

FACULTY OF ECONOMICS AND BUSINESS
ADMISTRATION, UNIVERSITY OF OULU
WORKING PAPERS

No. 26

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**CONSUMER BEHAVIOR AND VALUE CREATING NETWORKS
IN MULTIMEDIA MOBILE SERVICES
– RESULTS OF ROTUAARI PROJECT**



UNIVERSITY of OULU
OULUN YLIOPISTO

OULU 2007

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ISBN 978-951-42-8581-3
ISSN 1459-8418
ISBN 978-951-42-8582-0 ELEKTRONINEN VERSIO
Oulu University Press
August 2007

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**Consumer Behavior and Value Creating Networks
in Multimedia Mobile Services
– Results of Rotuaari Project**

Abstract

This paper reports the main findings of the research conducted in the Department of Marketing during Rotuaari –research project. Rotuaari was a three –year (2003-2006) multidisciplinary research project, which focused on the development and testing of technologies and business models for mobile multimedia services of the future. Key components included service and testing environments, wireless technologies, new kinds of value chains and numerous field trials. The actual research in this project was divided into so-called work packages (WP), in which mobile multimedia services were approached from several intercomplementary perspectives. The work packages of the Department of Marketing focused on the value creating networks and consumer behavior.

Key words: Mobile multimedia services, value networks, consumer behavior

1 Executive Summary

Research consortium Rotuaari developed and studied multimedia mobile services during 2003-2006 and was financed by Tekes Fenix programme. This paper summarizes the main findings of work-packages 'Consumer behavior' and 'Value Creating Networks' both hosted by the Department of Marketing.

The goal of work-package 'Consumer behavior' was to analyze consumers' acceptance of new mobile services. First of all, we produced accurate information about consumers' needs in various mobile service use situations. We also provided thorough analysis of the effects of different navigational solutions of user interfaces on consumer behavior. The purpose of the analyses of work-package 'Consumer behavior' was to provide valuable information, which serves as good grounds for developing successful mobile services.

In the case of work-package 'Value Creating Networks' the project's focus was two-fold, firstly, the management of a research and development network was studied and secondly, the evolving business network. The studies conclude that R&D network development and learning can be achieved and managed via various actor roles. This is possible, if the net finds common goals, ways of working and understands the interest of the actors, as well as of the network as a whole. The same applies to business networks where consumers, retailers, and advertising agencies need to learn the value of the new service. In addition, the network companies need to learn how to work together to provide the value and to generate revenues.

2 Consumer Behavior in Multimedia Mobile Services

2.1 Research Team

Research party: Department of Marketing

Research director: Professor Timo Koivumäki

Advisor: Research Prof. Heikki Karjaluoto

Researchers: M.Sc. Annu Ristola, M.Sc. Manne Kesti,

2.2 Objectives

In Rotuaari project work-package ‘Consumer behavior’ had two generic objectives. The first one was to carry out the field experiments conducted during the three project years. This objective included taking part in the design of the services offered in each field experiment and taking care of the practical arrangements of the experiments, such as setting up and operating a field office during the experiments. The work-package was also responsible for collecting the empirical consumer data during the field experiments. Secondly the work-package ‘Consumer behavior’ aimed to provide new information about consumer behavior in mobile services use environment and consumers’ adoption process of new mobile services.

2.3 Findings

To gain as much information about consumer behavior in m-commerce environment as possible, we utilized several alternative theoretical frameworks in our analyses. In our first study we examined how well the Technology Acceptance Model (Davis, Bagozzi & Warshaw 1989), with its recent extensions, can be applied in the area of mobile services. The main explanatory constructs of TAM are ease of use and usefulness. Our theoretical framework includes two additional constructs to TAM; perceived resources and user satisfaction, a feature related to Flow concept. We also studied how these factors affect consumers’ willingness to recommend mobile services to others. This

study was conducted in SmartRotuaari service environment. Usefulness appeared to be the most important individual factor in explaining the likelihood of future use of mobile services. Our results also indicated that the ease of use does not directly affect likelihood of future use. The results clearly showed the importance of resource variables as essential explanatory variables of mobile services acceptance. Especially external resources (guidance and support) revealed strong statistical significance. Internal resources (user skills) also appear to be statistically significant. User satisfaction, much to our surprise, did not seem to have any predictive power over the likelihood of future use. However, it did appear to have strong positive effect on the willingness to recommend services to others. The effect of user satisfaction appeared to be almost as strong as the effect of usefulness.

In addition to TAM model, we also applied several other theoretical frameworks in studying mobile services acceptance. One of the applied theories was the information quality framework by Chae, Kim, Kim and Ryu (2002). The empirical analysis was conducted in two separate field trials, one in a hedonic user context (Finnish National Ice Hockey League championships playoffs), and one in a utilitarian user context (information and guidance service for visitors in downtown Oulu, Finland). The field trials were conducted during spring and summer 2004. The empirical results confirmed our three research hypotheses. Content quality, Connection quality, Interaction and Contextual quality were all positively related to user satisfaction and User satisfaction was positively related to intention to use the service. The behavioral goals of the user affected the magnitude of the relations between the information quality dimensions and user satisfaction. The effect of content quality was much stronger for the users with hedonic goals.

We also examined how different variables that facilitate the use of mobile services (the time of usage, familiarity of the mobile device and users' technology skills) effected users' perceptions of performance expectancy (usefulness) of the services, effort expectancy (ease of use), social influence, attitude towards the services and the intention to use the services again. The results showed that the perceptions users got from the services tested did not differ a lot depending on the time spent on using them. This is an interesting finding as the general hypothesis is that people get deeper into new service or technology if they have more time to get used to it. This result encourages the mobile service developers to develop more intuitive services since the first impression seems to be the one that lasts. Even though the time spent did not have

an effect on perception, the familiarity of the device used did have an impact on users' perceptions of the service. Borrowers considered the system being more useful and easier to use than the users of own phones and they also had more positive attitudes towards the system. One explanation for this might be that the small imperfections of the system were more tolerable while using a loaned device and the possible problems would not concern the user. Also, the fact that a borrowed device is not as personal as own mobile device may increase the tolerance. One notable result was that the difference in the attitudes was not reflected in the intention to use the system again. Users' technology skills also affected their perceptions of the services. Skilled users considered the system more useful and easier to use. An interesting finding was that the influence of hearing about the system in the media and the recommendations of others were also more significant for skilled users.

