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BUSINESS MODEL ANALYSIS APPLIED TO MOBILE BUSINESS

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Abstract: Mobile business is a young promising industry created by the emergence of wireless data networks.. Similar

to other emerging industries, it is characterized by a large number of uncertainties at different levels concerning technology, demand and strategy. This paper focuses on the strategic uncertainties, where a large number of actors are trying a number of strategic approaches to position themselves in the most favourable position in the value system. As a consequence, they are experimenting with a number of innovating business models. We argue that successful business models are likely to be the ones that best address the economic peculiarities underlying this industry, like mobility, network effects and natural monopolies. The paper presents the principal classes of actors that will participate in the mobile business

industry and give an overview of their business models based on a formalized ontology.

1. INTRODUCTION

Many definitions of mobile business focus on enabling business transaction through wireless devices, confusing mobile commerce and mobile business. A commonly adopted definition, by Durlacher, defines mobile commerce as "any transaction with a monetary value that is conducted via mobile telecommunication network" (Müller-Veerse, 1999). Similar to e-commerce, the focus is on the exchange of products and services, but without the constraint of a stationary user using wired infrastructure. We prefer to adopt a broader view of mobile business, which includes "all activities related to a (potential) commercial transaction through communications networks that interface with mobile devices" (Tarasewich, 2002).

Mobile business is a very recent, but promising industry created by the emergence and widespread adoption of wireless data networks, that enable the convergence of the Internet, e-business and the wireless world (Kalakota, 2002). Similar to other emerging industries, mobile business is characterized by a continuously changing and complex environment, which creates important uncertainties at the levels of technology, demand and strategy (Porter, 1980). At the technological

level, uncertainties are typically caused by rapid technological development and the battle for establishing standards, which are typical in the beginning stages of the life cycle of an industry which is born thanks to a technological innovation. Concerning demand, despite a generalized consensus about the huge potential of mobile business services, nobody actually knows how to exploit the new possibilities brought by technology to create valuable services that the customers are willing to pay. Finally, strategic uncertainties are a common situation in emerging industries, whose essential characteristic from the viewpoint of formulating strategies is that there are no established rules of the game. As a consequence, actors must experience with a variety of strategic approaches and constantly reposition themselves in order to find the most favourable competitive position in the industry.

Based on these observations, we developed a general research framework inspired by the works on the Balanced Scorecard (figure 1). Our objective is to conceive a market observation tool for the mobile business industry. The underlying idea is that we can better understand the reality by taking views from different complementary perspectives and putting them all together. The perspectives are chosen to cover all the different uncertainties mentioned above. Each perspective focuses on certain aspects of the mobile landscape and requires specific observation tools. The innovation

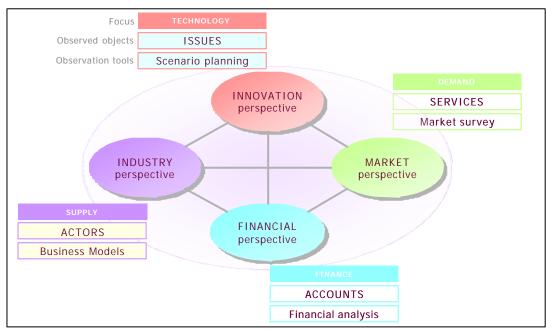


Figure 1: Mobile Market Scorecard framework

perspective deals with the future evolution of the mobile landscape and covers technological uncertainties using a scenario planning approach. The market perspective deals with the demand side of the industry and analyzes demand uncertainties using market surveys and adoption studies. The industry perspective looks at the supply side and assesses strategic uncertainties using competitive analysis and business models overview. We also add a financial perspective to assess the sustainability and attractiveness of the different actors, services and technologies.

While technological and demand uncertainties have already been addressed in a number of publications, strategic uncertainties remain largely unexplored. This paper proposes to study strategic uncertainties by analysing the roles and relationships of the different actors participating in the mobile arena. We propose to use business models analysis as a tool for better assessing and compare the strategic approaches of these actors.

