A COMPARATIVE ANALYSIS OF PUBLISHED SCENARIOS FOR M-BUSINESS

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ABSTRACT

A number of scenario planning studies have been conducted in relation to mobile business in the recent years for analyzing major trends and challenges in the wireless domain. Unfortunately, most of them ignore the other ones and never try to compare their results with the others. Now this validation phase is an important phase in a design science process. Without any kind of validation, the scenario approach will always have difficulties to be accepted as a pertinent method. This article is a first step towards this validation phase. It synthesizes and compares a representative set of these scenario proposals in order to extract the scenarios which are accepted as likely by most authors as well as a set of less frequent, but not less interesting, scenarios so as to provide some insight about the potential futures for the mobile business industry. For crosschecking the proposed scenarios, we adopted three different frameworks for classifying and examining the possible futures from many perspectives such as the role of the stakeholders, mainly the operators and the public authorities, the competition and collaboration in m-business, and several other technological, social, and political issues.

KEYWORDS

Mobile business, scenarios, scenario planning, futures research.

1. INTRODUCTION

The mobile business industry is a very promising industry which is emerging thanks to the appearance of wireless data networks enabling the convergence of the Internet, e-business and the wireless world (Kalakota et al. 2001).

Typical of an emerging industry, mobile business is experiencing a period of major turbulence which generates acute uncertainties related to technology, demand and strategy (Porter 1980). Technological uncertainties stem from the rapid development of technology (e.g. in networks, services and devices) and the consequent battle for establishing standards. This is common in technology intensive industries, where there is "*a conviction of an impending technological breakthrough, but no further knowledge of where it will come from or what it will consist on*" (Ansoff 1980). Demand uncertainties arise because users' needs and their adoption behavior are not sufficiently understood (Urbaczewski et al. 2003). Finally, strategic uncertainties are due to actors experimenting with a variety of business models and constantly repositioning themselves to find a favorable competitive position.

In such an uncertain, complex and rapidly changing environment, looking at the future prospects of the industry becomes an essential task for both practitioners and researchers. Practitioners need future insight in order to formulate sustainable strategies for their enterprises (Andrews 1987; Godet 2001), whereas researchers need it to identify relevant long term research questions (cf. Bria et al. 2001). This is even more important as the lead time between basic research, the deployment of infrastructure, the development services and their adoption is very high.

However, these same characteristics make looking at the future of m-business a challenging task. The huge amount of uncertainty undermines the basic assumptions of traditional forecasting methods like casual models and extrapolation techniques, namely that the future can be predicted accurately enough to identify a single forecast and that it can be extrapolated from present and past trends (Godet 1977; Courtney et al. 2001). A review of forecasting techniques applied to telecommunications strongly criticizes their adequacy to predict new products and services in uncertain conditions (Fildes et al. 2002). The inadequacy and danger of these methods are exemplified by the exaggerated investments in UMTS licenses and the consequent financial troubles of many operators in Europe.

As a result, one needs to consider a wider set of factors and to explore a range of more or less probable and even counterintuitive futures (Sideris 2002). This means adopting a foresight rather than a forecasting approach (Grupp et al. 1998). Among the different foresight approaches such as environmental scanning, Delphi, probabilistic forecasts, technology measurements and chaos theory (Donnelly 2003; Martino 2003), scenario planning planning is a valid alternative since it is well suited to cope with high levels of uncertainty and complexity (Dyson 1990; Harries 2003; Lindgren et al. 2003), especially if there is a lot of insecurity and time frames are very extended (Lindgren et al. 2002, p. 199). In particular, in the case of emerging technologies there are three particular challenges - uncertainty, complexity and paradigm shift - that can hardly be answered by other forecasting techniques than scenarios: (Schoemaker 2000, p. 211).

Not surprisingly, many scenario-planning studies have been conducted in relation to mobile business in the recent years (see below). Unfortunately, we have to observe that most of them ignore the other ones and never try to compare their studies with the others. The primary purpose of this paper is to synthesize and compare a representative set of these scenario proposals in order to extract the

scenarios which are accepted as likely by most authors as well as a set of less frequent (but equally interesting) scenarios so as to provide a good view of some other potential futures for the m-business industry.

The research question addressed in this article is to investigate if we can detect a convergence between the different approaches, and precise the nature of the eventual similarities and differences. For comparing and detecting similarities and differences among the different published scenarios, we adopted three frameworks. The first one compares the scenarios based on the main axes the authors themselves adopted for defining their scenarios. The second one relies on a framework comprising three key elements we already used for analyzing the m-business arena (Camponovo and Pigneur 2002): the market, the actors and the issues, which are intertwined by a series of influence relationships. In the last one, we suggest classifying the scenarios in a competition vs. cooperation perspective inspired by transaction costs theory (Malone, Yates et al. 1987).