There also seems to be a connection between the attitude towards the services and the intention to use them again, since they both were considered significantly higher by the skilled users. Based on the results the use facilitators had only minor effects on the popularity of different services.

Our studies also contributed to the discussion of consumers' perceptions towards m-services. In general, the perceptions proved to be quite positive. The answers gathered from the test users were affected by the attitudes the users had concerning mobile services beforehand, but most of all they were affected by the perceptions they got from testing new kind of mobile services. First of all, it seems that perceptions users got from testing the mobile services affected their intention to use those kinds of services in the future. Secondly there were no major differences in perceptions between high and low interest users. The most interesting services were guidance services, followed by mobile advertisements and personal communication. Thirdly, it seems that there are significant differences in how high given m-services are valued when considering low interest and high interest users' perceptions. The fourth result was that there is a significant dependence between a user belonging to a high interest group or a low interest group and their perceptions of a particular mobile service. Finally, the test users seem to be significantly interested in mobiles services overall and thus are also willing to use them in the future.

We also studied mobile marketing and mobile advertising. M-advertising has the potential to significantly and positively impact the marketing communication. Regardless of social, regulatory, and technical challenges, m-advertising will continue

to gain importance in the multi channel marketing. From the consumers' point of view, it appears that they are ready for the versatile use of mobile technology. Consumers require individually designed ads and are ready to receive them to their personal mobile phones, but only after giving permission for it. Consumer respondents indicated that they valued the context sensitiveness of m-advertising and that m-ads brought a wholly new and beneficial dimension to marketing communication. However, it must be noted that consumers expect mobile technologies to function without problems. For the advertisers, the emergence of m-advertising offers an effective new channel for their marketing communications. Mobile channel fills in the gap that exists in the traditional advertising media in that it enables to reach targeted consumers segments in specific contexts. It must be borne in mind that the successful utilization of the mobile channel in advertising requires careful planning of the content of the ad; mere technological gimmickry is not enough. Overall, we argue that m-advertising will be an integral part of advertisers' multi channel marketing communications in the future.

In addition to mobile service adoption and mobile marketing, we also studied consumers' buying behavior of mobile phones. The objective was to investigate the reasons underlying mobile phone change. The study found strong evidence that although mobile phones are developing at a rapid pace closer to personal digital assistants (PDAs), many consumers tend to be unaware of the properties and services the new models in the market contain. Even students are not familiar with new technical properties and their purposes of use. Furthermore, our studies showed that consumers are aware of the so-called curse of technology markets referring to the fact that new technologies reduce in price over time. This expected price reduction seems to be a factor slowing the diffusion of new models especially among lower income consumers.

2.4 Main results and their utilization

The main results of work-package 'Consumer behavior' include new information about consumer behavior in mobile services use environment and mobile technology adoption. This information is extremely useful in the development of new mobile services. In the course of Rotuaari project this work-package also gained valuable information and knowledge on conducting field experiments in real end user

environments and efficient means of collecting useful data from the experiments. This knowledge will be useful in future research.

2.5 Conclusions

The results clearly show that the most important explanatory variables for new mobile technology adoption are ease of use, usefulness and the resources related to technology use. The importance of resource variables as essential explanatory variables of mobile services acceptance, especially external resources revealed strong significance. User satisfaction appears to have strong positive effect on the willingness to recommend services to others. The effect of user satisfaction appears to be almost as strong as the effect of usefulness.

The fact that increased user skills generate more positive perceptions towards mobile services and increase the likelihood of continuous service use stresses the importance of enhancing the technology skills of general public and potential mobile service users. This can be done by e.g. organizing mobile service/mobile phone use tutoring workshops, including easily accessible user aids (manuals, navigational user guidance, etc.) or providing comprehensive hands-on user guidance in the situations where new phones are purchased. The increase in people's perceptions about their technology use skills will increase the adoption of new mobile services. Also, since the tolerance of service imperfections seems to decrease with the familiarity of the device, it is essential that services which are introduced to general public must be carefully designed and implemented.

With respect to purchases of new mobile phones our studies found strong evidence that although mobile phones are developing at a rapid pace, many consumers tend to be unaware of the properties and services the new models in the market contain. Furthermore, consumers seem to be aware of the so-called curse of technology markets referring to the fact that new technologies reduce in price over time. This expected price reduction seems to be a factor slowing the diffusion of new models especially among lower income consumers. Our studies indicated that there are that seven factors which characterize mobile phone choice: innovative services, multimedia, design, brand and basic properties, outside influence, price, and reliability. The first factor, innovative services explained most of the variability of the variables indicating together with other

statistical analyses conducted that especially men tend to value new services in choosing between mobile phones and intending to change their current mobile phone to newer model.

2.6 Publications of the Work-package 'Consumer Behavior'

Journal Articles:

Kesti, M., Ristola, A., Karjaluoto, H. & Koivumäki, T. (2004) Tracking consumer intentions to use mobile services: empirical evidence from a field trial in Finland. Published in the E-Business Review IV (2004), pp.76-80 and presented at the 4th Annual International Academy of E-Business Conference, Atlantic City, New Jersey, USA, March 28 - 31, 2004.

Leppäniemi, M., Karjaluoto, H. & Salo, J. (2004) The success factors of mobile advertising value chain. Published in the E-Business Review IV (2004), pp. 93-97, and presented at the 4th Annual International Academy of E-Business Conference, Atlantic City, New Jersey, USA, March 28 - 31, 2004.

Karjaluoto, H., Karvonen, J., Kesti, M., Koivumäki, T., Manninen, M., Pakola, J., Ristola, A. & Salo, J. (2006) Factors Affecting Consumer Choice of Mobile Phones: Two Studies from Finland. *Journal of Euromarketing*, 14 (3), pp. 59-82.

