Delphi Method Analysis: The Role of Regulation in the Mobile Operator Business in Finland

Kimmo Laakso[1], Anita Rubin[2], Hannu Linturi[3]
[1]Tampere University of Technology/Pori, Department of Information Technology, P.O.Box 300, FIN-28101 Pori, Finland. Tel +358-40-7087987, e-mail kimmo.laakso@tut.fi
[2]Finland Futures Research Center, University of Turku, Rehtorinpellonkatu 3, FIN-20500 Turku, Finland. Tel +358-50-5239772, e-mail anita.rubin@tse.fi
[3] Metodix, Otavantie 2, FIN-50670 Mikkeli, Finland, Tel +358-40-08155155, e-mail hannu.linturi@metodix.com

Abstract: Mobile communication has grown beyond its original scope and scale. Mobile operators have played a significant role in this phenomenon. Since the mobile operator business is highly regulated, the effects of regulation on the industry have been analyzed. The potential effects in the years up to 2015 are also considered. The aim of this paper is to discuss the possibilities of a futures-oriented method - i.e. the Delphi method, to estimate the effect of regulation on the mobile operator business. The challenge is that the method was originally created to assess experts' opinions about the course of development of a certain technology or phenomenon in the future and then, by using a scenario technique, to draw conclusions about its possible futures. Now the Delphi method is also being used to estimate past development, i.e. experts' opinions of the causes and effects of laws and other regulations in the past few decades. The paper forms a part of a larger study, the aim of which is to analyze the effects of changes in the regulatory framework for the mobile operator industry in Finland. According to this research the ultimate goals of the regulator, set as early as in the middle of the 1980s, have been actualized: In Finland there are several competing nationwide mobile operators and the use of mobile phones is cheap compared to many other countries. Significant finding of the study is also that the regulatory framework for the mobile operator business has become more complex over the years and that the complexity is also likely to grow in the future.

1. Introduction

Mobile communication has grown out of its previous scope and scale, and at the same time it has become one of the most influential factors of change in society and the way people interact with each other. Twenty years ago mobile phones were used only for talking. SMS messages, downloadable ringtones, and the possibility of taking photos were developed in the 1990s. Nowadays, in addition to other purposes, mobile phones and other mobile devices can be used for web browsing, navigation services, and video streaming [7, 20]. In 2007 the average number of mobile subscribers per 100 inhabitants in OECD countries was almost 100, while in 1987, in Finland for example it was 2.1, where as today it is over 130 [15, 11]. In Finland in the 1980s, the industry was monopolized by a state institution. In the 90s, there was a duopoly, and finally since the beginning of the millennium, there have been several private mobile operators, while the public sector is no longer the main owner of any operator.

Traditionally, the mobile operator business has been highly regulated in Finland, and the Telecommunications Act still regulates the operator business today. Finland joined the EU in 1995 and has ever since followed its legislation; hence EU regulation has been implemented into the Telecommunications Act, for example. During the

history of the mobile operator business, the Telecommunications Act and its predecessors have been changed several times. To the best of our knowledge, the effects of changes in regulation have not been researched qualitatively in Finland.

This regulation is described as being composed of three levels Fig. 1. As an EU member, Finland's mobile operator business is regulated by the Commission [4]. Since the directives and other EU regulation have been fully implemented into national regulation, EU-level regulation is not debated in this research (there is one exception, which will be discussed later), and it is Finland's national regulation that is the focus of this study.

National-level regulation can be divided into two parts. Firstly, there are the laws as well as lower level regulations and decisions that mobile operators are obliged to follow. Secondly, there are authorities that control the operators and try to make sure that the laws and other regulatory orders are followed. Authorities, e.g. the Finnish communications regulatory authority, can also operate as an active moderator on a certain (according to the authority) problematic issue or shortcoming and instruct the businesses to agree on procedures which are compulsory by nature. As an example, there are charges which the operators collect from each other and which have been and will be reduced by following principles that have been jointly agreed upon.

