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# The Role of the Adoption Network in the Early market survival of Innovations: the Case of the Italian Mobile Value-Added Services (VAS) Industry

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## RUNNING TITLE

Adoption Network and Early market survival of Innovations

*Keywords: innovation; early market survival; adoption network; launch tactic; underlying technology maturity; brand awareness.*

# The Role of the Adoption Network in the Early market survival of Innovations: the Case of the Italian Mobile Value-Added Services (VAS) Industry

*Adoption Network and Early market survival of Innovations*


## Abstract

**Purpose** – Considering the strikingly high number of new products and services that are withdrawn from the market very soon after launch, this paper studies how early market survival is affected by decisions regarding a particular launch tactic, i.e. the configuration of the adoption network through which the innovation is commercialized. The paper also investigates how the impact on early market survival of this launch tactics depends on the maturity of the technology underlying the new service.
**Design/methodology/approach** – The conceptual model relating the variables "size of the adoption network", "brand awareness of the organizations comprised in the adoption network", "maturity of the underlying technology" and "early market survival" is tested in the empirical setting of the Italian mobile Value Added Services market, utilizing a longitudinal dataset which includes more than 28,000 new VAS launched between 2003 and 2007.
**Findings** – The paper shows that increasing the number of external organizations involved in the adoption network is a particularly effective tactical decision for new services based on very novel technologies, whereas building an adoption network that involves organizations with high brand awareness in the eyes of prospective customers positively impacts the early market survival of services relying on mature technologies.
**Originality/value** – Besides providing practical insight to product and marketing managers seeking to maximize the chances of early survival of the services they are responsible for, the paper has interesting implications for launch decisions and diffusion of innovation research.


**Keywords** innovation; early market survival; adoption network; launch tactic; underlying technology maturity; brand awareness.
**Paper Type** Research Paper


## 1. INTRODUCTION

Across industries and geographies there is a clear pattern whereby a very high number of new products or services fail very soon after they are launched into the market (Cierpicky *et al.*, 2000). Because of the limited diffusion and customer acceptance that they experience, their sales are discontinued very early, as it happened, e.g., with

the IBM PC-Junior in 1985 or the Google Wave networking service in 2010. This often results into major financial losses, that can even cause the innovating firm's bankruptcy.

As noted by Gourville (2006), there is a tendency to believe that these early failures are due to inaccurate product development, e.g., the inability to understand the need of the prospective clients, which causes a lack of critical functionalities. In fact, the early diffusion and customer acceptance of a new product or service can be greatly affected by the strategies and tactics used to launch it into the market (Chiesa and Frattini, 2011). This is clear if we consider the high number of innovations that, despite being technically and functionally superior to competing products, were far less successful due to inaccurate launch (Hartley, 2005).

Research has shown that managers can increase new product and service success through a well planned and executed launch process (Langerak *et al.*, 2004; Montoya-Weiss and Calantone, 1994). Several levers can be acted upon during market launch by product and marketing managers. They can be distinguished, as proposed by Hultink and colleagues (see, e.g., Hultink *et al.*, 1997), into:

(i) *strategic* launch decisions, i.e. those that are taken before the actual introduction of the innovation into the market or even before starting its development, and basically define the context in which the launch of the new product occurs), and;

(ii) *tactical* launch decisions, i.e. those encompassing the key elements of the marketing mix, concerned therefore with the operational issues of the innovation's launch.

Much empirical work has been done (see, e.g., Talke and Colarelli O'Connor, 2011; Talke and Hultink, 2010a,b; Hultink *et al.*, 1997, 1998; Hultink and Robben, 1999; Hultink and Hart, 1998; Hultink e*t al.*, 2000) to investigate the impact of launch decisions on several dimensions of a new product success. These dimensions can be grouped into:

(i) product performance, e.g., the new product's quality and competitive advantage;

(ii) market performance, e.g., the new product's market share, sales or ROI).

However, as noted by Asterbo and Michela (2005), no systematic analysis has focused so far on the impact of launch decisions on a particular aspect of new product performance, i.e. early market survival. Using the traditional product life cycle model (Day, 1981), early market survival is defined in this paper as the ability of a new product or service to survive the introduction stage of its life-cycle and not being withdrawn from the market before its sales can eventually enter the steady growth phase. In addition to the fact that early survival has been under researched in launch strategy and tactics literature so far, focusing on this performance dimension is relevant because early product survival is key to firm survival, especially in case of new technology-based ventures (Asplund and Sandin, 1999).

The adoption network of a new product or service encompasses all those interrelated organizations whose decisions and behavior affect each other's and, most importantly, the innovation's diffusion and market acceptance (Chakravorti, 2003; Chiesa and Frattini, 2011; Aarikka-Stenroos and Sandberg, 2012). It includes, for instance, companies supplying complementary hardware, software and service and those involved in distributing the innovation and information about it. This paper contributes to fill the research gap on the relationship between adoption networks and survival by proposing a conceptual model (see Figure 1) which investigates the impact of a critical tactical launch decision on the innovation early market survival. In particular, the paper studies:

(i) how the configuration of the adoption network of the new product or service affects early market survival;

(ii) how the maturity of the technology on which the new product or service is based moderates the relationship between the configuration of the adoption network and early market survival.

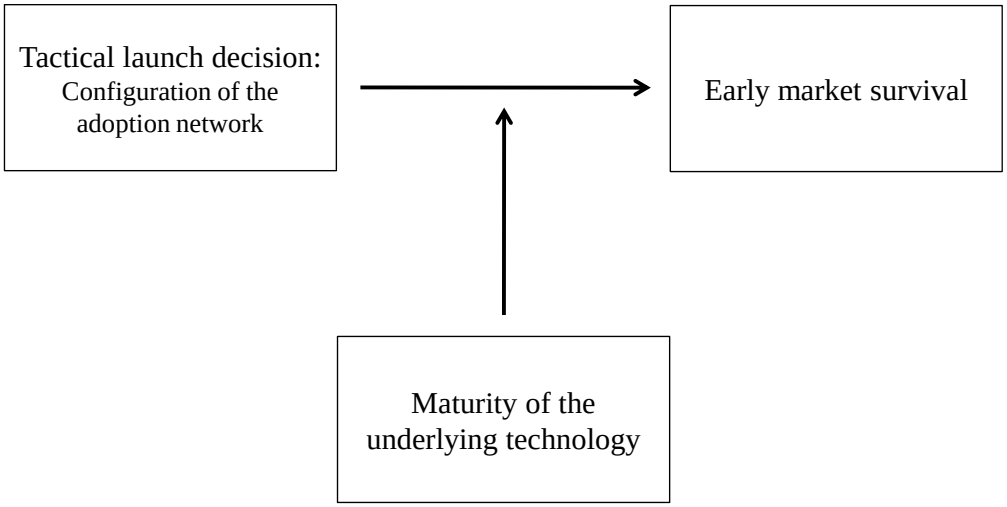


**Figure 1: Conceptual model**

The model is tested utilizing a longitudinal dataset which includes more than 28,000 new mobile Value Added Services (VAS)[i] launched between 2003 and 2007 on the Italian market. This setting is very appropriate for the analysis because:

- the relevance of the mobile VAS market in the worldwide mobile telecommunications landscape is rising dramatically, as analysts expect its global value, only partially hindered by the ongoing recession, will exceed 100 billion $ by 2013 (Strategy Analytics, 2010);
- the Italian mobile VAS market has experienced a significant expansion in the recent years, with an average growth rate per year equal to 26% (Bertelè and Rangone, 2008) to the point that Italy is the European country where mobile VAS have experienced the most significant diffusion in the last decade;
- Italy shows the highest European content ARPU, and has the highest European smartphone penetration rate (32%) (Juniper Research, 2009; Strategy Analytics, 2010);
- firms competing in the mobile VAS industry are very innovative and hundreds of new services are launched every year on the market;
- the mobile VAS industry is characterized by a very high mortality rate, with a sizeable percentage of new services being withdrawn from the market a few months after launch, and a limited number of VAS that survive for several years and become the source of substantial revenues and profits. Therefore, early market survival is an important determinant of competitive advantage for mobile VAS firms;

- at a given point in time, the same mobile VAS (e.g., a daily sport news service) can be delivered through different technological platforms (e.g., SMS, Browsing and Download), each characterized by a different level of maturity;
- the launch process for a mobile VAS is particularly complex and comprises several different activities, to which adoption networks with very dissimilar configurations correspond.

From a practical point of view, the paper provides product and marketing managers with insights about how to increase the odds of early market survival of mobile VAS, especially those based on very new and embryonic technologies, by acting on the configuration of their adoption network. Furthermore, the paper points to the importance of focusing on a further critical aspect when studying the dimensions of new product or service success, i.e. early market survival. Product management and launch strategy research could investigate in the future what further endogenous (i.e. managerial levers) and exogenous (i.e. environmental conditions) variables affect this particular facet of innovation performance.

The paper is structured as follows. The next section develops theory and hypotheses. Section 3 describes the data and the methodology applied in the empirical analysis, while Section 4 reports and discusses the major empirical findings. Finally, Section 5 concludes and outlines opportunities for future research.

## 2. THEORY AND HYPOTHESES

*Launch strategies and tactics*

Research on new product launch strategies and tactics have originated and expanded during the 1980s. This body of literature mainly emphasized empirical analyses of the relationship between launch strategy and new product performance, without developing first a theoretical understanding of the concepts and then testing the theory (Hultink *et al.*, 1998). The impact of launch strategy on new product performance was investigated, among the others, by Choffray and Lilien (1984, 1986), Green and Ryans (1990), Yoon and Lilien (1985). Nevertheless, drawing general conclusions

from this research was complex due to the inclusion of different launch variables in the different studies and because each investigation was incomplete, only exploring a subset of the decision that make up a launch strategy. In the second half of the 1990s, studies started to focus on developing a comprehensive theoretical understanding of the new product launch concept and then link it to market performance, using large empirical databases (see, e.g., Hultink *et al.*, 1997, 2000).

One of the major contributions of this body of research regards the definition of the new product launch concept. According to Hultink and colleagues, a launch strategy can be defined as "[…] those decisions and activities necessary to present a product to its target market and begin to generate income from sale of the new product" (Hultink *et al.*, 1997, pg. 245). They show that a relevant part of the launch decision-making occurs prior to making the marketing mix launch decisions, and even before the new product development (NPD) process is started. These are called *strategic launch decisions* and concern the "what" to launch, "where" to launch, "when" to launch and "why" to launch. They define therefore the strategic contest in which market launch occurs and are related to product, market, competitive and firm strategic issues. Nonetheless, other commercialization decisions take place after the conceptual and physical development of the product has been completed. These can be named *tactical launch decisions* and are concerned with the "how" to launch the new product, i.e. with the elements of the so-called "marketing mix" (product, price, promotion and distribution decisions).

*Configuration of the adoption network*

In this paper we focus on a particular tactical launch decision, i.e. the configuration of the adoption network of the new product or service. This aspect has received limited attention in launch research so far, although it appears to be a critical determinant of new product performance, especially in high-technology industries (Frattini, 2010; Aarikka-Stenroos and Sandberg, 2012). In the last years, more and more markets have taken on the characteristics of networks (Chakravorti, 2004), due to the improvements in communication technologies, the advent of the internet and an increased internationalization of business activities. Therefore decisions regarding launch and adoption of innovations are more and more distributed among many interrelated organizations, whose behavior influences each other's. These players represent the so-

called adoption network of the new product or service (Chakravorti, 2003), which usually comprises:

(i) companies supplying complementary hardware, software and contents that improve the value of the innovation for prospective clients;

(ii) companies engaged in distributing the innovation and disseminating information about it;

(iii) companies providing complementary services (e.g., pre- and post-sale assistance, billing, payment). Research suggests that the way in which this adoption network is configured heavily affects the degree of diffusion and market acceptance of new products and services (Chakravorti, 2003).

In particular, the size of the adoption network and the type of organizations it includes can make the difference between a successful and unsuccessful innovation (Chiesa and Frattini, 2011). This seems to be particularly true in high-technology, high-velocity industries, as shown by high-tech marketing scholars (Easingwood and Beard, 1989, Beard and Easingwood, 1996).

A new product or service fails to survive the early stages of its life cycle because it experiences unsatisfactory levels of sales, i.e. due to limited customer acceptance. According to sociological theories of innovation diffusion (Turnbull and Meenaghan, 1980; Burt, 1987; Deroïan, 2002), the first reason why potential adopters decide not to purchase an innovation is uncertainty. New products or services cause indeed a great deal of uncertainty in potential customers, which often results into a postponement of the adoption decision (Chiesa and Frattini, 2011). Even in case several specifications and consumer reports are available, and the cost of purchase is precisely determined, customers may still be unsure about how the product will perform for them, whether it is suited to the applications they have in mind and whether it will be well backed from the members of its adoption network.