Koivumäki, T., Ristola, A. & Kesti, M. (2006) Predicting Consumer Acceptance in Mobile Services – Empirical Evidence from an Experimental End User Environment. *International Journal of Mobile Communications*, 4 (4), pp.418-435.

Koivumäki, T., Ristola, A. & Kesti, M. (2006): The effects of information quality of mobile information services on user satisfaction and service acceptance - empirical evidence from Finland. Accepted for publication in the *Journal of Behaviour and Information Technology*

Koivumäki, T., Ristola, A. & Kesti, M. (2006) The perceptions towards mobile services – an empirical analysis of the role of use facilitators. Accepted for publication in Personal and Ubiquitous Computing.

Conference Articles and Book Chapters:

Ojala, T., Korhonen, J., Aittola, M., Ollila, M., Koivumäki, T., Tähtinen, J. & Karjaluoto, H. (2003) SmartRotuaari - Context-aware mobile multimedia services. Proc. 2nd International Conference on Mobile and Ubiquitous Multimedia, Norrköping, Sweden, 9-18.

Salo, J., Karjaluoto, H., Kesti, M., Koivumäki, T. & Ristola, A. (2004) Sports Event Spectators' Reactions to Mobile Marketing. Empirical evidence from Finland. SMA II the 2004 conference of the Sport Marketing Association (SMA), also in Sport Marketing Association's second book of edited papers.

Mähönen, M., Koivumäki, T. & Karjaluoto, H. (2004) Technology licensing strategies. The case of a Finnish high-tech firm. Proceedings of the Western Business & Management Conference, Las Vegas, USA, October 10-12.

Ristola, A., Koivumäki, T. & Kesti, M. (2005): Analysing Consumer Experiences in a Real m-Commerce Environment. The 5th Annual Hawaii International Conference on Business, Honolulu, Hawaii, USA.

Ristola, A., Koivumäki, T. & Kesti, M. (2005) The effect on familiar mobile device and usage time on creating perceptions towards mobile services (Annu Ristola, Timo Koivumäki and Manne Kesti). The IEEE Fourth International Conference on Mobile Business, Sydney, Australia.

Masters Theses:

Karjala, A. & Mäentausta, M. (2002) Mobiilipalveluiden hyväksymiseen vaikuttavia tekijöitä. Pro gradu -tutkielma. Markkinoinnin laitos, Oulun yliopisto.

Högdahl, H. & Kuopus, K. (2003) Kuluttajan käyttäytyminen mobiiliympäristössä – mobiilipalveluiden käyttämiseen vaikuttavat tekijät. Pro gradu -tutkielma. Markkinoinnin laitos, Oulun yliopisto.

Mikkonen, M. - L. (2003) Rotuaari-projektin palvelut nuorten kuluttajien näkökulmasta. Pro gradu -tutkielma. Markkinoinnin laitos, Oulun yliopisto.

Pavilainen, M. (2004) Effects of navigational experience on adoption of personal digital assistants by consumers. Pro gradu -tutkielma. Markkinoinnin laitos, Oulun yliopisto.

Huovinen, M. (2004) Yksityisasiakkaiden sitoutuneisuus matkapuhelinoperaattoriin. Pro gradu -tutkielma. Markkinoinnin laitos, Oulun yliopisto.

Alatalo, T. (2005) Factors Affecting Consumer Attitudes Towards Mobile Marketing s. Pro gradu -tutkielma. Markkinoinnin laitos, Oulun yliopisto.

Blomster, M. (2005) Kuluttajan uuden teknologian omaksuminen paikkatietoisessa mobiilipelissä. Pro gradu -tutkielma. Markkinoinnin laitos, Oulun yliopisto.

Saurama, J. (2006) Kontekstisidonnaisen mobiilipalvelun käyttöönottoon ja hinnoitteluun vaikuttavat tekijät – Case Hockey Night Goes Mobile. Pro gradu -tutkielma. Markkinoinnin laitos, Oulun yliopisto.

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- Davis, F. D., Bagozzi, R. P. & Warshaw, P.R. (1989) User acceptance of computer technology: a comparison of two theoretical models. *Management Science*, 35 (8), 982 - 1003.
- Chae, M., Kim, J., Kim, M. & Ryu, H. (2002) Information quality for mobile internet services: a theoretical model with empirical validation. *Electronic Markets* 12 (1), 38 - 46.

3 Value Creating Networks in Multimedia Mobile Services

3.1 Research Team

Research party: Department of Marketing

Research director: Professor Jaana Tähtinen

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3.2 Objectives

The objectives of this work package ‘Value Creating Networks’ were to model the formation processes of the value creating networks (i.e. different stages of the process), to distinguish the factors affecting the formation and development of the value creating networks and to model how different factors influence the stages of the formation and development processes.

To achieve the above objectives, the research programme was divided into two tasks. First, we concentrated on studying the evolving research and development network that all the participants in the Rotuaari project formed. Second, we focused on the business networks or nets that, in the beginning of the project, were anticipated to form around the developed mobile multimedia services. During the project, the mobile advertising system became the focal service and thus the actors and networks evolving around it were studied closely. The objectives of the two tasks will be described in the following.

3.2.1 First Task: R&D Network

The objective of the task was achieved through qualitative, follow-up studies that focused on the influencing factors and the formation and development processes of an R&D network. The studies followed the formation and development of Rotuaari R&D network during the three-year project. The task also gathered and analyzed data concerning the network’s knowledge creation activities and processes. Based on this

real life data, the researchers combined theoretical knowledge into a description of the dynamics of R&D network in its development stages. Based on the data gathering and analysis, the task also provided managerial guidelines concerning network management.

3.2.2 Second Task: Business Network

The objective of the task was achieved through qualitative, follow-up studies that focused on the influencing factors and the formation processes of a value creating business network in mobile services. The task also enhanced the development of business networks by recruiting mobile advertisers and following the formation of a mobile advertising network during the field trials of Rotuaari. Data was collected on the initial conditions, the value-creating processes, the actors and their business models, in the emerging network. Based on this real life data, the studies placed theoretical knowledge into tentative models of the emerging mobile business network.