The next section provides an overview of what the scenario approach is. Section 3 briefly summarizes the main scenarios studies for m-business published so far, using a common framework. Section 4 compares the different scenarios using the three abovementioned frameworks. The last section drafts a synthesis of the different analyses.

2. THE SCENARIO PLANNING APPROACH

Scenario planning is a methodology which aims at obtaining some insight about the future, just like other forecasting techniques. However, unlike forecasting - which is based on the rationalistic assumption that there is one single right future and aims at predicting it as accurately as possible - scenario planning has a fundamentally different starting point and is based on the assumption that there is no single best answer but since the future is uncertain and unpredictable (Van Der Heijden 1996). As a result, it considers a broad range of potential futures. Whether one approach is better that the other is a matter open to discussion. Nevertheless, scenario planning appears to be more suited to uncertain, complex and fast developing situations where the future cannot be predicted accurately enough to identify a single forecast and it cannot be reasonably expected to be a continuation of present and past trends (Godet 1977; Dyson 1990; Courtney et al. 2001).

In order to investigate the broad space of future possibilities, scenario planning follows a systematic, interactive and imaginative process. The process usually begins with a thorough analysis of the current situation so as to identify the major drivers of change, uncertainties and potential events which will shape the future. On this basis, a range of potential futures is constructed. The exercise usually ends up with three or four scenarios presenting plausible and surprising alternative futures. Scenarios are descriptions of possible futures states as well as the hypothetical sequences of events that will lead the original situation to evolve towards the described future state (Kahn et al. 1967).

There are a range of different methods for designing scenarios that combine various qualitative and quantitative methodologies to different degrees. At one extreme, developed in the so-called *French School* (De Jouvenel 2000), the *structural scenario method* aims at constructing representations of probable futures as well as the formal rules and routes that lead there, using a mixture of facilitated group interaction and formal quantitative techniques (i.e. prospective workshop, structural analysis, analysis of actor's strategies, morphological analysis, expert inquiries). On the other way, the *Global Business Network* approach (Schwartz 1991), popularized by Shell in the 70's, is much more informal

and based on the key factors, the driving forces and the alternative visions gathered by a team of experts during scenario workshops.

3. M-BUSINESS SCENARIOS

This section presents the main scenario proposals for m-business published so far. We selected the three scenario studies specifically addressing the mobile business (Lai et al. 2000; Aarnio et al. 2002; Lindgren et al. 2002), and three other ones coping with the broader mobile and ubiquitous computing world (Flament et al. 1998; Ducatel et al. 2001; Karlson et al. 2003). For each of them, we analyzed (a) the methodology they designed for building their scenarios, (b) the assumptions and (c) the axes underlying the construction of the scenarios and (d) the 3 or 4 scenarios they proposed and described.

Arthur D. Little consultants (Lai et al. 2000) analyze the drivers, the value chain and other trends in m-commerce. They describe three scenarios with a time horizon of 2005, based on assumptions about the potential role of the key players and the resulting mobile market structures. The authors do not explicitly mention neither methodology nor axes. The *"Super Operator"* scenario refers to a situation where the operators leverage their ownership of the access network to get a dominant position in the value chain. The *"Intimate Seller*" scenario is designed around the idea of market anarchy, with many sellers offering contents and services to buyers, via different operators. The *"Brand Bureau"* scenario considers the emergence of partnerships of sellers, aggregators and payment agents, gathered in bureaus offering integrated services and contents under umbrella brands.

The *Mobicom* European project reported in (Aarnio et al. 2002) and (Mylonopoulos et al. 2002) analyzes the future of mobile commerce until 2006, with its policy, regulatory and social implications as well as its new market dynamics and business models. They adopted the *French prospective method* (Godet 2001), identifying the key variables and the actor's strategies in order to identify the main battlefields whose outcome will shape the future. The following battlefields were isolated: access to customer, dominance in the value chain, role of the public sector, Intellectual Property Right, standards, privacy, alternative technologies, social needs fulfillment and seamless roaming. Scenarios are built based expert judgment about potential outcomes of these battlefields and arranged according to two main axes: public initiative and operator power (see Figure 1). In the "*Business as usual*" scenario, the market resembles the current one, with slow growth due to operators' dominance imposing meager revenue sharing and closed garden models as well as privacy concerns. In the *"Institutionalization"* scenario, operators still dominate the value chain, but government intervention favoring the adoption of open standards and the resolution of all other issues favor a moderate development of new services. In the *"The world changed"* scenario, operators concentrate on network operation and open their network to third parties, hence enabling the development a large number of services and fostering demand. In the *"The Invisible Hand"* scenario, the regulator is active in creating a liberal mobile commerce policy which boosts significant innovation and competition.