A similar argument can be also developed from a transaction costs perspective (Tyagi, 2004; Lynch and Ariely, 2000). According to this standpoint, a potential adopter will purchase an innovation only when the benefits she expects to reap from using the new product or service will overcome the expected transaction costs. The latter are due, besides search, information, bargaining and decision activities, to switching, learning

and obsolescence phenomena (Gourville, 2006). What should be remarked here is that the assessment of the expected benefits and transaction costs occurs under strong psychological biases, which behavioral economists call "endowment effects" or "status quo biases" (Kahneman *et al.*, 1990; Knetsch, 1989). Accordingly, potential adopters tend to overvalue the expected costs and to underestimate the benefits, in an irrational attempt to stick to their "status quo". Unless uncertainty about expected transaction costs and benefits is lowered, resistance to purchasing the innovation on the part of the potential adopters will be therefore particularly soaring.

Recent findings from Aarikka-Stenroos and Sandberg (2012) points to the important role that the adoption network plays in the innovation commercialization process. First of all they describe how the innovating firm needs resources to engage in a growing set of activities (e.g., customer education, distribution, marketing communication, relationship mediation, credibility building) when moving from R&D tasks to commercialization tasks. Second, they show that, for acquiring such resources, the firm needs to leverage on network relations. Commenting on these results, Prenkert (2012) sets guidelines for future research in the field, arguing that higher effort should be placed in delineating innovation processes, new product development and business networks, so as to stress their complex and multifaceted nature.

In this paper we argue that pre-purchase uncertainty can be reduced by product and marketing managers by acting on the configuration of the innovation adoption network. Increasing the size of the adoption network by establishing partnerships and cooperation agreements with many external organizations which are convinced to actively take part in the launch of the new product or service can be very useful to signal to potential purchasers that the new product or service is very well backed and receives support from the several parties whose role is critical to ensure a successful adoption and use of the new product. Winning pre-purchase resistance to adopt a new product or service is particularly challenging under circumstances of strong market interconnection, because potential adopters are especially unsure about the degree of support that the members of the adoption network will ensure to the innovation. We are assuming therefore that the value of a new product and service in the eyes of a potential adopter is strongly influenced indeed by the amount of support ensured by

these external organizations (Schilling, 2003). This is not a new idea in marketing (see, e.g., McKenna, 1985 and Wind and Mahajan, 1987), but it has become more and more critical in today's highly networked markets. This leads us to posit that:

*H1: The size of the adoption network of the innovation will have a positive association with early market survival*

Besides the number of organizations which take part in the launch process, in this paper we argue that their brand awareness is critical as well to affect early market survival. Brand awareness can be conceived as a rudimentary measure of brand knowledge, which implies at least brand recognition by prospective customers (Hoyer and Brown, 1990). Marketing research shows that generating and maintaining brand awareness is one of the key objective of marketing, as this strongly affects adoption decisions, especially in situations where the customer does not own enough information to aid choice, as it typically happens in the earliest stages of the life cycle (Macdonald and Sharp, 2000; Rogers, 2003). In particular, it has been argued that brand awareness influences perceived quality and value of a new product or service by reducing pre-purchase uncertainty (Hoyer and Brown, 1990). Therefore product and marketing managers involved in the launch of an innovation can increase the likelihood of early market survival by improving the brand awareness of their firm, e.g., through more effective investments in advertising (Macdonald and Sharp, 2000). However, in this paper we argue that, in highly interconnected markets, it is not only the awareness of the firm launching the new product or service that influences customer adoption decision, but also that of the organizations involved in the adoption network. Put it differently, customers' perception regarding the degree of support that a new product or service will receive from its adoption network will be positively affected by customers' knowledge and recognition of the members of the adoption network. Therefore, product and marketing managers can improve the likelihood of early market survival by involving in the adoption network, through properly planned and executed collaboration agreements, organizations characterized by a particularly high awareness among prospective customers. This leads us to posit that:

*H2: The brand awareness of the organizations comprised in the adoption network of the innovation will have a positive association with early market survival*

*Maturity of the underlying technology*

As shown in Figure 1, in this paper we are also interested in the moderating role of the maturity of the technology on which the new product or service is based. Especially in high-technology innovation, it often happens that the same functionality incorporated in a new product or service can be delivered to customers using an already established and well-known technology (e.g., voting a TV program by sending an SMS), or through an embryonic technological platform, which is almost unknown to prospective users and often requires them to change the approach through which they interact with the product or service (e.g., voting a TV program browsing the web with the mobile phone). The degree of change in behavior and consumption patterns required to customers to use an innovation can be significantly affected by the maturity of the technology on which the new product or service is based (Veryzer, 1998).

Our assumption is that the greater the change in behavior and consumer patterns required from potential adopters to make the most out of a new product or service, the higher the degree of pre-purchase uncertainty she will perceive, which can slow and freeze early diffusion, as discussed above (Chiesa and Frattini, 2011). This proposition is grounded in marketing research, which indicates that the chances of having a new product withdrawn from the market for poor commercial results early after launch is especially high for really-new products (Alexander *et al.*, 2008). This is due to the fact that, when confronted with a radically-new product, as compared with an incrementally new one, customers perceive:

(i) higher uncertainty regarding the consumption benefits and transaction costs (Hoeffler, 2003);

(ii) the need to more deeply modify their behavior to fully benefit from the new product (Gourville, 2006).

This strongly increases their resistance to change, which underlies any decisions to adopt an innovation. It can be argued therefore that the more novel the technology on which an innovation is based, the higher the level of pre-purchase uncertainty that potential adopters will perceive.

A similar argument can be developed also by looking into research on the dynamics of technological change (Anderson and Tushman, 1990; Utterback and Abernathy, 1975), which indicates that in the early, pre-paradigmatic phases of a technology's life cycle, several alternative technologies fiercely compete for achieving market acceptance. These periods of ferment are characterized by a high level of uncertainty as regards which technology will establish itself as the dominant design in the industry (Tushman and Anderson, 1986). Therefore, the more a new product or service is based on a technology which is in the early stages of its life cycle, the higher the uncertainty perceived by potential adopters and hence the higher the likelihood that they will postpone purchase.

Based on these premises, it can be argued that acting on the configuration of the adoption network, by increasing its size and involving organization characterized by a strong brand awareness, becomes especially critical for the early market survival of those new products and services based on very new technologies, as the level of pre-purchase uncertainty perceived by potential adopters is particularly soaring under these circumstances. Therefore we posit the following two hypotheses:

*H1a: The size of the adoption network will have a stronger association with early market survival for innovations based on new technologies, in comparison with those based on mature technologies*

*H2a: The brand awareness of the organizations comprised in the adoption network will have a stronger association with early market survival for innovations based on new technologies, in comparison with those based on mature technologies*

The conceptual model and the research hypotheses developed in this section are synthesized in Figure 2.