3.3 Findings

In the following sections, the research results of the two tasks will be discussed.

3.3.1 Rotuaari as a R&D Network

3.3.1.1 Managed Formation Process of R&D Networks

Heikkinen and Tähtinen (2006) propose an empirically grounded process model of managed R&D network formation, with three elements: the initial conditions, the role of the network Webber and the sub-processes of the formation. The study offers three contributions to the existing knowledge on R&D network formation. First, the study shows that it is possible to manage the formation of an R&D network and that it may be beneficial, although the existing research presents conflicting views. In this study, management is viewed as an activity that does not refer to telling or forcing any other actor in the net to behave against its goals. Instead, management refers to the influencing of network actors and directing the network towards its shared goal.

Second, Heikkinen and Tähtinen (2006) suggest that a single actor can take an important role in the network formation. The role of a network Webber is to trigger the formation process when other initial conditions are not strong enough. Webber also influences all the processes during the formation. The Webber receives the power of accepting and rejecting members to the net based on its position, reputation, and previous actions in triggering the network formation. The third contribution concerns the nature of the formation process. Heikkinen and Tähtinen (2006) argue that, for understanding the managed formation of an R&D network, it is useful to distinguish the antecedents of the process and divide the process into sub-processes. The model suggests that the formation process includes six overlapping and iterative sub-processes: enabling network formation, acquiring actors, assuring continuity, formal structuring, learning, and developing commitment. Thus, the network formation activities do not follow a predetermined path, but appear in an overlapping and iterative structure.

Heikkinen and Tähtinen (2006) also discuss the challenges and benefits related to novel mobile service development. They also notify the difficulties related to researching novel mobile service development and suggest that focal network analysis could be applied as a feasible research method for studying the phenomena.

3.3.1.2 Knowledge Creation in R&D Networks in their Early Stages

Still (2006) presents a framework of the conditions that influence knowledge creation in research networks in their early stages. The framework consists of three categories of conditions: context, organization culture, and organizing and management. First, the study argues that the context of the network, in itself, is a condition that influences its creation of knowledge. In the early stages, the network actors learn to co-operate; they are creating knowledge not only on the formal goals of the network, but also largely on the network itself. As all the processes and codes of practice are still evolving, this stage of the process offers great possibilities for actors to influence the direction in which the network develops. However, the early stages also pose great challenges as there is no common understanding among the actors of the network, and this can lead to misinterpretations and false actions based on them.

Second, from the viewpoints of organization culture and organizing and management, the diversity of actors is a highly influential condition in research networks (Still 2006). It results in diverse ways of operation, and in different types of

stocks of knowledge. What seems to be crucial in these types of networks is to create a level of basic understanding of the network itself, the goals it has, and the ways to achieve these goals. Knowledge creation calls for some shared understanding of the roles of the members, their expertise, and ways to do their work. It must, however, also be emphasized that rich and diverse viewpoints on the matters at hand usually result in better outcomes of the knowledge creation process. One important notion is then that networks are, in themselves, sources of varying viewpoints and ways of operation, and in this way, serve as a fruitful base for knowledge creation.

Third, Still (2006) argues that the diverse ways of working and communicating are learned through practice; hence the collaboration itself increases the common stock of knowledge. All types of shared documents and artifacts can also aid in building common understanding. The people working in the network have an important role in this process by acting as bridges between different actors. Furthermore, shared forums are also crucial in networks, as they are places where representatives of the actors meet, share, and discuss their viewpoints. In all the above-mentioned issues, ICT technologies can be used to assist the sharing of information and explicit knowledge. The role of management and organizing is important, for there are structural solutions with which to assist collaboration and building of shared understanding. It is also the responsibility of management to try to make the goals and strategies, i.e. the overall vision of the network viable and clear to all its actors.

3.3.1.3 Actor Roles in R&D Networks

Heikkinen and Still (2005b) identify roles in which organizations can manage in nets that develop new mobile services. The starting point of the paper is the notion that organizations act in cooperative R&D networks. Consequently, the paper describes how organizations can influence the operations of the network and its offerings, i.e. how they can manage within a R&D network.

Heikkinen and Still (2005b) describe the managing in networks through actor roles and network elements. Based on the case study, three managerial roles were identified: Webber (see also Heikkinen and Tähtinen 2006), Resource Provider, and Organizer. Notably, in each role an actor influences the network in different ways, either through the elements of actor bonds, resource ties, or activity links. Heikkinen and Still (2005b) argue that this understanding is essential, in both the analyzing and operating in

networks. Research and development networks, as networks in general, are complex structures, whose comprehensive understanding is not possible or even desirable for managers because of the strict time limits they face in today's dynamic industries. The complexity of networks also poses challenges for network researchers. Therefore, the conceptualization provided by Heikkinen and Still (2005b) decreases the real complexity of networks.

Heikkinen and Still (2005b) offer implications concerning managerial roles influencing the innovativeness of the network as well as the operational effectiveness of the development process. The Webber's connections to multiple types of organizations seem to positively influence the innovativeness of the network. In other words, the more connected the Webber is to a variety of actors, the more innovative the network becomes. The use of existing technologies in a modular way also speeds up the development process, which is an important implication for all resource providers. From the perspective of an organizer, commonly acknowledged goals help managing the operational development process. Overall, the study indicates that a new offering is a result of expertise of several types of organizations forming the net. This enables the development of a truly market oriented and extensive service offering.

Heikkinen, Mainela, Still and Tähtinen (2006) further examine the organizational roles for managing in new mobile service development nets. The organisational roles stem from the changes in the net and in the service development over time. In addition, the way the other actors in the net interpret an actor's behaviour indicates a certain role. The study presents a typology of twelve organizational roles for managing in nets: Webber, Doer, Facilitator, Gatekeeper, Unexpected Entrant, Aspirant, Instigator, Planner, Compromiser, Advocate, Auxiliary, and Accessory Provider. Managing in the net refers to influencing the net, and thus the analysis of the empirical data concentrated on the influence different actions had on the net and its operations. The roles were classified under four categories based on whether the actions were seen as expected or emerging and whether their influence on the net was radical or incremental.