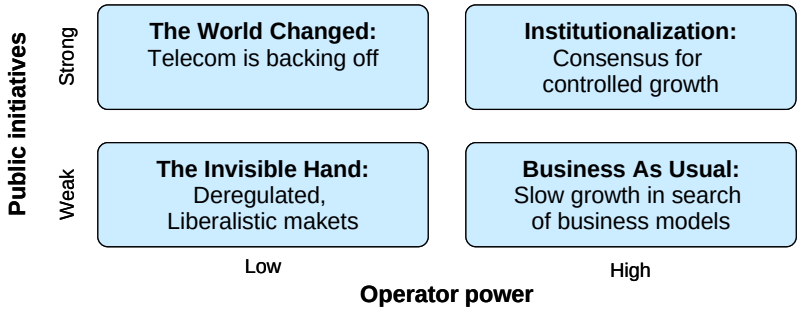

Figure 1. Axes and scenarios proposed by MobiCom 2006 *(Aarnio et al. 2002)*

Beyond Mobile (Lindgren et al. 2002), a book about the future of mobile communications and marketing, proposes four scenarios for m-business in 2007. The scenarios are based on a set of technical, individual, institutional and economic assumptions for the deployment and adoption of m-business solutions as well as the implications for the key players in the industry. The axes on which they define their scenarios are mass market vs. limited market and openness vs. integrity (see Figure 2). In the *"Mobile Klondike"* scenario, a massive market development is fostered by enthusiasm for the technology and the consequent willingness to pay for it. Innovative services abound and are readily adopted. Moreover, the advantages brought by personalized location based services prevail over privacy concerns. In the *"Trusted Guide"* scenario, the shift towards 3G networks is quick, mainly because of curiosity and financial incentives from mobile operators and services providers. However, development of mobile services is hindered by privacy concerns. In the *"Professional Users"* scenario, developments have been extremely slow and adoption is mainly limited to professionals due to privacy fear and high pricing policies, putting operators in serious financial trouble. In the *"Community Lifestyle"* scenario, the lack of interest in mobile data has become a worrying problem: the market is limited to a few communities such as professionals demanding high quality information services and young people wanting entertainment services.

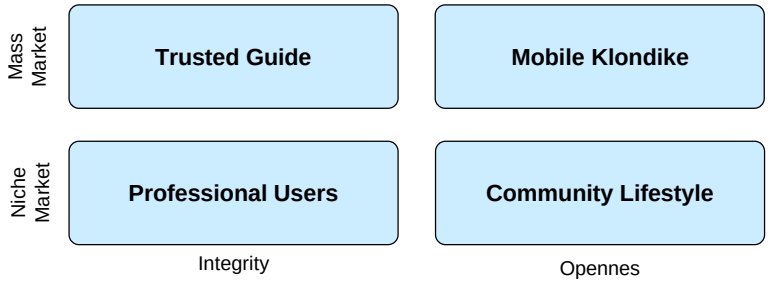

Figure 2. Axes and scenarios proposed by Beyond Mobile 2007 *(Lindgren et al. 2002)*

Telecom 2010 (Flament et al. 1998) is a scenario exercise conducted as part of a research project focusing on fourth generation wireless infrastructures at the KTH institute with the aim of creating awareness of plausible futures and identify reasonable research assumptions (Bria et al. 2001). Inspired by the Global Business Network approach, they adopt a methodology based on the identification of the potential driving forces and combining them in megatrends. The scenarios are based on several hypotheses about global trends in technology, economy and politics and are verified using a Delphi survey among leading industrials and scientists. Two axes were adopted for defining the scenarios: government vs. market standardization and government vs. market globalization (see

Figure 3). In the *"Integrity"* scenario, heavy government intervention is called to ensure integrity and security, at the expenses of market development. In the *"Anything goes"* scenario, alternative mobile solutions, such as WLAN, are introduced at a very fast pace, central control decreases, access is more or less free and de-facto standards dominate. In the *"Pocket-computing"* scenario, technological development is fast, but economical and educational differences split the population between those who can have access to a wealth of innovative services and those who cannot.

