupled" data and information existing in different formats and manners. Therefore, explicit BMs (textual and/or graphical) would enhance business understanding, facilitate knowledge sharing and dissemination, and support mobile operators in analysing and evaluating the feasibility of their BMs in action. In particular, it would enhance the organization's ability to sustain and innovate, and most importantly to speed up its adaptation and innovation levels.

Casadesus-Masanell and Ricart (2010) indicate that aggregation and decomposability are two main ways to simply the representation of a business model. Aggregation is like "zooming out" or looking at the BM from a distance which helps in understanding the overall BM. On the other hand, decomposability allows only one or few parts of the BM to be represented.

5.2 Industry-oriented critical design factors

5.2.1 Market alignment. This research suggests that there is no direct proportional relationship between the technological excellence of the mobile services provided and the outcomes they can generate. Such a relationship is mediated by social context as the importance of social and cultural factors is significantly increasing due to the regional and international expansion strategies adopted by many telecoms. Furthermore, the variability of environmental factors such as size of customer-base and nature, market opportunities, competition level, laws and regulations, and technological advances, also affects the viability and value of mobile data services BMs. To give just one example, NTT DoCoMo's i-mode is a successful BM in Japan that had more varied results in the European market (Kallio *et al.*, 2006). Therefore, telecoms need exposure to the outside world since market-orientated mobile business is needed in order to launch effective and innovative services. Slater and Narver (1995) argue that a market-orientation is important since it focusses the business organization on:

(1) continuously collecting useful information such as information about the needs and preferences, of target customers and the capabilities and competences of competitors; and

(2) using this information to create superior customer value.

Indeed, telecoms need to listen carefully to their customers and exploit those ideas and resources that fit their capabilities. Since a mobile data service is only valuable if it fulfills customer needs or solves business problems, only those specific mobile services that add value to the targeted customers within the current market conditions might be considered as candidates. The current research reveals five main market-related factors affecting the design of mobile data services BMs (see Section 5.2).

We consider that valuable mobile data services are those consistent with their external operating environments and with their industry forces. A successful mobile data service in one market may not be successful in other markets. For example, the success of NTT DoCoMo's i-mode depends largely on the market characteristics in which the service is functioning. Japan's unique customer profile and market conditions have facilitated the progress of i-mode diffusion and success in Japan. On the other hand, the absence of similar conditions in the overseas markets has made it very hard

for i-mode to be adopted outside Japan, given the service attributes. Hence, the authors postulate that the fit between service and market significantly affects the success of innovative mobile data services.

5.2.2 Dynamicity. Dynamicity is about continually linking MNOs with their external environment to ensure consistency. An operator's dynamicity is represented by its flexibility and readiness to adapt to its dynamic environment. Only when mobile BMs are dynamic (flexible and adaptive), can MNOs adjust their BMs without any substantial limitations. Mobile dynamicity is essential since continuous improvements to a mobile BM would reduce the associated risks and maximize the probability of success, more than a method based on a radical change (Kalakota and Robinson, 2001; Pateli and Giaglis, 2006).

The iPhone BM is dynamic, evidenced by the smooth and prompt changes, mainly to the value proposition, value network, and value finance dimensions so as to keep the offering successful in the market. Apple has provided five major generations of the iPhone within a few years with each new generation offering significant improvements in terms of quality and features. In developing iPhone applications, Apple has moved from a totally closed to a walled-garden network model and has been able to offer more varied applications as fast as possible. To stay competitive over time, Apple has changed its pricing methods allowing customers to pay the price of the handset through monthly instalments that usually span the contract lifetime and has changed the revenue share mechanism it employed with MNOs. It is suggested that in a more complex and sometimes unique digital business such as telecoms, the BM needs to be dynamic and more flexible than conventional BMs.

Another example is NTT DoCoMo's i-mode. The i-mode value proposition has been enhanced over time by adding new features and services to the platform aiming to attract more customers and keep existing customers satisfied. Moreover, NTT DoCoMo also changed its pricing method by giving customers the ability to choose between volume-based or flat-rate pricing methods. These changes are necessary to cope with changes to the market to keep offerings successful.

Our analysis also reveals that mobile dynamicity has two dimensions: technological and organizational flexibility and adaptability, encompassing technology application, organization structure and arrangement, and people. Technology characteristics and readiness that enable changes to the BM signify the mobile operator's "technology dynamicity." We categorize these technology characteristics as follows:

(1) Scalability: the ability of the mobile network along with its applications to expand efficiently to accommodate change. Clark and Pasquale (1996) argue that networks must be designed with scalability in mind from the outset; and that truly scalable network architecture is able to accommodate growth in several dimensions, such as bandwidth, number of users, and number of connections.