Heikkinen et al. (2006) argue that the actors act very differently in distinct stages of the development process, depending on their ambitions, connections, and resources in each of the stages. Thus, roles are also dynamic; none of the actors only acted in a single role, but changed roles during the development process. For example, almost all actors in the Rotuaari case net were first Aspirants that aimed to be members of the development net. Later on, these actors acted in several strategic and operational roles.

Since the study uses existing research to ground the role criteria, similar kinds of roles are expected to be found in other development nets. Naturally, the context of new mobile service development is seen in the detailed descriptions of the roles and these details are best applicable with consideration to new service development nets. Moreover, all development nets do not necessarily involve all the roles in the presented typology. However, the paper suggests that analysing the acting and its influence on both the service/product and on the net structure, in relation to the interpretation of the other network actors, is relevant for understanding the possibilities and constraints that different actors have for managing in nets.

3.3.1.4 The Success of R&D Networks

Heikkinen and Still (2005a) introduce an empirically grounded network view to new mobile service development and argue that more attention should be placed on collaborative actions in creating new mobile services. A case study of a collaborative network that developed a new mobile service for the supporters of a sports team, describes the development and operation of a new service development (NSD) network. The study shows that new mobile service development benefits from cooperation between several types of network actors. Networks offer a way to overcome the challenges created by the complex mobile services and the mobile business, by enabling the combination of actors' resources and knowledge, as well as the shortening of mobile service development time. However, the study argues that innovations in mobile services require more than just finding the best actors and technologies within the network, i.e. the possession of technological or financial resources, or rights to certain content. It is the novel and innovative combination of the resources of multiple actors from different industries that is the cornerstone of new mobile service development. Clear goals and tasks for all network actors are important factors in a successful mobile service development process.

Moreover, Heikkinen and Still (2005a) argue that there is a need to conduct separate research on mobile service development and mobile service commercialization networks, as the actors in them differ in nature. For example, noncommercial organizations usually do not participate in the commercial mobile service networks, but they are a vital part of new mobile service development nets. The study concludes that networks are complex structures, consisting of heterogeneous actors with only partially

mutual interests. In spite of the numerous benefits of networking in mobile service development, the existence of possible conflicting interest must be taken into consideration. Hence, a comprehensive understanding of the motives of each actor must be obtained in order to prevent misunderstandings and opportunism, which are the biggest challenges of R&D networks.

3.3.2 Rotuaari as Business Networks

3.3.2.1 Customer Perceived Value in Mobile Advertising

In order to understand value creation and value creating business networks in mobile services, the concept of value needs to be further examined. Komulainen, Mainela, Tähtinen and Parhi (2005) present an empirically grounded model of customer perceived value in mobile advertising services. The study applies interview data from 17 retailers who served as customers using a novel mobile advertising (m-advertising) service system provided by the Rotuaari research project. In contrast to the existing static view on value, the paper argues that customer perceived value is dynamic, multi-dimensional, and time-sensitive with past, present and future dimensions. The past, present and future dimensions of value are titled as expected, realized, and potential value. They are connected to each other through the learning of the customer. By distinguishing three concepts, it is possible to understand customer perceived value before the first service experience, after using the service for a while, and in anticipation of the future, improved service. The study also brings forward a proposition that the value elements; i.e. benefits and sacrifices have a complex interaction in service value co-creation. It is argued that the benefits of monetary and non-monetary sacrifices cannot be counted straightforward, so sacrifices would inevitably decrease the customer perceived net value. Value in the new m-service setting is strongly dependent on the resources, or sacrifices, the actor itself invests in the value co-creation process (see also Komulainen, Mainela, Tähtinen and Ulkuniemi 2004). Investing in some type of resources, e.g. investing time to learn how to best use the service, may increase the benefits to the extent that they will outweigh the risks in making extra sacrifices. On the other hand, if the actor tries to minimize its investments, the benefits may not even exceed the sacrifices.

In relation to the discussion on the concept of customer perceived value Komulainen, Mainela, Tähtinen and Ulkuniemi (2004) identify different customer perceived value elements in the emerging context of technology intensive professional services. The empirical data was gathered through interviews among 16 retailers who used a mobile advertising service for the first time. In emerging value systems in technology intensive innovative services, customer perceived value is largely customer expected value. However, customers still distinguish certain elements of value that they look for in services that are being developed. The study identified five different customer perceived value elements of technology intensive service innovations; service quality, service support, service provider's know-how, interaction and pioneer status. It is also noted that value creation in relationships depends on the investments, which vary in the degree of commitment and the amount of resources available and used in the relationship. Therefore, in addition to customer perceived value elements, the study classifies mobile advertisers based on the sacrifices they made when using the m-service. This classification presents four types of new mobile advertising service customers: low-motivated, motivated testers, stuck with technical problems, and curious.

For managers, the papers by Komulainen, Mainela, Tähtinen and Ulkuniemi (2004) and Komulainen, Mainela, Tähtinen and Parhi (2005) offer 'food for thought' in several respects. First, for a new service provider, it is good to recognize the elements of value that customers pay attention to when deciding whether or not to use the service. Second, the different role of the benefit elements helps the service providers to emphasize, that in new service development, the first customers have to understand that, in order to receive outcome benefits, they need to make some sacrifices. Moreover, the service provider needs to be willing and able to help customers make the sacrifices, e.g. new thinking and new ways of doing things. If the service provider is able to adjust the expectations of the customer to achievable level, the customers' realized value will increase and the chances of getting him/her to use the service on a regular basis increase. Third, in such professional services as mobile advertising service, the outcome benefits are always subject to not only the co-creation of value by the service provider and the advertiser as a customer, but also the co-operation of the consumers. The advertiser expects to receive feedback from the service provider about the end consumers' responses to the company's m-advertising. The advertiser and/or their advertising agencies have the responsibility of planning advertising messages that