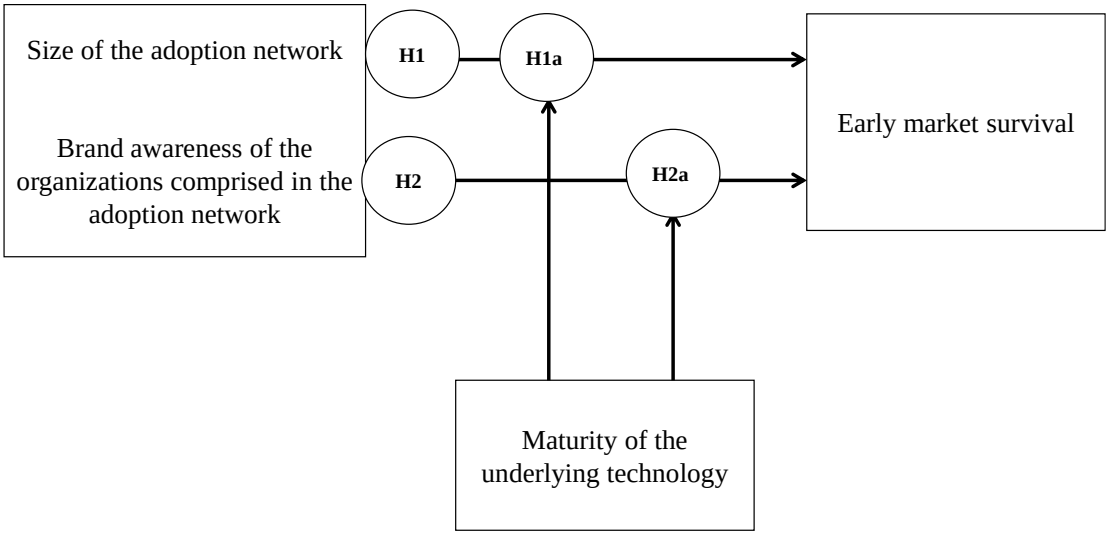


**Figure 2 Research hypotheses**

The next section describes the empirical data and the analyses undertaken to test our hypotheses.

## 3. METHODOLOGY

*Empirical setting*

As previously mentioned, our research hypotheses are tested using a longitudinal sample built from the Italian mobile VAS industry, which arose as a part of the overall mobile telecommunications industry when mobile incumbents started offering non-voice, value added services to create other potential sources of revenue capable of sustaining their future growth (Peppard and Rylander, 2006; Gartner Research, 2009).

The rise of VAS, however, implied deep changes in the very structure of the mobile telecommunications industry, as it determined a deep value system reconfiguration (e.g., see Huemer, 2006; Peppard and Rylander, 2006; Funk, 2009; Ghezzi et al., 2009). For their conception, creation, delivery and commercialization, VAS required the creation of a multi-actor adoption network, where diverse players cooperate so as to merge their expertise and assets to deliver innovative VAS. Specifically, the complexity of the commercialization process is due to the existence of several different organizational solutions that can be adopted by the Mobile Service Provider

(MSP) to promote a new service and deliver it to customers. First, the members of the adoption network of a new mobile VAS, which can be involved in its commercialization process, comprise:

(i) Mobile Network Operator (MNO) – owns 3G – UMTS licenses, operates the mobile network, and is responsible for the provisioning of its functionalities;

(ii) Mobile Content Provider (MCP) – owns the rights for original content to be delivered through the mobile channel, and concentrates on the conception and creation of VAS. In a broad sense, music majors, media and web companies also belong to such category;

(iii) Mobile Technology Provider (MTP) – focuses on the technological enablement of the VAS offer, providing the Content & Service Delivery Platforms to create, manage and deliver digital content.

These external organizations can be involved by the MSP to a varying extent in the several activities which are required to commercialize and launch a new service. In other words the adoption network can be configured according to different architectures. The four players take on complementary – and sometimes overlapping – roles when they engage themselves in the value creating activities necessary to bring a new service to end users (for a description of all activities, see Ghezzi et al., 2009). Of course some of these tasks are always under the responsibility of a particular external organization (e.g., the MNO is always involved in "content charging" and "content billing & accounting" activities), but there is the opportunity for the MSP to enlarge the involvement of a certain member of the adoption network to include several other activities (e.g., the MNO, which is highly visible to the end user of a mobile VAS due to its size and brand awareness, can be involved in "content delivery & market making" or "customer relationship management"), instead of undertaking them on its own.

The dataset designed and employed for testing the model was extracted from the pool of data gathered by the Mobile VAS Observatory, a permanent research project promoted by the ICT & Management Observatories, a research center of Politecnico di Milano. The Mobile VAS Observatory has been gathering data on the Italian mobile market since 1998 and, starting from 2002, it has collected information

regarding the totality of Application-to-Person (A2P) services – i.e. those services produced by an application and sent to a mobile subscriber – delivered through the four Italian MNOs' mobile portals. Data were collected through an annual detailed census regarding a set of relevant information – e.g. service category; year of publishing; price/fee; key features; MNO/MSP/MCP/MTP of reference; key activities required for placing the service on the market – for each Italian VAS[ii] (Bertelè and Rangone, 2008).

The empirical analysis reported in this paper relies on a sample of data which includes more than 28,000 new mobile VAS belonging to the Short Message Service (SMS), the Browsing and the Download service categories, and launched between 2003 and 2007 on the Italian market[iii]. The selected timeframe influences the choice of the service underlying technologies. Between 2003 and 2007, three technologies were of particular importance for the Italian mobile VAS industry:

- SMS, which allows to send short text messages to and between mobile phones, and contain the embedded information representing the VAS – e.g. for infotainment services –. The first A2P services based on SMS were delivered to Italian customers in 2003;
- Browsing – also known as Mobile-Browsing or Micro-Browsing –, which allows the user to surf Mobile-Sites and Mobile-Portals as it happens with traditional browsers. A2P VAS delivered through the Browsing technology appeared on the Italian market in 2004;
- Download, which allows the user to download mobile contents as it happens with traditional browsers. A2P VAS delivered through the Download technology appeared on the Italian market in 2004.