(2) Interoperability: the ability of the mobile network (including hardware and software) to communicate across all platforms (platform-independent). We consider this characteristic crucial to market growth, because it offers lower-cost products and services that are not only easier to install and maintain, but are also faster to market, with more options for customers and suppliers (Lee, 2001; Aungst and Wilson, 2005).

(3) Modularity: modularity is determined by the ability to organize and modularize mobile system components into subsystems which can be (re)used for the same or different functions. In the mobile business, modularity should extend beyond network issues to include product and service concerns in order to reduce complexity and increase efficiency.

(4) Versatility: to satisfy their needs, customers shift between diverse roles and use unlike mobile appliances with varied forms, requirements, and facilities over different networks and technologies. Moreover, they are billed for these services in various ways and at different times. Mobile versatility however is the key to resolve this dilemma as it addresses the potential of a mobile operator technology to incorporate other technologies such as Wi-Fi to achieve the desirable extended capabilities. We suggest that versatility will be, in the near future, one of the most important domains providing MNOs with a sustainable competitive advantage.

(5) Adjustability: the ability of operators to modify and change their mobile technologies incrementally, rather than radically. An equally important factor in adjustability is the number of mechanisms that can be used or deployed to adjust existing mobile technologies including self-adjusting options.

The second dynamicity, "organization dynamicity" relates to operators' flexibility and adaptability to change in terms of: organizational structure, non-technical configurations, management practices, and internal social and cultural aspects. To cope with the rapid pace of change in mobile business, "change" must be seen as a process rather than an event, and this philosophy enforced within an operator's culture. A flexible organization structure, teamwork, and training are vital to dynamicity in this context.

5.2.3 Uniqueness. Another identified critical design factor of innovative mobile data services is uniqueness or novelty. The authors agree with Porter (1996) that "a company can outperform rivals only if it can establish a difference that it can preserve" (p. 3). Indeed, when the BM of mobile data services is positively unique, the potential for success is highly leveraged. The mobile BM is unique when it is significantly different from those of counterparts. In the context of mobile data services, the significant difference can come from one or more of the V^4 BM Framework dimensions including their constituent design concepts (see Self-reference 4). For example, the mobile BM can be considered unique when employing novel and effective pricing methods, or when using innovative cutting-edge technology not accessible by other rivals which has the potential to influence the offering positively, or even when delivering new added-values and benefits. It is also unique when telecoms target original markets, sectors, or segments overlooked by existing rivals, but deemed to be profitable. Uniqueness can also be achieved when telecoms incorporate new actors not considered before within the value network, or when telecoms are linked to the traditional actors in new innovative ways.

It is interesting to consider how Apple differentiates its iPhone BM from those of other established competitors. The uniqueness factor in the iPhone BM is multifaceted. The first fundamental element is its value proposition along with its target segment. Almost all other smartphones such as Blackberry, Nokia E71, and Palm pre were designed principally for professional users; the iPhone targets personal users creating for itself a unique position within the market. This in turn has affected the design and engineering of the iPhone services and applications in terms of their functionalities

and their look-and-feel aspects. Other elements contributing to iPhone's uniqueness are its operating system, usability due to simplicity, convergence, and the unprecedented number of available iPhone applications (only available through Apple's App Store via iTunes) along with their diversity that make them more powerful.

Apple's distribution of the iPhone only through exclusive and selected mobile operators in addition to Apple itself, also contributes to the uniqueness of the iPhone. Apple's philosophy seems to be completely different and has created an important psychological effect on customers as well as mobile operators by limiting the distribution channels. The Apple approach to its iPhone distribution has been unique and successful in making both customers and mobile operators think they are privileged to have the iPhone.

In the case of i-mode and OBS services, one can easily recognize that i-mode was unique simply because it was the first mobile data platform to be launched not only in Japan but also in the world, while OBS complements the services offered by Orange-Jordan as it comprehensively addresses the requirements of the business market.

5.2.4 Fitting network-mode. The fitting choice between closed vs open network models signifies the fourth recognized key value driver in the industry-oriented sphere. Chesbrough (2006) argues that the open BM where those both inside and outside the company can offer ideas is the correct and only way to thrive in the new innovation landscape. Chesbrough (2007) also argues that the open BM addresses the rising cost of technology development and shorter product life cycles by saving time and money in the innovation process through leveraging outside R&D resources. It also addresses revenue sources by either licensing resources to other companies, or by creating new products and services by licensing resources from other companies.