attract target consumers and respond to the consumers' feedback. Moreover, consumers have to be willing to interact with the m-advertiser and provide personal profile information through this medium, to make sure that the messages received are of value to her/him. The customer realized service value is defined by the actions of and interaction of all these actors. Fourth, for service providers the knowledge on different types of customer groups can be applied in segmentation. Service providers need to be able to take into account that if a customer segment lacks technological resources and know-how, the service provider needs to offer turn-key solutions. In addition, it is essential that the service provider ensures that the customer company is aware of the potential commercial benefits of innovative services. In the case of mobile advertising, the advertiser should realise that the commercial potential of the mobile service is different from the traditional means of advertising. Mobile advertising, as any form of traditional advertising should be evaluated as a part of the advertising mix, or integrated marketing communication.

3.3.2.2 Business Models in Mobile Advertising

A group of studies by Komulainen, Mainela, Sinisalo, Tähtinen and Ulkuniemi (2005a, 2005b, 2006) explores the evolving business around mobile advertising. They studied what kind of business networks could evolve around the novel mobile advertising services. Using a scenario planning method, several different scenarios for business models are suggested that describe different ways of conducting m-advertising business with different business logics. The suggested business models describe the service, the roles of the network actors, and the value-creating exchanges between them. The scenarios are built with the aid of a theoretical discussion, historical analogies of two industries (advertising and software business), an empirical field trial as well as expert discussions and insight. The papers suggest that the number of business network actors critically affects the complexity and flexibility of the network, and it may also influence its profitability. Therefore, the number of actors and their roles in the network need to be carefully considered. For example, access to end users is an important question determining which actor will become the central one in the m-advertising business network. Another question is which actor will be the one developing, understanding, and gaining expertise of the special features of m-advertising. The business models around m-advertising are an example of emerging business networks and in which the

value system is in the continuous development. The issues related to the possible future development of this emerging business field are further elaborated and discussed in the papers.

One way to increase understanding of the influencing factors and the formation processes of a value creating business network in mobile services, is to look at the existing business networks and their development. In their study on internationalisation of small high-technology firms, Komulainen, Mainela and Tähtinen (2006) suggest that personal relationships are sources of critical information and can open doors to new relationships. In particular, the study emphasizes the very active role that the social network can play as a mediator in the small firm's internationalisation. The mediation can provide the small firm publicity, contacts, and legitimacy resulting in international contacts and the development of international business relationships. The results of the study can be further applied to the context of emerging mobile services, as the firms involved in mobile service development and marketing face similar challenges as internationalising small firms. For example, resources of the small firms are often limited and they are usually run by owner-managers whose expertise is mainly focused on the business itself (Komulainen, Mainela and Tähtinen 2006; Ulkuniemi, Heikkinen, Komulainen and Tähtinen 2006). Therefore, the role of social networks needs to also be taken into account when examining the development and the future direction of value creating business network in mobile services.

3.3.2.3 The Network Actors in Mobile Advertising Business

Leppäniemi, Karjaluoto and Salo (2004) discuss factors that influence the development of the mobile advertising business model. Although using the metaphor of 'value chain', the paper acknowledges the diversity of the network actors; the advertisers, the m-advertising service providers, the media, the advertising agencies, the network operators/carriers, the technology providers, and the end customers. Thus, all these actors have to understand the elements that are needed before the network can exist and create value. The elements are: the attractive content of the m-ads, the use of m-advertising as an integrated part of marketing communication, the effective campaign management using the opportunities provided by the m-advertising systems, the database of receivers of m-advertising, and the carrier cooperation in delivering the m-ads. Next, the key players and their different roles in m-advertising are examined in

more detail; the advertising agencies as intermediaries between m-advertisers and m-advertising service providers, the end consumers as receivers of m-advertising and the m-advertisers as buyers of the m-advertising service.

Komulainen, Mainela and Tähtinen (2005) and Komulainen, Mainela, Sankari and Tähtinen (2005) both pose the question if wide range and effective implementation of mobile advertising requires intermediaries between advertisers (e.g. retailers) and mobile advertising service providers. Both studies concentrate on analyzing the possibility of advertising agencies to act as these intermediaries. Three roles that advertising agencies are playing in mobile advertising triads are suggested. In principle, the connecting, mediating and distracting roles form a continuum from an active positive role to an active negative role, although none of the cases represented an active negative role. The indicators of the roles are the attitudes (thinking), and behavior (actions) of the ad agencies. From a managerial point of view, a connector is the driver of developments in the triad and has the most influence on the other actors. It may develop its own skills, the skills of the advertiser, and even influence the mobile advertising system. Because such systems are still under development, an advertising agency taking the role of an active developer of the system, would gain new capabilities that other agencies lack. On the contrary, by performing a distracting role, an agency not only misses the opportunity to develop new skills, but also may run into the danger of being removed from the triad by the advertiser. The ad agency can be replaced either by a more skilful agency or by the m-advertising service provider should the advertiser choose to develop a dyadic relationship with the service provider. Finally, for an advertiser, an agency that merely mediates value co-creation is not as useful as an agency performing a connecting role. Thus, it would make sense either to pay less for such performance, or to switch to another agency, if m-advertising is something that the advertiser considers investing in.

The survey by Kangas and Ketola (2006) concentrates on the attitudes that Finnish advertising agencies have towards mobile advertising. Mobile advertising is a well-known practice since more than half of the agencies had planned or implemented m-advertising, mainly in the form of SMS-messages. The attitudes towards mobile advertising were clearly positive. Almost all saw m-advertising as a fast medium and noted it as a good support for other marketing communications with personalization as a distinctive benefit. Unclear pricing and legislation seems to hinder the implementation of m-advertising, although almost all respondents believe that the use of m-advertising

will increase in the future. The main strengths of mobile advertising were the possibilities for targeting and personalization of the messages, speed and good reach of the medium. On the other hand, the main weaknesses of m-advertising were peskiness, obtrusiveness, deficits in technology and mobile devices, privacy violation and the unclear pricing and legislation. Almost two thirds of the respondents viewed mobile advertising to be best suited for communicating with loyal customers. When evaluating the results of the study, it has to be kept in mind that the response rate of the survey was 27.6 % (124 surveys sent).