The paper is structured as follows: section 2 gives a rapid overview of what is a business model and why it is useful in our work. Section 3 exposes the principal characteristics of the mobile business industry that enterprises must take into account when designing their business models. Section 4 illustrates and classifies the key actors participating in the mobile business and specifies their business models. Finally, section 5 concludes illustrating the principal conclusions that can be made from our work.

2. MOBILE BUSINESS CHARACTERISTICS

The mobile business industry present a certain number of peculiar economic characteristics such as mobility, network effects and proprietary assets.

Enterprises must take these characteristics into consideration when they develop their business models. Indeed, the successful strategic approaches are likely to be those that comply with all of these particularities.

2.1 Mobility

Mobility is the most important characteristic of mobile business, because it represents its only distinctive advantage upon which mobile services can build their value proposition. In fact, mobility brings a number of unique benefits that can be related to a number of attributes such as freedom of movement (services can be used while on the move), ubiquity (the possibility of using services anywhere, independent of the user's location), localisation (user's location information can be exploited to offer location-based relevant services), reachability (users can be reached anywhere anytime, and they can restrict it to particular persons and contexts), convenience (as mobile devices are always at hand),

instant connectivity and personalization (since the phone is a personal device and can store personal information, it can be used to provide personalized services) (Müller-Veerse, 2000).

However, mobility involvesalso some constraints, and, in fact, wireless services are inferior than their wireline counterparts in different other dimensions. In particular, mobile applications suffer from limited and more expensive bandwidth and device limitations. Bandwidth limitations are a consequence of radio spectrum being a fixed and rare resource and its control being restricted to license owner. Device limitations are due to the portability requirement of mobile handsets, that have to be small and lightweight, letting limited space to be used for screen, batteries and input/output interfaces.

Even if valuable services can be entirely built around mobility, exploiting the distinctive features of the mobile channel, combining them with the advantages of e-commerce services and other channels would lead to substantial more value delivered to the customer. [XXX]

2.2 Network effects

Formally speaking, networks are composed of a set of components connected together by links. Since the provision of a service typically requires several components, they are complementary to each other. Because of this complementarity, networks exhibit a characteristic economic phenomenon known as network effects, an example of what economists call a positive consumption externality. An externality occurs when a transaction between two actors affects, as a side-effect, a third party that is external to the transaction. The externality is said to be positive because the third party gains value from the transaction and it is said to be a consumption externality because it affects the third party's consumption function.

This topic has received wide attention in the economic literature. According to Economides, network externalities signify the fact that the value of a unit of a good increases with the expected number of units sold (Economides, 1994). When customers are identified with network components, which is typical of two-way networks such as telecommunication networks, the externality is direct and results from the fact that the act of joining

a network confers a benefit on all other participants in the network because the number of potential interactions increases¹. It follows that the value of being part of the network increases as the network expands and the number of its users gets bigger.

Rohlfs showed that this type of externalities play an important role in the market of telecommunication where the utility of joining a communication network is positively related to the number of its members (Rohlfs, 1974). In this case, network effects take the form of being able to communicate (call and receive calls) with a larger number of other users. On the other hand, the increase of the number of network members also produce negative externalities such as network congestion.

In a communication network there also are indirect externalities, where users benefit indirectly from network size. As an example, an extra customer potentially increases the number of services available to the other customers, since by increasing the demand for services, service provisioning become more profitable and more firms are willing to offer them².

Network externalities influence both consumers, when they decide whether to adopt a new technology (Heikkilä, 2002), and producers, when they decide whether to standardize their products to allow compatibility with other producers, set the product quality and chose the pricing policy (Economides, 1994).

2.3 Exclusive control over important assets

The mobile business market is also characterized by the existence of important assets that are under the exclusive control of a firm. Exclusive control may arise for a certain number of reasons: the absolute rarity of a good, the existence of a fabrication secret, a special privilege or a patent that gives its owner the exclusivity over a certain asset,

If there are n users, there are n(n-1) possible communications between pair of users; an additional user provides direct externalities to all network members by increasing the number of possible communications by 2n

² An interesting representation of network effects using the formalism of system dynamics is found in (Constance, 2001).

and the presence of particular cost structures with increasing returns or very high initial investments that cause natural monopolies to arise. In the mobile communication area, spectrum is a necessary but Besides telecommunication, finite resource. spectrum is required by many industries in different domains, such as military, TV and radio broadcasting, transport, navigation etc. As a result, the portion of spectrum allocated to mobile communications is rather small. Furthermore, except for the limited ISM and amateur frequencies bands, spectrum access is restricted by licenses given to a few license owners, so that the available spectrum is under the control of a few network operators.

