TOWARDS A BUSINESS MODEL FOR CELLULAR NETWORK AND TELECOMMUNICATION OPERATORS: A THEORETICAL FRAMEWORK

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ABSTRACT

Cellular networks and telecommunications bring major change to the way businesses are conducted. Mobility has become one of the main priorities for users and this has impacted on cellular networks and telecommunication operators (CNTOs). However, entrants into the cellular industry have been confounded primarily by inexistent or weak Business Models (BMs). Designing a BM for a CNTO is complex and requires multiple actors to balance different and often conflicting design requirements. Nevertheless, most research about CNTOs has been technically oriented and has mainly addressed the technological and engineering issues related to their infrastructure. Less attention has been given to the business model of CNTOs. Hence, there is a need to enhance our ability to determine what constitutes the optimal and most viable business model to meet the various strategic objectives and goals for these CNTOs. In this paper an overview of research into the cellular business model and the main issues to be resolved is provided. In particular, the authors propose guidelines as a basis on which to develop a more comprehensive definition which may lead to a consensus. Moreover, a generic model (V^4 Model) is proposed for the BM of these companies based on value proposition, value architecture, value network and value finance.

Keywords

Business Model, Cellular Network and Telecommunication Operators, Information Systems.

1. Introduction

The ability to communicate virtually from anywhere at any time offers unprecedented levels of flexibility and convenience, and the stage is now clear for wireless networks and telecommunications to bring tremendous change to the way that businesses are conducted. Because of the newness of this area as well as the provisioning of new technologies such as third and fourth generation cellular phone services, this has become one of the most important and exciting areas for research purposes (Panko, 2005). There is also increasing popular interest in cellular telephony; mobility has become one of the main priorities for users impacting on Cellular Networks and Telecommunication Operators (CNTOs). However, designing business models for CNTOs is a complex process; it requires multiple actors to balance different and often conflicting design requirements (Haaker et al., 2006).

Most of the research into cellular technology has addressed the technical and engineering issues related to its infrastructure. For instance, Lin (1996) discuss mobility management, that is, how to track the locations of the users and allow user movement during conversations, Li and Chao (2004) investigate an analytical model for cellular communications networks, and Chaouchi et al. (2006) discuss certain issues related to signaling information in integrated 4G networks such as which approach of integrated signaling (unified versus non-unified) should be adopted.

Few researchers have looked at the cellular technology domain from a business and information systems perspective, with the exception of marketing aspects. Although there is some published research on the alignment between business model and organizational strategies of technology companies (Pateli and Giaglis, 2004; Osterwalder et al., 2005), less attention has been given to the business models of cellular networks and telecommunication operators as discussed in this paper.

Generally speaking, the business model concept is becoming one of the important domains in the field of Information Systems (IS). To give just one example, the AMCIS conference has a mini-track on the topic. However, attention to the business models of CNTOs is particularly important since recent developments in wireless networks and cellular technologies have generated many possibilities relating to new

business models that might be adopted by different cellular networks and telecommunication operators (Kim et al., 2006). Yet entrants into the cellular networks and telecommunications market have been confounded by inexistent or weak business models (Kallio et al., 2006). Hence, there is a need to determine what constitutes the optimal and most viable BM to meet the various strategic objectives and goals for those CNTOs. In this paper, the main issues and challenges concerning cellular business models in general and in particular to those issues and challenges directly related to cellular networks and telecommunication operators are highlighted.

The remainder of this paper is structured as follows. In the next section, an introduction to the study area is provided, and the authors highlight the different viewpoints of researchers looking at the business models of technology companies. This analysis is used later to propose a more unified approach. Section 3 reveals a paucity of research into business models and CNTOs specifically. By using the information highlighted earlier and the research available on CNTOs, the authors are able to offer a generic model based on value proposition, value architecture (focusing on technology), value network and value finance in Section 4. Finally, in Section 5, we highlight the main contributions of our research and suggest further work.

2. Guidelines to Develop a Consensus for the Business Model

Early research into business models in the IS field were mainly concerned with e-business and e-commerce. Researchers attempted to develop convenient classification schemas to understand the business model concept. For example, at that early stage, definitions, taxonomies, and classifications of IS business models were provided for electronic markets and internet commerce (Timmers, 1998, Bambury, 1998). Later, researchers applied the BM concept to other domains, including the cellular technology sector (Haaker et al., 2006, Kallio et al., 2006). However attempts to understand the business model by identifying its components and boundaries is by no means complete and our understanding is not yet well developed (Osterwalder et al., 2005). Further, few researchers have attempted to study the interrelationships between the components of business models nor those between business models and the organizations' success or performance in the technology sector, so that these relationships are not well understood (Haaker et al., 2006).