Currently, telecoms are suffering financial problems due to factors such as the cost of 3G licenses, and the cost of debt due to its expansion strategies. In addition, telecoms are looking for new sources of revenue to shorten the payback period of the debt incurred in establishing the business. As potential broadcasters of ideas within the value network, telecoms are in a significant position; they own customer bases and have direct contact with end users. Accordingly, they are more able to discover market opportunities and pinpoint changing user needs than other players within the network.

An analysis of the collected data supports the view of Pisano and Verganti (2008) that partnerships and external collaboration can be distinguished as open or closed, and that each mode has trade-offs, thus requiring companies to choose the one that best suits their settings if they are to be successful in their markets. This can be explained by reference to the iPhone and i-mode cases. Apple has demonstrated that the closed network model is highly effective as it facilitates the creation of the best solution or innovation when the company recognizes the knowledge domains needed and which parties to draw on to develop the new service effectively. Even when Apple has moved to a walled-garden mode, it has not opened its network and the only facet that has become available to outsiders is application development. The iPhone hardware design, operating system, and core services and applications are still fully controlled by Apple and its closed network.

NTT DoCoMo i-mode follows a closed network mode as well. In developing the i-mode service, NTT DoCoMo has adopted a closed network mode given that user and market requirements were clearly defined following the market research conducted by

marketing specialists Muri Matsunaga and Takeshi Natsuno. A closed model was also deemed appropriate as the telecom was able to determine the required knowledge domains for the i-mode service and the parties with which to collaborate given its long and sustainable relationships with many and different types of actors inside and outside the telecommunications sector. Further, its extensive R&D capacities, as well as its knowledge of telecommunication standards, infrastructure, services, and devices also justify the appropriateness of a closed network mode in this case.

The decision whether to follow an open or closed network model significantly affects the success of the mobile data services developed; neither a closed nor open network mode is appropriate at all times and regardless of a telecom's particular situation. To offer innovative mobile data services, telecoms need to apply the most fitting network mode to their situation.

6. Conclusions

The mobile business environment is uncertain, turbulent, and hypercompetitive. MNOs are challenged with the fast pace of change, driven by innovative technologies (de)regulation issues, and competitive market factors. Operators face a paradoxical challenge that is functioning efficiently to sustain, and effectively to innovate. This adds to the complexity of designing feasible mobile BMs.

In this paper, we provide a framework for designing and developing Market-Aligned, Cohesive, Dynamic, Explicit, and Unique BMs with Fitting Network-Mode, which, if adopted by MNOs, would ensure their long-term success by improving the sustainability and innovation capabilities of their BMs. These critical design factors address different spheres of the mobile business: "Cohesion" and "Explicitness" are operator-oriented, whereas "Market-Alignment," "Dynamicity," "Uniqueness," and "Fitting Network-Mode" are industry oriented.

Cohesion is required among the four dimensions of value proposition, network, architecture, and finance, and also required between the organizational layers. These layers need to be treated as a harmonized package that should be reviewed continually to ensure consistency with the external environment. Constructing explicit BMs and forming these cohesive links textually and/or graphically would facilitate knowledge sharing and dissemination, and support operators in analysing and evaluating the feasibility of their BMs in action.

It is more apparent now that the structure of the telecom industry is shifting from an "autocratic" state to a more "democratic" one; where a more complex and open system including extensive collaboration, communication, and co-ordination are prevalent. An open mobile BM allows ideas to come from any stakeholder enriching the value network, and enabling innovation required for value creation. However, this requires an open management mindset and an appropriate internal culture. Choosing the fitting network-mode is a driver of BM success. Mobile BMs need to be flexible in this turbulent and highly competitive industry. Technological as well as organizational dynamicity is essential to ensure the vital consistency with the changing external environment in general, and, more specifically, the turbulent mobile business sector.

This study contributes to the existing body of knowledge in the intersection between BM and mobile telecommunications. In the BM context, the majority of studies are still looking at the composition of BMs. Other studies take one step further and suggested methods for developing BMs. Nonetheless, and to the best of our knowledge, this is the first attempt to define critical design factors for BMs in general and in the mobile

telecommunications industry in particular. Another fact with adds to the significance of this study is related to the high level of competition and also innovation in the mobile telecommunication sector. This industry is in great need to be provided by a framework that not only demonstrate to them the way in which BM for mobile data services are developed, but also direct them on how to develop a successful and innovative BMs. This study provides the mobile telecommunication sector with a comprehensive framework that clearly identifies the critical design factors of mobile BMs. This framework can help mobile telecommunication providers in developing more competitive, successful, and innovative mobile data services. In one hand, this can promise telecoms in significantly increasing their revenues through fulfilling the ambitious requirements of their customers and making them more satisfied. On the other hand, customers will be provided by innovative services which would also improve their quality of life (BBC News, 2008).

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