Network operators also have total control over a number of other important assets. By providing the SIM card to their customers, mobile operators have total control over them, since the communications from and to a user must pass through its operator network. In addition, by controlling the network, the operator possess an unique access of valuable user related information such as a complete customer profile, call patterns, location information etc.

In the communication area, infrastructure deployment can be considered a natural monopoly because of the substantial investments required to build a network. From a societal point of view, a single monopolistic firm could be a blessing, since it can satisfy the demand using a lower amount of resources than multiple competing firms; however, a single firm can exploit its dominant position to raise prices above competitive levels and make a profit. For that reason, and because the cost of building a network has considerably decreased, an oligopoly structure with several competing network operators has become possible.

2.4 Implications

From these characteristics it follows that the provisioning of complete mobile services solutions requires the collaboration of a large number of market players, especially including network operators and device manufacturers. Mobility adds complexity to application and services development, which require broader competencies, that, in the short term, are only accessible through partnerships or acquisitions. Network effects require that the different networks, devices and applications are inter-compatible, requiring partnerships to forge

common standards³. Finally, the existence of exclusively controlled indispensable assets and natural monopolies requires firms to partner with network operators, unless financial problems or regulations impose them to open access to the assets they control. In fact, until now, no player managed to succeed in providing an end-to-end solution between the content owner and the end-user on its own⁴. Partnership management is thus likely to become a core activity of a large number of mobile business enterprises.

3. BUSINESS MODELS

Although the concept of business model is widely used and seen as important, there is any generally accepted definition of what a business model is.

As explained by Petrovic, a business model describes the logic of a "business system" for creating value, that lies behind the actual processes (Petrovic, 2001). It can be seen as a detailed conceptualization of an enterprise's strategy at an abstract level, which serves as a base for the implementation of business processes.

Many authors tried to identify the elements composing a business model. A commonly quoted definition by Timmers defines a business model as an architecture for the product, service and information flows, including a description of the various business actors and their roles; a description of the potential benefits for the various business actors; and a description of the sources of revenues (Timmers, 1998). We adopt a similar definition: a business model provides a description of the roles and relationships of a company, its customer, partners and suppliers, as well as the flows of goods, information and money between these parties and the main benefits for those involved, in particular, but not exclusively the customer (Bouwman, 2002).

³ Very illustrative is the example of Symbian, a consortoum that brings together a very large number of device manufacturers with the goal to develop a common operating system that would ensure device interoperability

With the very particular exception of the i-mode service of NTT DoCoMo in Japan, which benefited from a very dominant market position and from the peculiar Japanese context.

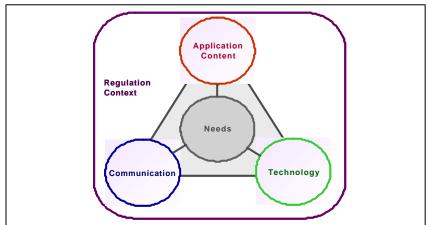


Figure 2: Mobile business framework

In order to investigate the business models of the different classes of actors in a consistent way, we based ourselves on a formalized ontology for e-business models specified by Osterwalder and Pigneur (Osterwalder, 2002), which has the advantage of fitting well with the above definitions. They understand business models as consisting of four main elements that illustrate the value proposition, the customer relationship, the infrastructure and the financial aspects. The infrastructure element further contains both internal activities and partnership network with other parties. Because of the specificities of the mobile business industry, we will focus a little more on the partnerships than the other elements.

4. ACTOR'S OVERVIEW AND THEIR BUSINESS MODELS

The previous section illustrated why the mobile business market is highly fragmented and the provisioning of complete mobile services solutions requires the collaboration of a large number of different market players.