Nevertheless, despite the increasing emphasis in the literature on the importance of the business model to an organization's success, there has been a lack of consensus regarding its definition and its pillars or components (Kallio et al., 2006). Researchers in the area have depicted business models from different perspectives. Through an analysis of definitions of the business model in the IS literature, the authors propose the following classification (see table 1) as a basis on which to develop a more comprehensive definition in order to reach a consensus.

Table 1: Business Model Perspectives

Perspective of the Business Model	Brief Description	Researchers
Value Creation Model	A way in which organizations, along with their stakeholders (business actors) create value either for their customers or to each party involved.	Magretta, 1998, 2002; Amit and Zott, 2001; Petrovic et al., 2001; Stähler, 2002; Osterwalder et al., 2005; Haaker et al. 2006.
Revenue Model	A way in which organizations generate revenue.	Timmers, 1998; Magretta, 1998, 2002; Rappa, 2000; Linder and Cantrell, 2000.
Abstraction Model	An abstraction of the existing business and the planned future business.	Stähler, 2002.
Architecture Model	As an architecture for the organization, including its assets, products, services, and information flow.	Venkatraman and Henderson, 1998; Timmers, 1998.
Business Logic Model	As business logic relating to the ways in which businesses are being conducted.	Petrovic et al., 2001; Osterwalder et al., 2005.
Collaborative Model	As a way in which an organization enables transactions through the coordination and collaboration among parties and multiple companies.	Amit and Zott, 2000; Bouwman et al., 2004; Haaker et al., 2006.
Alignment Model	As an interface or a theoretical layer between the business strategy and the business processes.	Camponovo and Pigneur, 2003; Osterwalder et al., 2005; Rajala and Westerlund, 2005; Tikkanen et al., 2005; Morris et al., 2005.
Strategy Model	As an organization's strategy or set of strategies.	Leem et al., 2004, Kallio et al., 2006.
Conceptual Model	As a conceptual tool, a business abstraction, and a blueprint.	Stähler, 2002; Haaker et al., 2004; Osterwalder et al., 2005.
Organizational Model	As a way of understanding a single organization or a network of organizations.	Bouwman et al., 2004; Haaker et al., 2006.

Our analysis of the literature on the business model has revealed a clear lack of consensus, perhaps due to the youthfulness of this concept, since it has risen to prominence only towards the end of 1990s with the advent of IT-centered businesses (Stähler, 2002; Osterwalder et al., 2005). However, as we show in the next section, this lack of consensus is even more evident in relation to CNTOs.

3. Cellular Business Model Pillars

In the previous section it became evident that there is a clear lack of consensus about the business model concept in general. However, in this section a paucity of research into business models and CNTOs specifically is also discussed. One exception is that of Van de Kar et al. (2003), who argued that the business model for CNTOs consists of four main components:

1) **Service formula (including customer value):** This component includes offered services meeting customers' preferences and needs to satisfy them and to add value. One of the key elements in business models is value creation. There are many factors to establishing cellular value, such as time-critical arrangements, efficiency ambitions and those relating to on-the-road situations. Moreover, service formula includes the manner in which CNTOs promote their services, pricing, and the way services are delivered to the target market.

2) **Enabling technology:** Emerging cellular technologies have made new cellular services available for customers' use via network technologies, protocols, location techniques, and handset designs and contents. However, even though they may be considered together as a factor enabling new service development, if they are heavily driven by technology they are unlikely to be successful in the market.

3) **Network formation and coordination:** Since cellular services require a great deal of resources and capabilities that rarely exist within one organization, collaboration and coordination needs to be formed among a number of organizations in order to offer the cellular services as intended. This network linking these organizations could be represented as a complex value system.

4) **Revenue model:** For each organization to take a part in this complex value system, services have to be financially viable to help that organization achieve its goals and objectives.

Camponovo and Pigneur (2003) suggest that the business model for CNTOs has the four components shown in table 2.

Table 2: CNTO Business Model Components (Camponovo and Pigneur, 2003)

Business model component	Brief description
Value proposition	The manner in which a CNTO provides physical connectivity, access to other networks, and access to the internet for its customers.
Target customers	Individual customers, businesses, virtual CNTOs
Core activities	1. Network promotion and contract management (customer service, invoicing) 2. Service provisioning (service development and quality assurance) 3. Infrastructure operation (network deployment, maintenance, management)
Revenue flows	Subscription fees, transaction fees, volume-based fees.