*Variables*

For properly defining and measuring the variables used in our analysis, we exploited the fact that one of the authors works in the ICT & Management Observatory research group. This allowed us to organize and conduct direct interviews (Yin, 2003) more than ten experts in the Italian mobile VAS industry and take part to several conferences and workgroups organized by the ICT & Management Observatory prior to starting data modeling and analysis. Appendix 1 provides details on the experts that

were interviewed prior to starting our study and the type of open-ended questions around which the interviews were organized. Informants were selected on the basis of their prominent role and professional background within the Mobile Telecommunications industry, so as to guarantee the significance and trustworthiness of data gathered. Completeness of information was also granted by the selection of informants who covered a wide span of roles in the value network – e.g., ranging from Chief Executive Officer to Product Manager (Eisenhardt, 1989).

The responses from interviewees were summarised, interpreted and tabulated from the transcripts, according to the themes of the research questions. More in details, data were coded within two documents: the central data-base (on a simple Excel table) and a word document containing the complete resume of the interviews. If any information remained unclear and/or the researchers believed more data were needed, informants were re-contacted later by phone for additional questions. The data analysis has been conducted according to two complementary approaches and both a within-case and a cross case analysis have been carried out. The first aims at generating the necessary insight (Gersick 1988, Pettigrew, 1988), while the second at enabling inter-case comparisons and highlighting similarities and differences between responses.

These preliminary interviews with experts in the Italian mobile VAS industry showed that a remarkably high percentage of new mobile VAS do not survive the first months after launch. In particular, our data indicate that about 75% of the new services based on SMS, 62% of those delivered using the Browsing technology, and 64% of those delivered using the Download technology are no more offered to customers in the year that follows the one when they were first launched (i.e. have a life cycle which is shorter than 12 months). However, those services that survive the first year after launch remain on the market for a long time (on average for more than 3 years) and become a major source of revenues and profits. Accordingly, we decided to operationalize our dependent variable, i.e. *Early market survival*, as a binary variable which describes whether or not the new service stays on the market for less than 12 months (*Early market survival* equals to 0 if the new service stays on the market for less than 12 months, 1 otherwise). This operationalisation leads us to consider only the 28,796 mobile VAS launched in Italy between 2003 and 2006, withdrawing the new services commercialized for the first time in 2007.

As mentioned in the previous section discussing the study's empirical context, the configuration of the adoption network can vary depending on the strategies adopted by the MSP. In particular, the number of distinct players belonging to the adoption network and involved by the MSP during the commercialization process of the new service varies from 1 to 4. Considering the necessary assets and capabilities some tasks are always under the responsibility of a particular player (e.g., the MNO is always involved in "content charging" and "content billing & accounting" activities), but the MSP can enlarge the adoption network to other players for developing specific activities: for example the "content & service delivery platform provisioning" activity can be developed by the MNO or the MTP; the "content creation" and "content packaging" can be developed by the MNO or the MCP. The basic configuration of the adoption network includes the MNO and the MSP, only in few cases the MSP is able to deliver the service alone, whereas most often the MSP involves other actors (e.g., the MTP or MCP) to commercialize complex services. For example the service "4 Lovers", an infotainment dating service based on SMS, was launched in 2004 through an adoption network composed only by one actor, the MSP Zed. This, because the service was relatively simple from a technological point of view and there was no original content to be bundled: the MSP internally created and managed both the infotainment content and the related delivery platform. On the other hand, the service "2 Fast 2 Furious", a mobile gaming service based on download, was launched in 2006 and required a more complex adoption network, where 4 different actors interacted: the MSP Netsize, the MNO Vodafone, the MCP iPlay and the MTP MBlox. The presence of 4 actors was necessary to ensure that the heterogeneous complementary activities were properly carried out: for instance, the MSP took care of the content bundling, publishing and market making; the MNO handled service charging, billing and accounting; the MCP acquired the content rights from the movie major Universal Pictures; and the MTP provided the technological capabilities for developing the mobile game. For the reasons discussed in this paragraph, we operationalize the variable *Size of the adoption network* as a binary variable: it is equal to 0 if the adoption network is composed by one or two distinct actors, 1 otherwise.

As the description of the empirical context shows , twelve value creating activities are necessary to bring a new service to customers (Funk, 2009; Ghezzi et al., 2009), but only three represent the front-end of the service, where interaction with the end user takes place: portal provisioning; content delivery & market making; customer relationship management. The MSP has to face specific constraints in the development of the adoption network because these front-end activities can be developed only by the MSP or, alternatively, by the MNO. The four Italian MNOs (Vodafone Italy, TIM, H3G and Wind) represent well-known and historical brands, they invest significant resources in promotional activities using mass-media channels such as the TV or the web aimed at increasing their brand awareness and their reputation. Their size and investments potential allows them to access pervasive promotion and communication channels, thus getting in contact with numerous end users. On the other hand, MSPs are mainly new high-tech companies with significantly smaller budgets for marketing and communication activities, in comparison with MNOs. This means that they can invest in advertising only through more specific channels and consequently reach less end users. Considering that product and marketing managers can improve the likelihood of early market survival by involving organizations characterized by a particularly high awareness among prospective customers we operationalize the variable *Brand awareness of the organizations comprised in the adoption network* as a binary variable that equals to 0 if all the front-end activities are developed by the MSP, 1 if at least one front-end activity is developed by the MNO.

Around 95% of the new A2P mobile VAS launched in Italy between 2003 and 2006 were based on three underlying technologies: SMS, Browsing and Download. If MMS represented a marginal technology, only in 2007 new platforms were proposed on the Italian market: Streaming, Videocall, DVB-H. While SMS represented an already established and well-known technology, Browsing and Download can be interpreted as embryonic technological platforms considering that they were launched on the market in 2004. SMS is labeled as the mature technology in this paper, because of its earlier diffusion and lower technological complexity: if the first A2P service delivered through the SMS technology in Italy was launched in 2004, the underlying technology was already mature considering the advanced stage of its lifecycle. The SMS platform didn't require end users to change behaviors considering the incredible

diffusion of Person To Person services delivered using the same technology. Moreover, according to the interviews with experts in the Italian mobile VAS industry, the SMS technology guaranteed a satisfactory level of reliability, stability, quality of service and user experience. For the same reasons, Browsing and Download, which were launched at a later point in time and are characterized by greater sophistication, are considered embryonic technologies in the paper. Based on these elements, we operationalize the *Maturity of the underlying technology* as a binary variable equals to 1 if the new service has been launched by using the SMS technology, 0 otherwise.