The literature contains a great number of publications that illustrates the abundance of players in the mobile field. Many authors share a similar set of mobile business market key actors (Müller-Veerse, 2001), which they classify according to three general main classes: technology, application and network.

We already stated in a recent paper (Camponovo, 2002) that these three classes do not give a complete view of the mobile landscape and should be completed by other classes such as regulation, user and supporting services (i.e. payments). We propose to classify the players according to the framework illustrated in figure 2. At the centre of the mobile

business world is the user, who have mobility-related needs. In order to fulfil these needs, we need three necessary and complementary supporting blocks: communication (including the different networks that provide transmission capabilities), technology (composed by all the required hardware, including network equipment, mobile devices and platforms) and the services (including applications, content and supporting services). These blocks are then constrained by regulation and social context. A graphical representation of the whole industry with the different actors and their principal relationships is given in the appendix 1.

Similar to (Lai, 2000), we distinguish between primary and secondary actors. For the primary actors we identified in each class, we will give a very short textual description of their business model.

4.1 Technology

The primary participants in this area are access device manufacturers and network equipment vendors. Secondary players include device retailers, component makers and enabling technology vendors such as operating systems, micro-browsers producers and development platform provider.

4.1.1 Device manufacturers

Value proposition: Provide the physical mobile devices (mobile phone, PDAs, notebooks with wireless cards) to end users that enable them to access a mobile network and to run mobile applications.

Target customers: Device retailers and network operators' distribution channels.

Core activities: research and development, product design, production and marketing.

Business partners: Device manufacturers

purchase from component makers and application developers (operating system, micro browser, embedded software). They then assemble mobile devices and distribute their products through device retailers and network operators' distribution channels. Network operators are very important partners, because they usually subsidy the devices to customers that sign a contract with them and are very active to push the adoption of 3G handsets. Device manufacturers may also partner with content providers, application providers and portals in order to help them to develop new mobile services that would promote the adoption of new handsets and develop mobile portals, where device manufacturers can bring a strong brand and the possibility of setting the default device configuration and the others the complementary skills, content and applications. Other partners include other device manufacturers, to agree on common standards to ensure application interoperability and exploit network effects. Sometimes they are integrated with network equipment vendors.

Revenue flows: Revenues come from sale of devices to distributors. Additional revenues may come from portal activities.

Examples: We can distinguish mobile phone manufacturers integrated with equipment vendors (Nokia, Eriksson, Siemens, Motorola), other phone manufacturers (Sony, Samsung), PDAs manufacturers (Palm, Handspring, HP, Casio) and wireless card manufacturers (Agere, Cisco and Linksys).

4.1.2 Equipment vendors

Value proposition: Provide the physical core mobile network infrastructure (comprising air interfaces, base stations, routers, switches and backbone transport technologies) and the logical infrastructure required to operate and manage the network (including network management systems, billing systems, network management systems, application and service platforms, etc). They also offer infrastructure related services such as network design, evolution planning, integration, implementation, optimisation and operation.

Target customers: Network operators such as cellular network operators, WLAN operators and ISPs.

Core activities: R&D, production, system development, infrastructure related service provisioning.

Business partners: Equipment vendors purchase from component vendors and application developers, assemble a variety of network equipment and systems an sell them to network

operators, with whom they often partner and tightly collaborate. They must also collaborate with other equipment vendors to ensure network interoperability and offer multi-vendors solutions; for the same reason, they usually are influent members of standardization groups. In order to promote the adoption of new generations of mobile networks, the actively support and partner with application developers and content providers. They sometimes partner or are integrated with device manufacturers.

Revenue flows: They earn revenue from sale or leasing of equipment and provisioning of services.

Examples: Companies operating this role include Ericsson, Nokia, Motorola, Siemens and Lucent.

4.2 Services

Mobile services are value-added services, content and applications that the user can access on his mobile device. The primary actors in this domain are content providers and application providers. Some authors further distinguish content providers in content owners, content aggregators, syndicators, portals⁵ and application providers in application developers, ASPs and system integrators. This category further includes e-business players implementing a mobile strategy and supporting services providers, which include payment agents (as a primary player), security solution providers (i.e. PKI encryption), trusted third parties, advertising companies and professional service providers (i.e. consultancies).