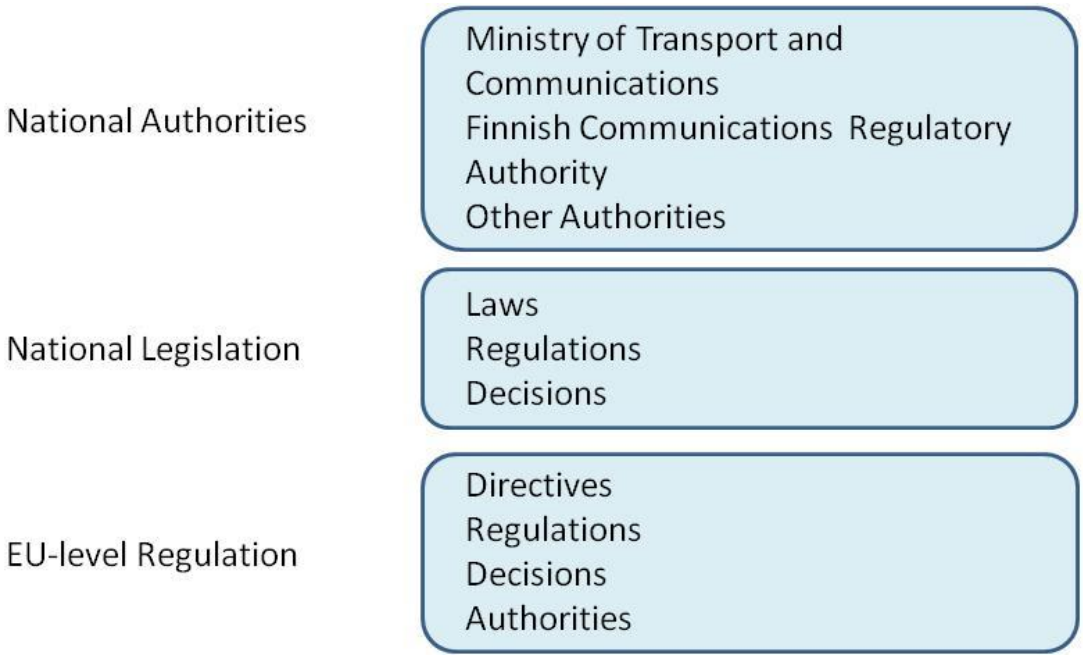

Fig.1. Levels of regulation

The method chosen for this study is Delphi, because expert opinions on the most important changes in regulation and their impacts on the business was the target of research interest in this study. The Delphi method is widely in use in futures studies. In this study, however, expert opinions are also utilized in the reassessment of past decisions and events and their consequences. The possibilities of the Delphi method for evaluating the future have then been implemented by anticipating the impacts of regulation in the future up to the year 2015.

The paper is composed as follows. Firstly, in Chapter 2 the Delphi method is described. Secondly, in Chapter 3 we present the research settings and the use of Delphi, including the panelist selection process. Thirdly, in Chapter 4 we introduce the results of the study, and finally, in Chapter 5 we describe the conclusions of analysis of the results and evaluate the adequacy and applicability of the Delphi method used in this research.

2. The Delphi method

Delphoi (or Delphi, as it is more commonly known) is a survey or interview method in which the expert panelists' knowledge and presumptions on an issue or development process under study are collected in an interactive process. By nature, Delphi can fall into the category of both quantitative and qualitative study. Delphi is especially useful when the phenomenon under study is complex or when the topic is somehow delicate – difficult to define, awkward to talk about, politically sensitive, etc.

The method was first developed by Olaf Helmer of the Rand Corporation in the USA in the 1950s and 1960s [3]. At first the method was used for military purposes as a tool in creating strategies for the army. The meaning of the Delphoi process was originally to define the future of a certain phenomenon with the help of experts. The goal was to achieve unanimity on how experts saw the future of the issue in question. Consensus was the ultimate target, and it was reached by iterating the opinions and their grounds among the experts so many times that unanimity was reached – everybody agreed to think the same way in the end. [1].

At first the Delphi was received very positively, but gradually the results started to arouse doubts and criticism. The Delphi was strongly criticized in the 1970s especially for gaining results that were too simple [1]. Because of the heavy critique, the Delphi method was disregarded for nearly 20 years. However, in the 1980s, some researchers returned to the method and started to think how it could give better answers to the needs of rapidly changing society. As a result of the work of U.S. researchers Harold Linstone and Murray Turoff [9, 13, 22] in particular, the method again became popular. Another of the new developers of the method is Dr. Osmo Kuusi [8].