As regards the method used to test our hypotheses, we used a simple t-test (Greene, 2011; Miller, 1997), which has been already applied in a similar analysis (Frattini et al., 2012).

## 4. RESULTS AND DISCUSSION

The empirical results with reference to the research hypotheses are synthesized in Table 1.

| Hypothesis | Empirical result | Interpretation |
|---|---|---|
| **H1** | Verified | Services launched through adoption network with large Size show higher Innovation Survival than those launched through adoption network with small Size |
| **H1a** | Verified | Services based on mature technologies and launched through adoption network with large Size show lower Innovation Survival than those launched through adoption network with small Size<br><br>Services based on embryonic technologies and launched through adoption network with large Size show higher Innovation Survival than those launched through adoption network with small Size |
| **H2** | Not Verified | Brand awareness of the organizations comprised in the adoption network is not significant |
| **H2a** | Partially verified | Services based on mature technologies and launched through adoption network with high Brand awareness show higher Innovation Survival than those launched |

| | | |
|---|---|---|
| | | through adoption network with low Brand awareness<br><br>Brand awareness of the organizations comprised in the adoption network is not significant in the case of embryonic technologies |

**Table 1: Synthesis of empirical results and interpretations**

As mentioned above, the first set of hypotheses consider the impact of the *Size of the adoption network* on the *Early market survival*. The empirical results concerning hypothesis *H1* (*The size of the adoption network of the innovation will have a positive association with early market survival*) and obtained through a t-test show that the mean value of *Early Market Survival* for services launched through large adoption networks (36.5%) is significant higher than the mean *Early Market Survival* for services launched through small adoption networks (32.4%). Hypothesis is therefore supported by our data (see 2).

| | **Services launched by *small adoption networks*** | **Services launched by *large adoption networks*** |
|---|---|---|
| Early market survival | 32.4% | 36.5% |
| N | 8,358 | 20,438 |
| T | 6.803** | |

*p<0.05; ** p<0.01

**Table 1: Impact of the *Size of the adoption network* on the *Early market survival***

The empirical results appear consistent with both adoption and value network studies (see, e.g., Gulati, 2000; Chakravorti, 2003) as well as research into the mobile service industry (Funk, 2009; Ghezzi et al., 2009). The interplay of different actor typologies, namely MNOs, MSPs, MCPs and MTPs, who are characterized by complementary expertise, resources and competencies – as testified by their linked, though not overlapped coverage of the adoption network activities – contributes to shaping a solid VAS offer, that can encounter the mobile end users' favor, and in turn, facilitate early market survival. Having several members of the new service adoption network taking part in commercialization activities increases its visibility in the eyes of early adopters and signals extensive commitment and endorsement for it, which helps reduce their uncertainty and resistance to change.

In order to investigate hypothesis *H1a* (*The size of the adoption network will have a stronger association with early market survival for innovations based on new technologies, in comparison with those based on mature technologies*) the t-test has conducted on two separated sub-samples: one including services launched through mature technologies (SMS) and the other comprising services launched through new technologies (Browsing and Download). By doing so it is possible to interpret the moderating role of the *Maturity of the underlying technology* on the relationship between the *Size of the adoption network* and the *Early Market Survival*. In the case of mature technologies, the empirical results show that the mean *Early Market Survival* for services commercialized through large adoption networks (22.3%) is significant lower than the mean *Early Market Survival* for services launched through small adoption networks (42.8%, see 3).

| | **Services launched by *small adoption networks*** | **Services launched by *large adoption networks*** |
|---|---|---|
| Innovation Survival | 42.8% | 22.3% |
| N | 374 | 2,809 |
| T | -7.635** | |

*p<0.05; ** p<0.01

**Table 2: Impact of the *Size of the adoption network* on the *Early market survival* in the case of mature technologies**

We had symmetric results for services delivered through a novel technology. In particular, the mean *Early Market Survival* for services launched through a large adoption network (38.8%) is significant lower than the mean *Early Market Survival* for services launched through small adoption networks (31.9%, see 4).

| | **Services launched by *small adoption networks*** | **Services launched by *large adoption networks*** |
|---|---|---|
| Innovation Survival | 31.9% | 38.8% |
| N | 7,984 | 17,629 |
| T | 10.853** | |

*p<0.05; ** p<0.01

**Table 3: Impact of the *Size of the adoption network* on the *Early market survival* in the case of new technologies**

These findings allow to infer the nature of the moderating role of technology maturity on the relationship between the size of the adoption network and the early market survival. In case of services delivered using mature platforms (e.g., SMS), mobile

customers are to a large extent used to the VAS fruition and delivery characteristics and therefore have only few or no concerns regarding adoption and subsequent usage. The maturity stage of the underlying technology guarantees indeed a satisfactory level of reliability, stability, quality of service and user experience. In such case, mobile customers somewhat take for granted usability and consolidation of the underlying technology, and decide to adopt the innovation on the basis of the simplicity of the purchasing and delivery process ensured by a small adoption network backing its launch. Such adoption network is typically composed by the MNO-MSP dyad (Peppard and Rylander, 2006; Kuo and Yu, 2006).

This argument is consistent with the assumption that a wide adoption network involving different actors increases the pool of resources and competencies which are bundled in the innovation conception, creation and delivery (Ghezzi, 2009), though, at the same time, it increases the system's complexity. Where the technology is mature, and the resources the overlaying service requires for its creation are believed to be widespread in the network – as if they became a sort of commodity –, the mobile customers prefer to avoid the increased complexity a larger adoption network brings about. While a share of such complexity pertains to network governance (e.g., see Gulati et al., 2000), it also impacts on processes which often are not fully transparent to the end user and may negatively affect its experience. For instance, the presence of multiple actors may increase the complexity associated with some critical activities for the fruition of the service, such as search, selection, purchase and billing (Peppard and Rylander, 2006; Ghezzi et al., 2010).

Where the underlying technology is new and embryonic (e.g., Browsing or Download), however, the end user perceptions towards the innovation tend to change radically: given that the innovative VAS is grounded on an underlying platform which is an innovation in itself, the achievement of a satisfactory quality of service and of experience is far from being a triviality. The required resources, competencies and assets to shape the service are neither commoditized nor concentrated on a single actor's resource endowment, but are rather dispersed throughout the adoption network. When such conditions hold true, mobile customers value the configuration of a wider adoption network where a large number of diverse players cooperate and integrate their core activities so as to develop and market a VAS with high quality and

reliability, notwithstanding its reliance on an embryonic and potentially unstable technology. The development of large adoption networks is particularly appropriate for reducing uncertainty perceived by those early customers who are taking into serious consideration the opportunity to purchase a new service, although it is delivered through a new and uncertain technological platform. The involvement of external organizations in the commercialization process reduces resistance to change on the part of those individuals who have already known about the opportunity to buy the new service and come to see which organizations are taking part to its commercialization process.