As participants in the broad research agenda that includes Business4Users (B4U) project, Haaker et al. (2006) have conducted research concerning cellular services business models. Instead of focusing on a business model of a single organization, they have provided a perspective on cross-company collaboration in complex value networks required for offering cellular services. Taking into account Haaker et al. (2004, 2006), Bouwman et al. (2004, 2005), and Faber et al. (2004), business models consist of the following components:

1) **Service:** The main issue here is value, seen as perceived benefits over total costs of a product or service for customers in target markets. Services offered must deliver the desired satisfaction in more effective and efficient ways than rivals. Furthermore, they have introduced new value concepts such as the intended and the delivered value for providers as well as customers. Targeting, creating value, branding, and customer retention have been identified as the critical design issues in the services domain. Targeting is about choosing profitable target groups in terms of demographics and size of market. Service providers could focus on a niche or a mass market. As for value creation, it is about the value proposition for customers. Value elements such as

accuracy, speed, and personalization are the main determinants of the offered services' added value. Trust could be viewed as the reliability of a service provider and the levels of privacy and security provided by the deployed technology. Branding design concerns the mechanism by which an organization reaches its customers. It directly affects the perceived value of the offered service, and is thus an important means for customer value creation. The last design issue in the service domain is customer retention. This is mainly tied to the marketing strategies deployed by the service provider which aim to keep customers' loyalty through their satisfaction with the offered services.

2) **Technology:** The main issue here is functionality. It describes the capabilities and the technologies being provided to the customer, for example, 3G-enabled cellular service functionalities such as high data rate. Another important aspect is the technical architecture. This describes the way in which the technical system is organized and is composed of applications, devices, access networks, and the backbone infrastructure. The critical design issues that have been identified here are security, quality of service, system integration, accessibility, and management of user profiles. The way security is implemented in the technical architecture directly affects the trust customers have in the offered services. The quality of service issue is directly influenced by the technical architecture performance. However, organizations have to maintain a balance between quality of service and the incurred costs. Personalization is about creating and maintaining customers' interests, preferences, and behaviors which heavily rely on technical capabilities. The extent to which new services could be integrated and launched within the existing technical infrastructure is identified as the system integration. Accessibility is about the ability of customers to access the offered services.

3) **Organization:** This concerns the resources and capabilities available either within the organization or in its surrounding environment. An organization's economic value is determined by its ability to absorb ICT resources and align them along with the existing resources, then diffuse them in activities which should be managed to create propositions at lower costs and higher qualities than organization rivals. Critical design factors here include partner selection, network openness, network governance, and network complexity. Partner selection is revolved around partners providing the

organization with the needed critical or supporting resources. Network openness is about the ability of business actors to join the value network and to what extent. The main strategic concerns in network openness are exclusiveness, customer reach, and control. As for the network governance, this is concerned with determining the dominant actor in the value network; in other words, customer ownership. Network complexity is about the number of relations each business actor has to manage, a trade-off between network complexity and the accessibility to critical resources.

4) **Finance:** This concerns revenue models, investment decisions, revenue sharing arrangements, cost effectiveness, net cash, and return. There is a direct relationship between the organizational and the financial domains. Furthermore, the organizational financial decisions require a collective agreement from all value network participants. Critical design issues in the finance domain are pricing, division of investments, decision about costs and revenues, valuation contributions and benefits. Pricing should ensure that customers' perceived value balance exceeds service price. The division of investments revolves around partners' profitability and risk profile. Costs and revenues distribution and allocation represent a division of costs and revenues design issue. Valuing contributions and benefits assures fairness through matching contributions for each participant in the value network with participants' allocated benefits. Furthermore, researchers have identified market opportunities, technical developments, and regulatory changes as factors affecting organizations' business model domains. On the other hand, it has been seen that organizations' business models affect both the economic value for the network businesses and customer value.

Table 3: Business Model Pillars (after Tadayoni and Henten, 2006).

Business model pillars	Brief description
Value proposition	Describes the offered services and/or goods provided to customers by a single organization or a network of organizations.
Technology solution	Influences the service/product price and quality and it has an impact on the value network players.
Cooperation platform	Describes the cooperation among value network players in order to deliver services and goods to customers.
Financial design	Describes costs and revenues distribution among the value network players.

These four 'pillars' for business models (summarized in Table 3) have been identified by Tadayoni and Henten (2006) in their research on mobile broadcasting.