4.2.1 Content providers

Value proposition: Provides relevant data and information products (such as news, music, video, location-based information,...) and distribute them using the mobile channel. The value proposition often integrates a multi-channel distribution offering that enables to broaden the reach and exploit the complementary characteristics of different channels.

Target customers: Content aggregators, syndicators and portals (which bundle content from different sources together and re-distribute it to end customers), and the end-customer itself through direct distribution.

⁵ Portals are well analyzed in (Sigala, 2002)

Business partners: Content providers often partner with a variety of content aggregators and portals in order to broaden the reach of their products and with content owners, press agencies and other media companies in order to get preferred access to raw information. Other useful partners include network operators to agree on a profitable revenue sharing business model and payment agents for micro-payment services. There might be partnership agreements with application providers for content management platforms.

Core Activities: Content collection, content processing and formatting, content publishing, content distribution, distribution agreements management, ...

Revenue flows: Revenues come from subscriptions fees, usage fees, syndication agreements and airtime revenue sharing.

Examples: This role is particularly done by press agencies (i.e. Reuters), media companies (i.e. CNN, Bertelsmann) and content aggregators (i.e. Yahoo, Videotext).

4.2.2 Application proViders

Value proposition: Provide mobile applications and platforms (such as middleware and application servers). The value proposition may include different application related services such as remote access to a variety of applications that are managed in a central location, with hosting, implementation, integration, support and maintenance services.

Target customers: Target customers include a variety of players in the mobile value chain such as network operators, portals, businesses, device manufacturers and consumers

Business partners: Application providers often partner with network operators, in order to ensure a sufficient quality of services and gain access to essential network services (i.e. location information) and have a privileged contact with their customer base. They also partner with device manufacturers, in order to ensure compatibility with the different existing and future devices and as a sales partner (to exploit their brand). If they do not develop their own applications, application providers purchase from other application developers or establish a partnership with them. Other application providers and system integrators are also useful partners to provide broader solutions and offer a single point of contact to customers.

Core Activities: Application development, integration, application management (versioning, portability checking,...), infrastructure operation, support and consulting services.

Revenue flows: They earn revenue streams from

sale of license fees, installation fees, rental agreements for hosting, operation and maintenance services, consulting services.

Examples: Mobile application providers are mainly small, rather unknown start-ups. Examples include iTerra, Geoworks, In-Fusio, Shockfish,...

4.2.3 Payment agents

Value proposition: Provide a method of payment to end-users for cash-free purchases of goods and services via the mobile phone. They can also provide payment platforms to other businesses.

Target customers: End users, different service providers.

Business partners: Payment agents usually partner with different financial institutions (i.e. banks, credit card companies) for payment processing and gain access to their customers accounts. Other valuable partners can be network operators (for billing and collection services), device manufacturers (device interoperability and special payment features), hardware providers and application developers (security solutions) and other service providers.

Activities: Billing and collection, payment platform development and management.

Revenue flows: Subscription and transaction fees.

Examples: Payment agents comprise network operators, banks, credit card companies, smartcard companies and start-ups. Example include PayBox, Sonera and Visa. More examples can be found in (Müller-Veerse, 2001)

4.3 Network

The primary actors are mobile network operators (MNO) or carriers, and internet service providers. If mobile network operators certainly are among the most important players in the cellular and other GSM or UMTS area, we can observe the first self-organized networks, WiFi networks and large scale wireless local area networks. Other players include virtual operators and infrastructure management service providers.

4.3.1 Mobile Network Operators

Value proposition: Provide ubiquitous communication services (physical connectivity) to end users, giving them access to their network and other network operators' networks and the Internet. Provide also various network-related services such as location information, user identification and

billing services to third parties.

Target customers: End customers, businesses, application providers, virtual operators, ISPs, ...

Business partners: Operators purchase from infrastructure vendors in order to build their networks. They must set traffic agreements with other network operators and ISPs in order to let their customers to access other networks (i.e. other operators' networks, the Internet). They also subsidy and distribute handsets in order to build their customer base. Given their central role in the mobile business, they are required to partner with a great number of other players including content providers, application providers, service providers, virtual operators and portals. These players are essential to develop the market for 3G services, thus increasing operators' revenues, and the operator can help them with revenue sharing agreements and access to network-related services (i.e. through open APIs, such as OSA-Parlay).