The second set of hypotheses investigates the role of the *Brand awareness of the organizations comprised in the adoption network*. The statistical analysis related to hypothesis *H2* (*The brand awareness of the organizations comprised in the adoption network of the innovation will have a positive association with early market survival*) points to the fact that the *Brand awareness of the organizations comprised in the adoption network* does not affect *Early Market survival*. Therefore, *H2* is not statistically verified (see 5).

| | **Services launched by adoption networks with *low brand awareness*** | **Services launched by adoption networks with *high brand awareness*** |
|---|---|---|
| Innovation Survival | 35.8% | 34.4% |
| N | 19,780 | 9,016 |
| T | -1.342 | |

*p<0.05; ** p<0.01

**Table 4: Impact of the *Brand awareness of the organizations comprised in the adoption network* on the *Early market survival***

Similarly to the analyses previously described regarding the *Size of the adoption network*, hypothesis *H2a* (*The brand awareness of the organizations comprised in the adoption network will have a stronger association with early market survival for innovations based on new technologies, in comparison with those based on mature technologies*) has been tested by using two t-tests applied on separated sub-samples: one comprising services launched through mature technologies (SMS) and the other including services launched through novel technologies (Browsing, Download). By doing so it is possible to interpret the moderating role of the *Maturity of the underlying technology* on the relationship between the *Brand awareness of the*

*organizations comprised in the adoption network* and *Early Market Survival*. Also hypothesis *H2a* is not verified. In the case of mature technologies, the empirical results show indeed that the mean *Early Market Survival* for services launched through adoption networks with *high brand awareness* (29.0%) is significantly higher than the mean *Early Market Survival* for services launched through adoption networks characterized by *low brand awareness* (9.4%, see 6).

| | **Services launched by adoption networks with *low brand awareness*** | **Services launched by adoption networks with *high brand awareness*** |
|---|---|---|
| Innovation Survival | 9.4% | 29.0% |
| N | 694 | 2,489 |
| T | 13.710** | |

*p<0.05; ** p<0.01

**Table 5: Impact of the *Brand awareness of the organizations comprised in the adoption network* on the *Early market survival* in the case of mature technologies**

In the case of novel technologies, the difference between the *Early Market Survival* of services launched through adoption networks with *high brand awareness* and services launched through adoption networks with *low brand awareness* is not significant (see 7).

| | **Services launched by adoption networks with *low brand awareness*** | **Services launched by adoption networks with *high brand awareness*** |
|---|---|---|
| Innovation Survival | 36.7% | 36.4% |
| N | 19,086 | 6,527 |
| T | 0.487 | |

*p<0.05; ** p<0.01

**Table 6: Impact of the *Brand awareness of the organizations comprised in the adoption network* on the *Early market survival* in the case of new technologies**

These empirical results can be interpreted by considering that customers are more used to associate the brand of the incumbent players with mature technology, since incumbents has built their market presence, reputation and customer basis thanks to services delivered for years through well-established technologies. Therefore, the brand awareness of the actors belonging to the adoption network, which has been created through intensive and multi-channel marketing campaigns, contributes to improving the chances of survival for innovation traditionally associated with the use of the consolidated SMS platform.

On the contrary, when dealing with embryonic technologies, mobile customers appear not to directly associate the innovative service with the brand awareness of the adoption network: such result can be explained by the partial distrust caused by early failures of services launched through the Download and Browsing platforms. In the market's preliminary stages of development, this was the case for several Browsing services characterized by extremely high navigation fees, and Download services where contractual agreement were unclear or sometimes vicious (Bertelè and Rangone, 2008). Such early failures can be claimed to be the cause for the limited importance of the brand awareness uncovered by our analysis.

Combining the results for hypotheses H1a and H2a, it can be argued that the involvement of external organization in the adoption network represent a launch tactic particularly appropriate for services based on novel technologies, while the development of an adoption network based on the brand awareness of its members positively impacts on the early market survival of services relying on mature underlying technologies.

## 5. CONCLUSIONS

Considering the strikingly high number of new products and services that are withdrawn from the market very soon after launch, this paper studies how early market survival is affected by decisions regarding a particular launch tactic, i.e. the configuration of the adoption network through which the innovation is commercialized. Furthermore, it investigates how the impact on early market survival of this launch tactics depends on the maturity of the technology underlying the new service.

Using a dataset comprising more than 28,300 new mobile Value Added Services (VAS) launched in Italy between 2003 and 2006, the paper shows that increasing the number of external organizations involved in the adoption network is a particularly appropriate tactical decision for new services based on very novel technologies, whereas building an adoption network that involves organizations with high brand awareness in the eyes of prospective customers positively impacts the early market

survival of services relying on mature technologies. The centrality of decisions regarding the configuration of the adoption network has already been acknowledged in marketing research (McKenna, 1985 and Wind and Mahajan, 1987), but it has become even more critical in today's highly networked markets.

Therefore, product and marketing managers who are seeking to maximize the chances of early survival of the services they are responsible for, should be well aware of the implications on customer acceptance of their decisions concerning the configuration of the adoption network. They are encouraged in particular to consider the maturity of the technology on which the new service is based, and the resulting resistance to adoption on the part of the prospective customers, to understand what tactics are more appropriate to encourage after launch diffusion.

Specifically, our study allows to argue that decisions related to innovative products or services launch, beyond encompassing traditional choices at an product development and marketing strategy level, should consider:

(i) the size and configuration of the adoption network from which the innovation springs. In addition to nurturing a wide and defendable internal resources endowment (Hamel and Prahalad, 1997), managers should carefully craft their portfolio of external relationships, as they equally affect their business. When taking this decisions, managerial trade-offs emerge, which shall not be overlooked. Involving a large number of actors make coordination and transaction costs arise, but proves to be a "necessary evil" whenever the new product is radically new, being based on embryonic technologies, and needs to be backed by a larger pool of players merging bundling their resources in it; on the contrary, "incremental innovations" based on mature technologies (requiring lower investments, and probably implying lower stakes) are more efficiently managed by smaller, strongly-coupled nets;

(ii) brand awareness of the organizations comprised in the adoption network. Though adoption network's brand awareness appears not be so significant in the investigated industry, managers should choose wisely which companies to partner with: top firms with high reputation should be selected as partners when those firms are known for their ability to market innovations based on well-established technologies; in case of radical innovations based on new or embryonic technologies, what appears to matter the most is the creative

capability to ignite R&D processes. Such capability sometimes prospers in low-tier firms with scarce brand awareness, which may become the best mates for new product development and commercialization endeavors;

(iii) maturity of the underlying technology. Decisions related to this variable proved to affect the kind of adoption network to merge within, as well as the expected early market survival of new products and services;

(iv) early market survival as a key indicator for assessing R&D and marketing functions performance, since such proxy highlights the firm's ability to develop truly marketable innovations.