The exploratory research of Kallio et al. (2006) focuses on the factors that are shaping the emerging market of cellular data services. They selected the external factors affecting cellular operators' business models using Osterwalder et al. (2002) but have adopted Rajala et al.'s (2001) framework for selecting the business model internal factors by replacing the revenue logic with the value creation component:

1) **Internal factors:** CNTO business models consist of the following strategies:
    1) ***Product development strategy:*** This covers the structure of the process that creates a value proposition and defines the manner in which value is created. It includes service packages offered by cellular networks and telecommunication operators as well as handset design and content.
    2) ***Sales and marketing strategy:*** This includes the strategies used by CNTO's for marketing and distribution purposes. It also illustrates how these strategies are used by CNTOs to create value.
    3) ***Servicing and implementation strategy:*** This represents the different deployments and installations a CNTO needs for working purposes as well as enhancing the offered value. Installations such as hosting and billing services are mostly handled by a third party.
    4) ***Value creation strategy:*** This is the value proposition, and is considered one of the most challenging issues for CNTOs. It describes how a CNTO generates revenues and profit, how it maintains or improves the service level offered to its customers, and how a CNTO provides its customers with access to many delivery channels.
2) **External factors:** According to Kallio et al. (2006), there are four key factors determining the viability and suitability of business models within different markets:
    1) ***Customer base*****:** This represents the CNTO's target customers' preferences and impacts on the success or failure of the CNTO's products and services.
    2) ***Government policy and regulation:*** This includes the different actions, rules and policies that the government takes, and accordingly supports or hurts cellular markets. Markets having government support have taken off relatively quicker than those have had not. Governments can provide support to cellular markets in different forms, including incentive regulatory policies, citizens' education, and sometimes through infrastructure investment.

3) ***Technological advances and constraints:*** This describes the chosen technology that has been adopted by a CNTO. The ability to sustain or grow in the market, as well as the development of applications and content competitively is correlated to the adopted technology and the existence of legacy systems or incompatible platforms.
4) ***Value chain dynamics between network operators and suppliers:*** This describes the CNTO's relationships with suppliers and third parties that ensure the successful launching of the CNTO's services. These relationships are crucial since services offered by CNTOs require a high level of collaboration among multiple actors to ensure that the needed alignment among handset design, content, and network service does exist.

4. Proposing a generic business model for CNTOs

Our analysis of the IS literature has shown a somewhat fuzzy and inconsistent understanding of business models for technology companies which is even further evident for CNTOs. Researchers have not aligned themselves with any business model definition for cellular networks and telecommunication operators. Indeed some researchers have defined business models based only on their components or even one or a few components (Timmers, 1998; Magretta, 1998; Rappa, 2000).

Some argue that the business model is an interface or an intermediate theoretical layer between the business strategy and the business processes (Osterwalder, 2004; Tikkanen et al., 2005; Rajala and Westerlund, 2005; Morris et al., 2005), whilst others such as Kallio et al. (2006) have mixed the strategy and business model concepts, depicting the business model components as a set of business strategies.

On the other hand, most of the cellular business model studies have only listed the BM components with a general and brief description of them. Furthermore, these studies have depicted cellular business model components from different points of view and each one has concentrated on only a few parts of the whole. However, Haaker et al. (2006) is one of the rare studies that have listed the main elements of each component. They have also built in a causal relationship between those elements to understand cellular business models and their relationships more thoroughly. Nevertheless, the emphasis of this study was on cellular marketing aspects as well as

cellular value network management and their Critical Success Factors (CSFs). Moreover, no description has been provided for their proposed cellular BM elements or its CSFs. Further, some important critical factors for cellular companies have been neglected in their study, including network coverage, capacity, reliability, and interoperability.

Table 4: Cellular BM Comparison.

Business Model Components / Studies	Van de Kar et al. (2003)	Camponovo and Pigneur (2003)	Haaker et al. (2006)	Tadayoni and Henten (2006)	Kallio et al. (2006)
Value proposition	Service formula	Value proposition, target customers	Service domain	Value proposition	Product development strategy, customer base
Value Architecture	Enabling technology	Core activities	Technology domain	Technology solution	Servicing and implementation strategy
Value Network	Network formation and coordination		Organization domain	Cooperation platform	Value chain dynamics
Value Finance	Revenue model	Revenue flows	Finance domain	Financial design	Value creation strategy

Different researchers have defined the main components of business models using different words (Rajala and Westerlund, 2005). However, our review of the literature concerning CNTO's business model components suggests that value proposition, value architecture, value network, and value finance are the main four components for these companies (see table 4). The value architecture component revolves around CNTO resources and capabilities as well as their configurations; the value network component represents the external arrangements which revolve around the communication and collaboration a CNTO needs and conducts with other businesses in its value network in order to be able to offer its products and/or services. The value finance component revolves around the financial arrangements a CNTO conducts for its value proposition and value architecture. The value proposition component is also included and this revolves around the core products and/or services a CNTO offers.