Core Activities: Network operators have a typical value network configuration (Stabell, 1998). Their main activities are network promotion and contract management (customer care, sales, problem handling, invoicing,...), service provisioning (service development and operations, quality management,...) and infrastructure operation (network planning, deployment, maintenance, systems management,...).

Revenue flows: Network operators earn revenues from their subscriber charging a combination of subscription, airtime fees and volume-based fees. They also earns revenues from network services provided to other parties, transaction fees (for their billing services) and may earn revenues from portal activities.

Examples: Swisscom, Vodafone, Orange,... This category also includes virtual operators such as Tele2 (who provide services through networks of other operators). Other kinds of wireless networks operators also exist, such as WiFi operators (Jippii, Monzoon) and satellite network operators (Globalstar).

4.3.2 ISPs

Value proposition: Provide access to the Internet network.

Target customers: Network operators, other ISPs (traffic agreements) and end users.

Business partners: ISPs purchase from infrastructure vendors for Internet equipment in order to build their part of the network and the gateways to other networks. They must set traffic agreements with network operators in order to gain access to customers and with other ISPs in order to let their customers access the whole Internet. They

also may partner with content and application providers in order to differentiate their offering.

Core Activities: Similar to operators, their main activities are network promotion and contract management activities, service provisioning activities and infrastructure operation activities.

Revenue flows: ISPs earn revenues from user subscriptions and traffic agreements with other ISPs and operators.

Examples: Wireless ISPs include WiFi operators such as Jippi and Monzoon, as well as wired ISPs such as Switch

4.4 Regulation

Regulation-related players include government, regulation authorities, and standardization groups. These players will set the legal environment in which mobile business will grow and may have a huge influence on other players.

4.4.1 Regulation authorities

Value proposition: Set the legal framework which provides the population and the economy with a wide range of competitive telecommunications services

Target customers: N/A

Business partners: Regulation authorities interact and consult all the implied parties in order to develop an adequate legislation that best satisfies their diverging needs. They are supervised by the government and are influenced by different lobbies.

Activities: Legislation development, frequency allocation management, service licences management, market monitoring to ensure compliance with legislation and antitrust requirements.

Revenue flows: Licence fees, taxes.

Examples: Swiss regulation authorities are OFCom and ComCom.

4.5 User

End-users, both corporate and consumer, are also important players in this game, because they ultimately can determine the success or failure of mobile business. It might be useful to consider some "vertical" players with particular mobility needs separately, like those of the travel, logistics, healthcare, retail and car electronics sectors. It seems that no expert mentions consumer groups as actors, yet some of them are very active against electronic smog and will have a true impact on some decisions, such as the deployment of UMTS infrastructure and

4.5.1 Consumer groups

Value proposition: Defend the interests of consumers.

Target customers: End customers

Business partners: N/A

Activities: Consulting and information services,

legal assistance, lobbying.

Revenue flows: Subscription fees, donations.

Examples: Consumer associations.

5. CONCLUSIONS

Even without going into a detailed view of the business models of the different actors participating in the mobile landscape, it is apparent that the economic characteristics underlying the mobile business have a profound impact on the adopted business models.

In fact, for nearly each player, partnerships with a number of other actors are an important part of their business models, as they are required to overcome the complexity of providing a complete end-to-end solution, which requires many complementary competencies. Furthermore different players require to establish partnership agreements with network operators and device manufacturers, in order to support interoperability of the different solutions (which is required to build network effects) and ensure access to essential proprietary assets (which are a consequence of natural monopolies).

It is however worth reminding that the mobile business industry is a very recent one and that the different players are still experimenting with a variety of business models in order to conquer a sustainable and profitable position in this promising industry. What business models will prove to be sustainable is yet to be seen. We argue that business models that explicitly address mobility, network effects and natural monopolies issues and that are profitable to all the different players needed to provide an end-to-end solution will be the most successful and sustainable.

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8. APPENDIX 1: WIRELESS ACTORS' MAP