Concerning research implications, our study aims at contributing to several literature streams:

(i) innovation launch strategies and tactics. With reference to innovation launch, the paper suggests to enlarge the scope of existing theory downstream: scholars investigating new product launch should focus on a further critical dimension when studying innovation success, i.e. early market survival. Early market survival is not necessarily correlated with market and profitability performance (Asterbo and Michela, 2005) and therefore it deserves specific attention. This especially because the survival of new ventures often depends on the early success of their innovation launches. Launch strategy and new product management research could investigate in the future what other endogenous (i.e. managerial levers) and exogenous (i.e. environmental conditions) variables affect this particular aspect of innovation performance. The paper also adds to our understanding of diffusion processes by investigating how a critical *supply-side* variable (i.e. a decision taken during the commercialization of the innovation, such as the choice on the maturity of the technology underlying the innovation) influences an important dimension of diffusion, i.e. early market survival;

(ii) role of the adoption network in innovation uptake and success. Considering the role of the adoption network in innovation uptake and success, the study proposes to investigate two key factors or network characteristics: the net's size and the participating actors' brand awareness. The findings on the importance of involving a large party of potentially renown actors, mediated by the underlying technology's consolidation, suggest to add more dimensions

of analysis to recent research exploring how networks affect innovation's development, commercialization and, ultimately, success and survival (see e.g. Aarikka-Stenroos and Sandberg, 2012). The paper contributes to the literature about innovation networks highlighting the moderating role played by the maturity of the underlying technology on the relationship between the size of the adoption network and the early market survival. More specifically it underlines the crucial role played by the size of the adoption network: services based on embryonic technologies and launched by large adoption network show higher innovation survival. This means that companies have to reconfigure their network according to the evolution of new underlying technologies. As argued by Halinen and Tornroos (1998), networks are commonly viewed as dynamic and constantly changing, but only a few attempts have been made to describe and explain these dynamics. Our findings underline as companies have to align their networks according to the evolution of underlying technologies.

The study has of course several limitations that suggest interesting opportunities for further research. First, the paper focuses on early diffusion in consumer markets, especially where it is of vital importance to maximize the likelihood of early market success for each new product that is launched. Even if it seems possible to argue that the findings of the paper apply also to similar industries, such as the broadcasting, movie, or publishing industries, future research will have to study if the impact of decisions concerning adoption network configuration on early market survival hold also in other markets. Second, we purposefully focused on high-technology new services in this paper. It could be interesting to study what launch tactics affect the odds of after launch survival for other types of innovations, e.g., design-driven innovations. Third, a partly simplistic view on the delineation of networks was adopted, so as to focus on key players and core activities: as suggested in Prenkert (2012), future works could devote an higher effort in modeling the multifaceted nature of development and adoption nets. Finally, further theoretical and empirical analyses are needed to discover how decisions concerning adoption network configuration affect other characteristics of the diffusion process, e.g., the speed at which new products and services are adopted.

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**APPENDIX 1**

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| Marketing Manager – Vodafone Italy (MNO) |
| Sales Manager – Reitek (MSP) |
| Marketing Manager – Dylogic (MTP) |
| CEO – Beeweeb (MSP) |
| Marketing Manager – David2 (MSP) |
| Vice President – Qualcomm Italy |
| Marketing & Sales Manager – Ericsson Italy (MTP) |
| CEO – Mblox (MSP) |
| CEO – Polymedia (MSP) |
| Product Manager – Buongiorno (MSP) |

List of people interviewed prior to starting the empirical study

Interviews details.

- Time span: interviews were carried out in the period December 2010 – March 2011;
- Number of interviews: thirteen (ten in the first round; 3 follow-up interviews);
- All interviews were conducted according to the same list of open-ended questions (see the Table below) in order to obtain comparable results;
- Interviews' average length: one hour twelve minutes;
- Contact modality: eight interviews conducted in person, five conducted by telephone (including the three follow-ups).

| |
|---|
| What activities are needed to commercialize a new mobile VAS? |
| What players can be involved by the MSP in the commercialization process? |
| Are any of these activities exclusively under the responsibility of the Mobile Service Provider or any other player? |
| What activities of the commercialization process are visible to the end user? |
| What players can be involved in these front-end activities by the Mobile Service Provider? |
| What type of brand awareness do the different players of the mobile VAS industry enjoy? |
| Is the decision to purchase a new mobile VAS affected by the technology underlying it? |
| What underlying technology increases resistance to change on the part of the potential user? |
| Does the pre-purchase resistance due to the presence of a particular underlying technology change over time? |

| |
|---|
| What factors inhibit and streamline the diffusion of a new mobile VAS? |
| Why is the average life-cycle of a new mobile VAS so short? |
| Why some new mobile VAS are retired very early from the market by the Mobile Service Provider? |
| What factors increase and shorten the survival rate of a new mobile VAS? |

List of open-ended questions used in the preliminary interviews.

[i] Mobile VAS are defined in this article as application-to-person (A2P) services beyond standard voice calls and fax transmissions. A value added service (VAS) is popular as a telecommunications industry term for non-core services.

[ii] More precisely, data were collected through an annual detailed census on all VAS published "on portal", i.e., present on the MNO-branded and owned delivery channel, and accessible by end users through a Wireless Application Protocol (WAP) connection. The focus on the on portal environment is fully justified by considering that: (i) only a non-significant fraction of VAS innovation appears on the off portal, non MNO-controlled world (Peppard and Rylander, 2006); (ii) and such an off portal offer is hardly reachable by customers – especially in the timeframe relevant for the present study –, because of industry-specific constraints (Ghezzi and Balocco, 2011).

[iii] Such 2003-2007 timeframe is selected taking into account that the ICT & Management Observatories Research Group significantly changed the data collection criteria for those services launched from 2008 onward: therefore, we decided to restrict the scope of our analysis to the five-years period mentioned.