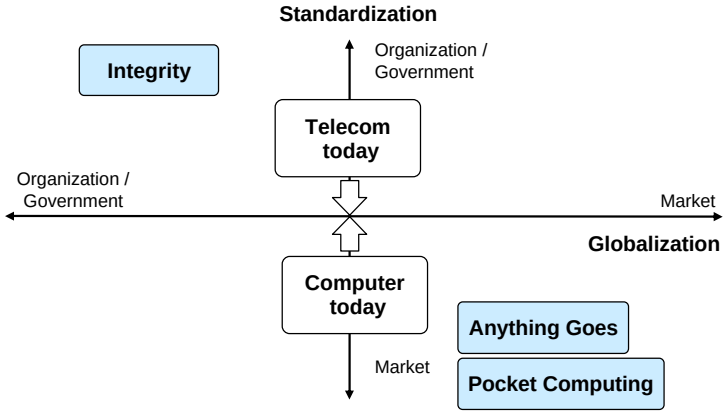

Figure 3. Axes and scenarios proposed Telecom 2010 *(Flament et al. 1998)*

Wireless foresight 2015 (Karlson et al. 2003), a more recent scenario exercise from the same research location, deals with the development of the wireless communications industry and technology during the coming ten years. It presents four scenarios about the state of the wireless industry in 2015. In the "*Wireless Explosion & Creative Destruction"* scenario, wireless services develop very rapidly in parallel to mobile operators losing market dominance due to the rapid development of open architectures based on the IP protocol and alternative WLAN networks. In "*Slow Motion*", an economic recession is observed and electromagnetic radiation from mobile devices is reported harmful, hampering industry development and forcing it to refocus on more harmless technologies. The "*Rediscovering Harmony"* scenario involves a significant lifestyle shift implying fewer wireless services usage than expected along with increasingly active and demanding customers expecting more tailored services and compelling tight environmental constraints. In the "*Big Moguls & Snoopy Governments" scenario*, a few large companies dominate the wireless market and, under the supervision of the governments, control the communication and media industry.

Ambient intelligence 2010 (Ducatel et al. 2001) reports results from a European Commission's scenario planning exercise with the participation of around forty experts from across Europe. The general background is to find potential usages for the so-called *Ambient Intelligence* technology, which is the product of the convergence of ubiquitous computing, ubiquitous communication and intelligent user-friendly interfaces. The scenarios were built according to a number of socio-economical and technological issues. The two adopted axes are efficiency vs. sociable humanistic and individuality vs. community. The report presents four scenarios respectively called *"Maria, Road Warrior"* with its strong focus on m-business, *"Dimitrios and the Digital Me"* emphasizing the trend towards inter-personal communication, *"Carmen: Traffic, Sustainability and Commerce"* providing the users with integrated solutions for solving their urban living problems, and *"Annette and Solomon in the Ambient for Social Learning"* focusing on the society as a knowledge community increasingly interested in knowledge, skills and creativity.

There are some other publications reporting scenarios for m-business, which we do not analyze. Among them, we highlight two works mainly for their methodology interest. Sideris (Sideris 2002) conducted an experiment using two different scenario planning methodologies: the *structural scenario method* (Godet 2001), and the *Global Business Network approach* (Schwartz 1991). Two groups of executive MBA students were involved in a workshop of four sessions to assess the opportunities and threats in the mobile business market in a five-year horizon. Another interesting scenario exercies (Kuhn et al. 2003) briefly presents a Delphi approach for collecting expert views and assessments about mobile business scenarios. Thirty-five experts took part in the study during the second part of 2002, giving first their views on m-business, and then ranking some possible scenarios.

4. COMPARATIVE ANALYSIS

As shown in the previous section, the mobile industry has been the object of several scenario exercises. Unfortunately, we have to observe that most of the scenario studies ignore the other ones and never try to compare and validate their propositions with respect with the others. The primary purpose of this research is therefore to try to compare the existing body of scenarios proposed by the different research teams. Our primary goal is to extract a set of scenarios which are accepted as likely by most authors as well as some of the less frequent (but not less interesting) scenarios so as to provide a good view of some potential alternative futures for the m-business industry.

Because the different studies adopt very different structures and sets of assumptions, the key features extracted from the scenarios were inevitably different from one another, making their comparison very challenging. In order to compare the different proposals, we had to find a common framework which indicates the essential features that must be taken into account and how they are related to each other in order to identify and compare the key characteristics of the scenarios on a common basis. Also notice that the comparison is still complicated by the fact that the scenario exercises have quite different time horizons, ranging approximately from five to fifteen years.

We conducted three analyses with different frameworks: the first one is pragmatically taken from the scenario studies themselves and involves the axes employed by the different proposals to construct and arrange their scenarios; the second one is inspired by a conceptual model we developed with the aim of analyzing technology landscapes (Camponovo et al. 2003); the last one is inspired by the competition-collaboration framework inspired by the transaction cost theory (Malone et al. 1987).

Of the scenario exercises mentioned in the previous section, we could only fully analyze the four most thoroughly investigated scenario proposals: *MobiCom 2006*, *Beyond Mobile 2007*, *Telecom 2010*, and *Wireless Foresight 2015*. The other mentioned scenario exercise from Arthur D. Little did not provide the information required for the comparison, except for the competition-collaboration framework.