Komulainen, Ristola and Still (2006a, 2006b) focus on the views of the other two key actors in the m-advertising network, i.e. the m-advertisers and consumers. The m-advertisers and consumers perceptions towards m-advertising were examined to describe the current possibilities and challenges that m-advertising is facing in actual usage (Komulainen, Ristola and Still 2006a). Looking at the views of both the consumers and the advertisers enables a better understanding of m-advertising as an emerging and new kind of advertising channel (Komulainen, Ristola and Still 2006b). Based on the empirical evidence gathered from two Rotuaari field experiments, it seems that both retailers and consumers regard m-advertising positively, yet there are many challenges which m-advertising still faces. Furthermore, it is identified that in order to utilize the full potential of m-advertising, both mobile channel and the content of the advertisement need to be carefully considered as separate yet intertwined elements that both have special features influencing the success of m-advertising. In other words, m-advertising can be approached from the viewpoint of the actual content of the ad but also from the viewpoint of the mobile channel.

The studies by Komulainen, Ristola and Still (2006a, 2006b) suggest that consumers like receiving mobile ads according to their personal preferences. Consumers require individually designed ads and are willing to receive them on their personal mobile phones, but only after giving consent. Consumers value the context sensitivity of m-advertising and that m-ads bring a new and beneficial dimension to marketing communication. The advertisers emphasized that the mobile channel enables a completely new way to target specified consumer segments because mobile devices are always carried and the messages that are sent to them are always noticed. This creates an important challenge for m-advertising, as both the consumers and the advertisers are concerned about privacy issues. European Union legislation gives consumers the power to decide when, how, where, and from whom to receive m-ads. M-advertisers were also

afraid of m-advertising turning into spamming. Hence, the challenge is to collect a database of consumers *willing* to receive m-ads. Loyal customer programs are one possible solution for this problem. A second challenge is that mobile technologies are unfamiliar to both the consumers and advertisers; they do not manage them well. This creates uncertainty, and hence advertisers and consumers are afraid to utilize the technologies, unless they are confident that they will function flawlessly. Furthermore, the successful utilization of the mobile advertising channel requires careful planning of the content of the ad; mere technological gimmickry is not enough. Overall, this paper argues that m-advertising will be an integral part of advertisers' multi channel marketing communications in the future.

Finally, as m-advertisers are the focal actors in the mobile advertising network, their different roles need to be carefully considered. As the customers of a m-advertising service provider they are also *buyers* of the m-advertising service. However, buying these types of high-technology systems and services can present major challenges, especially for small and medium sized (SME) companies. Ulkuniemi, Heikkinen, Komulainen and Tähtinen (2006) focused on the challenges from the service perspective and from the buyer's point of view. Furthermore, this paper also discusses some purchasing tasks that need attention in order for the buying company to overcome challenges. Four types of challenges were identified: service-related, buyer-related, technology-related, and business process-related. These four challenges represent the main areas that need to be taken into account in the buying process of technology intensive business services. In service-related challenges, the main problem is the specification of the service. A thorough analysis of the buyer's needs would help to specify the services they need and to evaluate the nature and level of co-creation that is needed to increase the value derived from the service. The buyer-related purchasing challenges are mainly related to the fact that in SMEs, purchasing expertise can be limited. Choosing the kind of technology intensive business service that does not require a high level of technological expertise helps to tackle the difficult task of purchasing. Technology-related purchasing challenges arise as technology intensive business services include high technology elements, issues such as compatibility of existing systems, exceeding acquisition costs, and the introduction of new versions. . . Furthermore, evaluating the service provider's capability to communicate about the maturity of the technology helps in creating a realistic vision of the service. Finally, business process-related challenges refer to the way the acquired service and its

technological system is connected and changes the existing business processes of the buyer. Identifying the processes where the service will be used and the required changes, helps in attaining the highest value possible.

3.3.2.4 The Use of M-Advertising

Tähtinen and Salo (2004) and Salo and Tähtinen (2005, 2006) all focus on the way the retailers' use mobile advertising in the first field trial by analyzing their m-ads. The conclusions show that the retailers could not easily make the best use of the opportunities the m-advertising offers to interactive, personal, and context-dependent dialogue with customers. Instead, the retailers and/or their advertising agencies designed mobile advertising to resemble newspaper advertising; in other words very non-personal mass communication. However, nearly all the m-ads were targeted according to the age of the consumer and over half of them use the receivers' mood (i.e. mood for shopping, food etc.) as a sending criterion. Although many other options, including the weather and the time (e.g. opening hours) were available, they were rarely applied. As for the content, only three out of 42 m-ads addressed the receiver by asking them a question or by welcoming them to the café. Thus, the m-ads were aimed at all potential customers instead of well-targeted individual receivers.

During the second field trial, 36 mobile ads were designed and created by advertising agencies. The content of those m-ads was analyzed in Komulainen, Mainela, and Tähtinen (2005) to see how well the advertising professionals could make use of the opportunities the new media offered. The results show that the professionals made good use of the technical features of multimedia messages (graphics, photos, animation, series of images, videos with a speaker and music). However, the interactive and personal nature of the media was only partly evident in the m-ads. Slightly over half, 61 percent, of the m-ads addressed the receiver, thus personalising the message. However, no m-ad invited the receiver to interact via the mobile phone by either phoning or visiting the company's web pages. There was also an interest in choosing suitable receivers, in other words, targeting m-ads to interested consumers. However, half of the m-ads were set to be delivered to receivers indicating any interest. This resulted in some problems since a person that was interested in sports could receive an unwanted m-ad from a nightclub, and get irritated. Thus, the paper concludes that in general, only few advertising agencies used the unique characteristics of m-advertising.