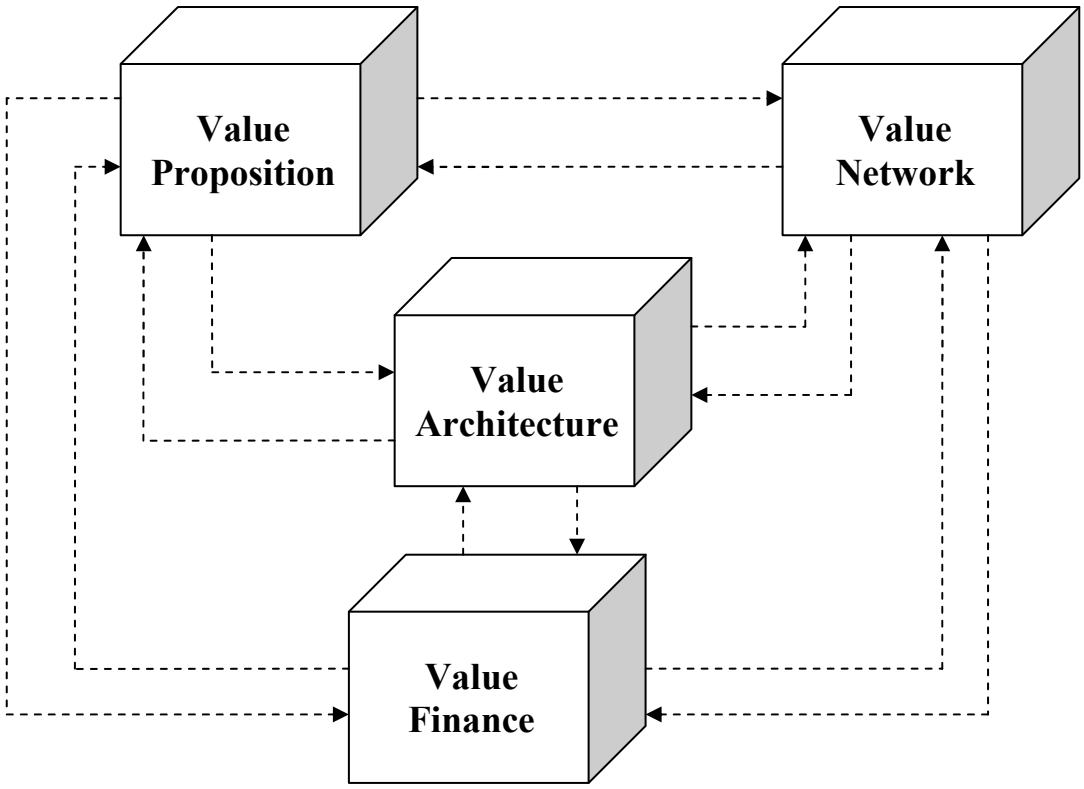

Figure 1. V[4] Business Model Components.

Moreover, the business model components of CNTOs are by no means independent; they are all interrelated with each other (see Figure1). To give just a general overview, CNTO's value architecture is highly dependent on its internal resources as well as the resources it gets from its value network. On the other hand, the products and/or services a CNTO is able to offer are highly dependent on its value architecture. Value finance in terms of costing and pricing is concerned with all previously mentioned arrangements regarding the three other components.

5. Conclusions and further research

This paper is part of ongoing research in the area of the business model for cellular network and telecommunication operators. Despite awareness of the importance of the business model to an organization's success, there is no consensus about its definition and components. The BM definition, components and boundaries have been subjectively determined. This lack of consensus is even more evident in relation to CNTOs, perhaps due both to the youthfulness of the business model concept and the cellular industry. Nevertheless, consensus about the business model is needed since it

represents a framework or a foundation on which researchers will be able to apply in different industries and in different contexts.

We have provided a critical analysis of the IS literature concerning the business model in the cellular technology domain. Guidelines as a basis on which to develop a more comprehensive BM definition in order to reach a consensus have been proposed. Furthermore, the authors propose a generic model (V^4 Model) for cellular network and telecommunication operators based on value proposition, value architecture, value network and value finance. However, it is hoped that this generalized model, taking account of the different views enables consensus that has not yet been apparent. This consensus might also represent a framework applicable to other industries.

From these preliminary insights and conclusions, our further work will be focused on the design of a comprehensive and tight ontology of the business model for CNTOs that fits the new world of digital business. This will lead to a tight and comprehensive definition of the CNTOs' business model pillars, building blocks, and their CSFs.

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