4.1. Comparison using the proposals' axis

Our first approach was to analyze the scenarios according to the axes adopted by the different proposals to construct and arrange their scenarios. The axes are the following:

- *Mobile operator's power*. Mobile operators currently dominate the mobile value chain due to their control of the access network, user information and billing systems. Yet, this situation might change due to deployment of alternative technologies like GPS or WLAN, regulation or

competitive pressure, resource and know how constraints etc. The role assumed by the operator will certainly have profound impact on the development of services and technology.

- *Strong vs. weak public initiatives.* Governmental bodies can be a major enabler for the development of m-commerce, for instance through direct investment on mobile services, by subsiding research or by adopting a favorable regulatory framework.
- *Mass market vs. limited market.* If consumers are offered valuable services at reasonable prices, a massive adoption of mobiles products and services can be expected. However, the market might be limited by excessive prices on new technology and services, limited coverage area, lack of compelling content and services, devices or other technical constraints, property rights and privacy concerns, digital divide, health concerns...
- *Openness vs. integrity.* People seem to be willing to give information about their private life for receiving more targeted and useful offers. However, if they feel used or perceive violations of trust, users can very quickly change their view towards greater confidentiality and integrity.
- *Market standardization vs. government standardization.* Standards can either be de jure, developed by organizations and government or de facto standards conceptualized by companies making strategic alliances to develop them. The telecom world of today is principally centered on de jure standardization while in the computer environment on the contrary de facto standards are dominant.
- *Market globalization vs. government globalization.* Globalization of markets can be limited due to the restriction of cross-border communication. To overcome this restriction, governments can collaborate to enforce common policies and standards. On the other side, large companies are present worldwide and can deploy global strategies without government intervention.

Then, analyzing and interpreting each scenario description given in the corresponding proposal, we ranked the 15 scenarios on the 6 axes, using a 1 to 0 scale:

- 1 when the scenario was characterized *by high operator power, strong public initiatives, mass market, openness, market standardization, and market globalization*;
- 0 for *low operator power, weak public initiatives, limited market, integrity, government standardization, and government globalization.*

Based on the three more discriminating axes: *mobile operator's power, public initiatives and mass market vs. limited market*, we pooled the scenarios in five groups, sharing significant similarities based on these axes (see Table 1).

	Groups	***Scenarios***
1	Strong public initiatives Low operator power Mass market	*The world changed (MobiCom 2006)* *Anything goes (Telecom 2010)* *Wireless explosion – Creative destruction (Wireless Foresight 2015)*
2	Strong public initiatives High operator power Mass market	*Institutionalization (MobiCom 2006)* *Trusted guide (Beyond Mobile 2007)* *Mobile Klondike (Beyond Mobile 2007)* *Pocket computing (Telecom 2010)*
3	Weak public initiatives Low operator power Mass market	*The invisible hand (MobiCom 2006)* *Big moguls and snoopy governments (WirelessForesight 2015)* *Rediscovering harmony (Wireless Foresight 2015)*
4	Weak public initiatives Low operator power Limited market	*Professional users (Beyond Mobile 2007)* *Community lifestyle (Beyond Mobile 2007)* *Integrity (Telecom 2010)*
5	Weak public initiatives High operator power Limited market	*Business as usual (MobiCom 2006)* *Slow motion (Wireless Foresight 2015)*

Table 1. *Cross analysis of the scenarios*

The three first groups depict a growth of m-business, but with different enablers and characteristics, while the two last groups describe a much slower growth for m-business:

- The first group includes scenarios depicting a possible future situation in which the development of m-business is important, fostered by governmental initiatives and facilitated by telecom operators moving back to their traditional role of operating the network infrastructure thus leaving place for service providers to experiment with various innovative services and business models as well as for the emergence of alternative technologies such as WLAN and other ad hoc networks.
- The second group agglomerates scenarios describing a technology-enthusiasm future, with high customers' willingness to pay, public sector encouragement and high investments by telecom operators which are successful in introducing valuable mobile services through partnering service providers while retaining control of infrastructures, services and customer data.
- The third group illustrates a market driven development of mobile business driven by technology pluralism, open and interoperable systems and loose regulations. This enables strong competition among service providers proposing services at competitive prices through different networks. Users massively adopt various services for entertainment, productivity, socializing and transactions.
- The fourth group describes a less bright future for m-business, with large-scale restructuring, where professional use eventually establishes but mass market adoption is relatively low, mainly because of the lack of compelling services and unfavorable regulation due to privacy and security concerns.
- The last group regroups scenarios expecting a slow growth due to the entrenched position of network operators and the consequent difficulty for service providers to find attractive business models. Growth is also limited by a gloomy economic climate, unclear standardization choices and lack of government intervention for overcoming issues such as privacy, IPR or health concerns.