Instead of gaining consensus, the modern Delphi emphasizes new and different knowledge, also tacit knowledge, and it aims at bringing this knowledge to the attention of other experts for their evaluation and comments. The new Delphi, often known as argumentative, or policy Delphi as opposed to the older version, consensus Delphi, is democratic and equal by nature. The Delphi process produces different viewpoints, hypotheses and arguments, which are then subjected to open expert testing. The process aims at sifting through personal knowledge and insight to form shared visions, either agreed or disagreed upon. Both views are equally valuable. There can be disagreement both on arguments and goals, as well as on the probability of various alternatives and their desirability.

The Delphi can be labeled an expert method. The panelists of the jury are selected from among the experts of the field of study, and the aim is to cover all the relevant aspects of the study subject. These experts are then brought into interaction with the

topic and with each other in a way that emphasizes the rationale of the arguments instead of the position or authority of the panelist in question. In the Delphi studies on technology foresight, large panels are favored, while, in social issues for example, the panels are small. In addition to expertise, the features that identify Delphi are anonymity and iteration, for example [10].

Experts

The appeal of Delphi as a method is based on its epithet as an expert method. The most knowledgeable people in their field of specialization are often also ahead of the others in their ideas about the future because of their exceptional understanding. According to Kuusi [8], an expert fit for a Delphi panel should be (1) at the highest level of his/her field of knowledge/science; (2) interested in the wide range of knowledge (around it); (3) able to trace connections between national and international, present and future development; (4) able to regard problems from unconventional angles also, and (5) be interested in doing something new. This viewpoint of the requirements of a good panelist also reflects the modern idea of expertise.

Anonymity

The anonymity of the panelists helps in avoiding the limits and problems of expression and listening to one another, which is always present in face-to-face expert groups. The position or status of a panelist – be it low or high – does not affect the formation and expression of opinions. Furthermore, the panelists do not have to fear losing face, even if they give a "wrong" or unsuitable answer or "loose" comment. They also need not be wary of expressing attitudes that their employer might find inappropriate to be aired in public. In interest or value conflicts, issues do not become personalized in the same way as in face-to-face communication.

However, sometimes anonymity is not necessary, or it may even be an obstacle to potential results [17, 18, 19]. If the expert panelists are needed as representatives of their specific group of interest, or as a "tribe" of experts who are united by their unanimity on the development of the study subject or development, then anonymity might guide the panelists to give personal opinions, while the need is in fact to gain knowledge of their specific background group.

This kind of Delphi is known as Disaggregative Policy Delphi. Its starting point is a society which is largely institutionalized and structuralized and in which a representative group for each opinion tendency of relevance can be named. In this way social knowledge is brought to light and distributed to others for their comments. It is like a "one argument, one voice" principle. Each information producer is on the same level from the point of view of the study, regardless of the position, support, or authority of the institution in question.

Iteration and feedback

The basic difference between ordinary surveys and the Delphi is its iterative and feedback nature. In contrast to gallup polls, opinions are not merely collected for analysis, but information about the answers is fed back to the panelists. With the help of the feedback information, the respondents are guided to give justifications for their choices. Therefore the building up of information proceeds round by round so that the previous round forms the basis for the next one.

The first round interview or questionnaire starts the study process. It also orientates the panelists to position themselves as regards to both the Delphi process and to each other. In the comments and arguments of the second and third rounds, the panelists clarify their opinions and views and try to convince the others. The panelists have the opportunity to clarify their answers and comments during the process. If this happens, it is a positive sign of listening and genuine dialogue. Between the rounds, the manager (researcher) analyzes the results and forms the arguments given into new claims for the panel to vote on in the next round.

Internet-based Delphi allows the possibility of having synchronic dialogue between experts. It is essential to contribute to the communication and problem solving of the panel group. The panelists do not necessarily have to react to all claims, but only to those about which they feel they have something relevant to say. It has been proven that expert evaluations have improved if the panelists can also reflect on the credibility of their answer [23].

By using the modern Delphi, i.e., the policy Delphi, in this research, the changing operational environment of mobile operators in Finland over the time period of two decades has been analyzed. Experts' opinions were explored and through the iteration process, systemically itemized, it is argued and reasoned during the process, which is to be described in the next Chapter.