The content of m-ads sent during the third field trial were analyzed in Salo (2006). The findings of the study show that the 50 m-ads contained both verbal and nonverbal information, which was also, to a certain extent, personalized to the receivers. The study also wanted to know if the m-ads differ according to its designer, whether it is a professional advertising agency or not. The finding is that there were only a few differences in the content of mobile ads, but in the use of the targeting criteria, differences appeared. Over 85 percent of the m-ads designed by advertising agencies targeted the m-ads towards loyal customers, receivers in a certain age group or of certain gender and having a certain interest area. The same applied only to 25 percent of the m-ads that retailers had designed. However, the targeting still could have been more effective because it would have improved the fit between the receiver and the message, which is highly important. Another difference was that retailers tended to use m-advertising as a quick way to let customers know about price reductions. Thus, they sent out m-ads that run for only a few days, i.e. as long as the special price applied. Advertising agencies were involved in designing such m-ads that run from a week to a month's period, although they also informed about the special prices. All and all, most of the m-ads encouraged the receiver to act, which suits well for the media.

All the above mentioned papers analyzed mobile ads that were mostly directed to consumers. In general, the use of the media has been limited to consumer markets and thus Takkula and Tähtinen (2006a) study whether m-advertising could also be used in business-to-business (b-to-b) communication. The results are based on interviews with b-to-b m-advertisers and their advertising agencies but also on the analysis of b-to-b m-ads that were sent during the second field trial. The paper argues that the most valuable features in b-to-b setting are speed, exact targeting, high attention value, and interactivity. These features enable m-advertising to be used in key account management as a true communication channel, bringing valuable information to receivers who have a positive attitude towards the sender of the message. On the other hand, for industrial convenience products, m-advertising could even be used before the first purchase as a sales promotion tool. However, Takkula and Tähtinen (2006b) stress that researchers do not yet know enough about the industrial customer's attitudes towards mobile advertising and therefore the results should be considered as preliminary.

3.3.2.5 *The Nature of M-Ad communication*

Since the terms mobile advertising and mobile marketing are both currently being used to describe commercial communication via mobile devices, Tähtinen (2006) makes an effort to clarify the terms and their usage. In doing that, the paper suggests that neither of the terms really bring up the most important characteristics of mobile commercial communication. Mobile *marketing* refers to an organizational function for *creating*, communicating and *delivering* value and thus presents a wider area than communication. On the other hand, mobile *advertising* refers to one-way mass communication, not to interactive, personal, and context dependent mobile means of communication.

Therefore, Tähtinen (2006) suggests two alternative terms: m-ad communication and mobile marketing communication. M-ad communication combines three characteristics to a single term; the mobility (m-), the commercial purpose of message (ad), and the interactive and personal nature inherent in the communication. This term highlights the importance of using m-ad communication only when the receiver is known, the m-ad communication can be personalized to suit the needs of the receiver, and when aiming to start or to continue a dialogue¹. The second suggestion is that mobile marketing communication adds the mobility into a term that is already established, and covers personal selling, advertising, public relations, sales promotion, and various other forms of marketers' communication with potential or existing customers. Thus, to use mobile advertising would mean that the message is sent one way to large masses, in other words, taking traditional advertising content and philosophy and placing them into a new media. This suggests that 'mobile' is a media that can be used, although it would not be the optimal usage of the media or the optimal media (e.g. for impersonal mass communication).

¹ Although this chapter has, until now, used the term mobile advertising, it is done to be true to the original sources and the terms used in them.

3.4 Conclusions

3.4.1 Conclusions of R&D Network Dynamics

The research on R&D networks provides us a picture of networks that are complex and dynamic phenomena consisting of heterogeneous actors acting in different roles and in various processes during the network's life. Managing in networks was a clear theme that was studied in almost all of the above presented papers. In sum, managing in networks is different than managing within a single organization. However, managing, guiding, influencing the network and enhancing its development and learning is possible and even beneficial, as was seen in some of the case studies.

The development of a network progresses through different sub-processes, which are influenced by actors taking roles, such as webber, gatekeeper, and resource provider. Important issues to the success of the network is that it finds common, clearly expressed and shared goals, and common ways of working, which facilitate its functioning and learning. Once the network and its task develop, the roles that actors occupy also change, conflicts may arise, and new situations have to be resolved. An understanding about the interests of the actors as well as the network as a whole and being prepared to resolve conflicting situations, helps the network to be successful in achieving its tasks. However, it was noted that networks that develop new solutions are not the networks that commercialize them. Thus, a new avenue for research emerges here. We need to know more about the transformation of R&D networks into business networks.

3.4.2 Conclusions of Rotuaari as a Business Network

The development of business networks around novel technology intensive services has not been as rapid as many authorities in Finland had hoped. It is clear that there are many challenges to overcome. The value of such services is uncertain to potential buyers making the purchase and use of the services difficult and risky. In the case of mobile ad communication, this also applies to the end users of the services, the consumers or people representing customer companies. This sets high expectations to the networks commercializing novel technology intensive services. The profits for the companies are, at least at the beginning, uncertain and modest since the network has to

educate its customers, end users, and also other actors in the networks. A company must teach actors such as advertising agencies to use the mobile technology and to plan m-ad communication to fit the media and the needs of the end users. Thus, a lot of learning in different levels has to take place. Different company customers appreciate different elements of value, and thus the service providers need to provide different offerings to the customer types. Customers differ in their resources and abilities to learn how to use a technology intensive service. Advertising agencies can enhance or hinder the spreading of the new communication media.

Finally, an important issue in m-ad communication is the willingness of the end users, i.e. the receivers of the messages. The studies see two avenues for this question; either to use the existing loyal customer data bases of retailers, or to collect a detailed data base of consumers interested in receiving mobile communication from companies. In both cases, the success of m-ad communication is directly related to its value regarding the receivers. The receivers must be the ones deciding what they wish to receive, when and from whom. Companies must learn how to design a personalized dialogue with the consumer. The studies show that, although learning has taken place, it is a slow process.

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