This analysis suggests that the role network operators is seen as a determining factor for the success of mobile business. The fear is that they if they try to leverage their dominant position to earn a sizeable fraction of revenues, they will end up in discouraging service providers and thus impede the growth mobile due to insufficient services development. Government intervention is seen as a means to cope with the negative effects of operators' power and to generally contribute to the success of m-business. Authors also highlight optimistic scenarios with growth fuelled by market enthusiasm as well as pessimistic scenarios with growth constrained by lack of interest in mobile services or other concerns.

4.2. Comparison using a technology environment assessment framework

As the different scenario proposals also described the assumptions from which they designed their scenarios and the implications at different levels they derived from each scenario, we conducted a second analysis of the scenarios proposals using a framework we defined for scanning technology environments such as the mobile business landscape (Camponovo et al. 2003). This framework is based on three elements: the market, the actors and the issues, which are intertwined by a series of influence relationships as depicted in Figure 4.

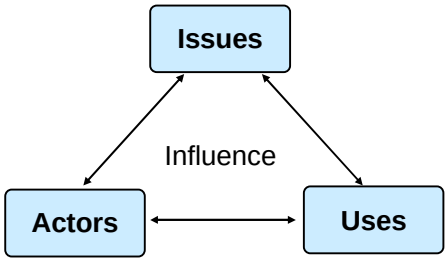

Figure 4. *Environment assessment framework*

The *actors* perspective represents the supply side of the environment with all the players contributing to offer mobile services and their different business models. The m-business market witnesses a large number of market players involved in offering an end-to-end solution between the content owner and the end-user. Understanding the roles, interdependence and balance of power of the key actors participating in a business system is essential because of their central role in shaping the competitive conditions and profitability of the industry (Porter 1980).

For assessing the role and impact of the different key actors on the m-business value chain, we detected, in each scenario if there was a group of dominant players in the value chain and the role played by the various key players was also assessed. These were regrouped in four main areas: 1) network operators, 2) infrastructure and device providers, 3) services, applications and content providers and 4) governments and regulation authorities. Moreover, the foresighted level of competition and collaboration between the different stakeholders was also considered (see Table 2).

ACTOR characteristics	Scenario 1	Scenario 2	Scenario …
Dominant player(s)			
Network operators			
Infrastructure and device providers			
Services, applications and content providers			
Governments and regulation authorities			
Level of competition			
Level of cooperation			

Table 2. *ACTOR characteristics*

The *use* or *market* perspective represents the demand side of the mobile business environment. Its assessment implies investigating the end user needs, how they are translated into demands and how they end up in the adoption of specific products (Kotler 2003). It is important to understand how customers are arranged into segments, how they adopt and value the different technologies and value propositions offered by the different actors. Each individual scenario was thus analyzed to extract key properties such as the main customers segments, their willingness to pay, their needs and their adoption behavior. The proliferation of services, their nature and their adoption were also characterized as well as the level of demand for personalization and location-based information (see Table 3).

USE characteristics	Scenario 1	Scenario 2	Scenario …
Customer segments			
Level of demand and willingness to pay for mobile services			
Proliferation of services			
Main types of services			
Customization and personalization			

Table 3. *USE characteristics*

Finally, the emerging m-business environment presents a new set of *issues* or *challenges*. These are ideas, topics or problems open to discussion or dispute, which are critical for the development of the mobile business industry and on which players can speculate and have different positions. Although inherently a technological domain, mobile business is expected to have profound impacts upon the people's ordinary life, the businesses and the society as a whole. Inspired by (Tarasewich et al. 2002), we explored not only technical issues, but also pointed out social and business issues which are among the biggest threats to a favorable development of the wireless industry. The former comprised issues such as the adoption of a dominant network standard, the emergence of alternative technologies (e.g. WLAN and ad hoc networks), the type of standardization, the interoperability and seamless roaming between networks, device capabilities. Among the latter, we considered privacy and security concerns, health and environmental concerns, intellectual property rights management, digital divide, new ways of life with its impact on mobility, transportation and urbanization, and the trade-off between globalization and localization (see Table 4).

ISSUE characteristics	Scenario 1	Scenario 2	Scenario …
Dominant network standards			
Emergence of alternative networks (WLAN, ad hoc)			
Interoperability and roaming			
Device Capabilities			
Standardization			
Privacy, security and integrity			
Health risks and environmental concerns			
Intellectual property rights management			
Digital divide			
New way of life, mobility, transportation and urbanization			
Globalization vs. Localization			

Table 4. *ISSUE characteristics*

Based on these three series of characteristics, we individually analyzed each scenario proposed by the proposals, and we filled the matrix (an excerpt is given in the appendix). We then conducted a comparison of the scenarios based on these properties. We also conducted a "principal components analysis" based on a rough quantification of these properties in order to get a more intuitive feeling of the data at hand. These analyzes allowed us to identify the following groups of scenarios:

	Features	***Scenarios***
1	Massive development lead by service providers due to operators backing off to their traditional role	The world changed (MobiCom 2006) Anything goes (Telecom 2010) Wireless explosion – Creative destruction (Wireless Foresight 2015)
2	Massive development driven by service providers and market adoption	Mobile Klondike (Beyond Mobile 2007) The invisible hand (MobiCom 2006)
3	Development driven by operators and governmental initiatives	Institutionalization (MobiCom 2006) Big moguls and snoopy governments (WirelessForesight 2015)
4	Development driven by operators, moderated due to privacy concerns	Trusted guide (Beyond Mobile 2007) Pocket computing (Telecom 2010)
5	Low development due to operators excessive power and entrenchment	Professional users (Beyond Mobile 2007) Business as usual (MobiCom 2006)
6	Low development due to unsolved major concerns (privacy, property rights, radiations,...)	Rediscovering harmony (Wireless Foresight 2015) Community lifestyle (Beyond Mobile 2007) Slow motion (Wireless Foresight 2015) Integrity (Telecom 2010)

Table 5. *Scenario groups*

- Groups 1 comprises scenarios illustrating a strong development of the mobile business industry due to operators moving back to their traditional role of operating the network infrastructure and the

parallel emergence of alternative networks, which gives service providers the opportunity to experiment with various business models and propose a variety of innovative services.

- Group 2 depicts a market driven development of mobile business in which enthusiasm for technology and huge demand for mobile services attracts numerous player to the mobile industry. The result is a proliferation of innovative services and technologies. In addition, the perceived utility of these mobile services counterbalances privacy and environmental concerns.
- Group 3 scenarios show a strong development promoted by mobile operators, which fully deploy 3G networks, and public initiatives which impose public service constraints and successfully limits the power of operators, regulates issues such as privacy and property rights and establishes favorable competitive conditions attracting many players like content and service providers.
- Group 4 scenarios similarly show a development promoted by mobile operators and government initiatives, but which is somewhat limited by public initiatives which are ineffective in limiting operators' power and solving privacy and other social concerns.
- Group 5 scenarios expect a continuation of the current situation, with a slow growth due to the excessive power and entrenched position of network operators which makes it difficult for service providers to find attractive business models and hampers the development of mobile services. Lack of services, demand and investments reinforce each other in a downward spiral.
- Group 6 regroups a variety of scenarios which similarly depict a depressing picture for the mobile business industry, but for different reason pertaining to the social issues. Growth is severely limited by the incapacity of overcoming issues such as privacy, IPR or health concerns.

4.3. Comparison using a competition-cooperation framework

Based on a careful analysis of the matrix crossing each scenario with each characteristic, we made the assumption that a theoretical model inspired from (Malone et al. 1987) could be applied to classify the scenarios using two axes: strong or weak competition, and strong or weak cooperation, among the stakeholders of the m-business landscape, as shown in Figure 6. As this framework presents many similarities with the scenarios proposed by (Lai et al. 2000), they are also included in the analysis.

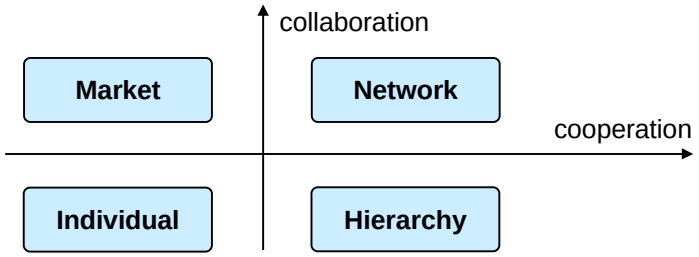

Figure 6. *Market vs. Hierarchy axes*

We claim the following proposition, still to be validated by further research:

> *Proposition. The published scenarios for m-business can be grouped in four families according the major driving forces of the possible m-business futures, which can be the liberalistic (chaotic) market, the vertical integrated operators, or the networks of complementary competencies and corporations. A slow development of m-business, without particular driving force, could be a last alternative future.*

Based on this proposition, we placed the scenarios according to these four families (see table 6).

MARKET (liberalistic market)	**NETWORK (alliances)**
The invisible hand (MobiCom 2006) *Wireless explosion (Foresight 2015)* *Mobile Klondike (Beyond Mobile 2007)* *Anything goes & Pocket computing (Telecom 2010)* *Intimate seller (ADL 2005)*	*The world changed (MobiCom 2006)* *Rediscovering harmony (Foresight 2015)* *Community lifestyle (Beyond Mobile 2007)* *Brand bureau (ADL 2005)*
Business as usual (MobiCom 2006) *Slow motion (Foresight 2015)* *Professional users (Beyond Mobile 2007)*	*Institutionalization(MobiCom 2006)* *Big moguls and snoopy governments (Foresight 2015)* *Trusted guide (Beyond Mobile 2007)* *Integrity (Telecom 2010)* *Super operator (ADL 2005)*
INDIVIDUAL	**HIERARCHY (integrated operator)**

Table 6. *Four families of scenarios*

In the *Hierarchy* family, the scenarios depict a m-business sector, which is largely controlled by integrated telecom operators. By managing the access network infrastructure and the customer relationship, operators can leverage their dominant position to select the players and services that are allowed on their network. Cooperation is high as the network operators coordinates the players inside the group built around them, while competition is pretty low as operators exert an enormous power over the other players which have to accept the competitive rules imposed by the operator.

In the *Market* family, at the opposite, the scenarios foresight the development of m-business in a competitive market setting. Competition is the rule. Players in all sectors of the value chain have to be efficient, innovative and aggressive to stay and grow in the market. Disruptive technologies emerge and old actors are challenged. Consumers can make their choice among a large offering of mobile services. Cooperation is much less developed. The market drives the sector.

In the *Network* family, the scenarios predict futures where high competition and cooperation are driving the development of m-business. Partnerships, alliances and strategic networks are established between the different actors, with different competencies, which cooperate for proposing bundled mobile services, products, and value propositions. Consumers deal with intermediaries who help them to find and aggregate mobile services corresponding to their needs. Even if cooperation governs the networks, it remains a competitive environment where only the best players are accepted in the winning strategic networks and ferocious competition rages between the different networks.

In the *Individual* family, we find scenarios describing a future where the actors avoid the risk of taking any initiative and are ready to react only if others moved in the first place. As a consequence, the marketplace is stagnant, with little innovative services, business models and technological developments. The professional segment eventually adopts mobile solutions but consumers show little willingness to pay. Competition is weak in the mobile sector and inefficient actors can remain in place. In addition, cooperation among players is not much more developed.

5. CONCLUSION

The goal of this research was to conduct a descriptive and comparative analysis of different published scenarios planning proposals within the environment of mobile telecommunication marketplace. Many proposals exist and suggest scenarios for the future of mobile business. However, none of them refers the others and tackles the validation issue. Accordingly, the research question in this project was to

conduct a cross-analysis of the different proposals for demonstrating the convergence or the divergence of these proposals.

Before discussing the results, two aspects have to be highlighted about the characteristics of the compared scenarios: that the scenarios were built according to different time horizons (between approximately five to fifteen years) and that the scenarios were built from teams with different backgrounds and purposes. Although, this might raise concerns as to their comparability, the resulting scenarios seem not to be radically different depending on the time frame or context used. Concerning this second aspect, the difference in context of scenario creation is not so broad and it would be interesting to have the possibility to consider scenario studies of teams from different contexts in time and space such as the Asians countries.

In order to conduct this comparison, we adopted three approaches: in the first one, we plotted the scenarios on the axes adopted by the different proposals, whereas in the second approach, we applied an assessment framework and a theoretical model to the different scenarios.

Through these three comparisons, we did not find a one-to-one correspondence between the scenario groups. Our comparison pinpoints the lack of convergence in the different proposals even if many similarities have been detected. This brings out the question of the legitimacy and suitability of the scenario planning approaches. Our research is a first attempts to improve the validation phase in the scenario planning approaches applied to m-business for justifying the adequacy of scenario methods in the tool box of environment assessment and strategic decision-making.

When discussing the validity of the scenario approach, it is worth keeping in mind that the scenario planning approach has been conceived with the intention of fostering the reflection on the multitude of different futures rather than trying to predict a single one. The main contribution of the scenario approach is in forcing the participants to understand the key forces and uncertainties that will shape the future and to open the mind to the variety of potential futures, in particular the less likely and counterintuitive ones. Therefore, even if various scenario proposals illustrate very different scenarios, this does not imply that the scenario approach is not valid or not useful.

It can be argued that analyzing the different scenario proposals tells us more about the implicit conceptual framework of their creators than about the various futures. According to this perspective, the different scenario proposals can be analyzed in order to assess if there are some widely accepted patterns people involved in very different contexts, with diverging backgrounds and interests. From the analysis conducted in this study, four patterns appear to be shared among the majority of authors:

- the role of network operator is seen as the most decisive factor in determining the success of mobile business: their power is mostly negatively related to the development of mobile business as authors fear that operators which try to leverage their dominant position to earn a substantial fraction o f service revenues risk of discouraging service providers
- government intervention is also seen as a major success factor for mobile, be it for sustaining research, invest in services or through the development of a regulatory framework fostering favorable competitive conditions
- development of mobile business will be extremely limited unless important concerns such as privacy, security and intellectual property rights are not resolved either through regulation or through the development of suitable practices by industry participant

- development of alternative access technologies such as WLAN or more advanced ad hoc networks is seen as an almost sufficient condition for granting a bright future to mobile business.

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