3. Delphi application: The Role of Regulation in the Mobile Operator Business in Finland

3.1. Research problem and research questions

The telecommunications industry has been regulated in an exceptionally meticulous way. Telecommunications is growing tremendously, not only mobile communication in itself, but also technical development and convergence, which together place special requirements on the development of legislation and other regulation. That is why regulation as a whole forms an essential part of the changing operational environment of operators. In order to research the effects of changes in regulation, the following research questions were posed:

The aim of the research is to demonstrate that regulation plays a significant role in the mobile operator business.

In order to achieve the goal of the research, the following research questions were formulated:

1. *Which have been the most significant changes in regulation in the past?*
2. *What kind of impact have those changes caused?*

3. *How will regulation influence the industry in the next five years?*

3.2. Description of the research process

The research started with a desk study on the mobile operator industry in Finland. The changes in regulation in a period of over two decades, starting from the second half of the 1980s and ending in 2009, were analyzed in a desk study. Then a number of companies were analyzed and various data from the industry as a whole was collected. Among other things, the collected data includes the services offered, the number of subscribers, as well as the usage and average prices of services.

The final research questions (see above) were then created on the basis of the research problem. After that the Delphi panel was built up. A three-round iterative Delphi study started in the first half of 2009. The first round was accomplished by means of recorded interviews. The second round was carried out using an Internet-based questionnaire. The third round will be carried out in January-February 2010 also using the Internet-based questionnaire.

3.3. The panel of experts

According to e.g. Kuusi [8] and Gordon [2] the selection of the Delphi panel is one of the most critical phases of a Delphi study. In terms of the communication process, Delphi is well suited to setting up a communication structure among members who possess the same general core of knowledge and who are already well informed. However, for the needs of our specific study, the successful realization of Delphi also requires the design of a panel structure which allows many knowledgeable individuals from different disciplines or specialties, or having a different working background and experience, to contribute information or judgments to the problem area which is much broader in scope than the knowledge which any single individual can possess. Therefore, the objective of research could not have been achieved if all the parties to the Delphi had been drawn from the same specialized interest group [9].

Before selecting any individuals for the panel, attention was paid to selecting companies and other organizations that were considered likely to possess the desired knowledge on the mobile industry. Therefore it was decided that the panel should represent the following interest groups:

a) Authorities
b) Mobile operators
c) Other stakeholders

It was also considered that the panelists should have personal competencies and working experience covering:

a) Operations (including management and product development)
b) Law
c) Research and development of the industry

In the next stage, senior level persons in selected organizations were interviewed in order to find the right individuals for the panel. The actual size of the panel is not limited but the literature recommends that the panel should have at least 10 -- 15 members [2, 16, 8, 24]. There were 14 experts on our panel.

The panelists share a wide range of understanding of the telecommunications industry. The panel consisted of 12 men and 2 women. The majority of the panelists were male, since the topic area is such that there are fewer female experts, even today. The average age of panelists was 48.1 and the average working experience in the telecom sector 20.9 years. Their personal competences and organizational interests can be expressed as follows Fig. 2:

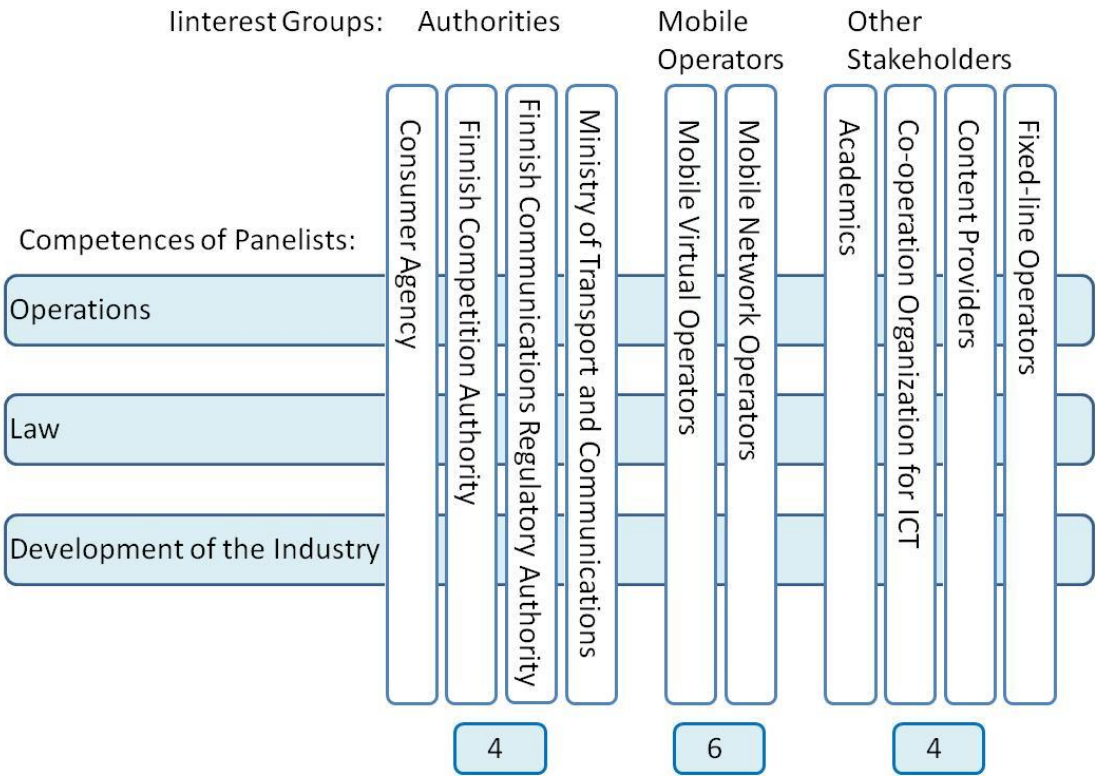

Fig. 2. Panelists in the competence/interest group matrix

Authorities

In this group we have four bodies. The Ministry of Transport and Communications [12] is responsible for preparing the laws and developing telecommunications as a whole. The Finnish communications regulatory authority [5] is responsible for setting out lower level regulation but is also the controlling body in communications. The Finnish competition authority and consumer agency are also represented.

Mobile operators

In Finland there are three mobile network operators. These are all included in the panel. In Finland there are some 15 virtual and service mobile operators (which all together represent approx. 2% of the market share in 2009 but nevertheless have had a share of approx. 20%). Three of them were chosen for the panel.

Other stakeholders

In addition to academics, fixed-line operators, mobile content providers and the ICT sector are all represented by national co-operating organizations. In this group there are four stakeholders.

3.4. Anonymity of panelists

In this Delphi application, the complete anonymity of panelists was considered unnecessary [17, 18]. It would also have been difficult to put into practice because all three mobile network operators were represented on the panel and the representatives were persons who have comprehensive experience in telecommunications. Therefore this study falls into the category of Disaggregative Delphi studies. However, the answers and arguments during the Delphi process were handled anonymously. At the beginning of the first Delphi round, the panelists were given the names of all the other panelists participating on the panels, but the individual answers and arguments shown to the panel were anonymous.

3.5. Delphi rounds of interviews and questionnaires

Before the 1st Delphi round, the changes in regulation over the past twenty years were examined. The changes have taken place at all levels of regulation. Firstly, legislation has been changed numerous times. Secondly, the sector-specific regulatory authority Ficora has been given many additional duties and more power in comparison with the situation in the 1980s. And thirdly, Finland joined the EU in 1995. This has meant that EU-level regulations, mostly in the form of directives, have been applied to national legislation. An inclusive listing of the changes in regulation was made before the beginning of the 1st Delphi round interview.

1st Delphi round

The first Delphi round was carried out in the form of interviews. All 14 panelists were interviewed for 1.5 - 2 hours. The interviews were recorded, transcribed, and documented. The interviewees were given the list of changes in regulation and they were also asked to talk about and describe the changes that, in their opinion, had been the most significant. The effects of those changes on the industry were also the focus of the interviews. Through personal contact with the panelists the researcher also wished to increase the commitment of the panelists for the next rounds, which were based on Internet Delphi questionnaires.

The target of this Delphi round was to identify the most significant changes in regulation in the past.

2nd Delphi round

The second Delphi round was carried out using an Internet-based questionnaire. The questions and claims in this questionnaire were composed on the basis of the interviews in the first round. The questionnaire included 32 questions and claims. The panel members were also asked to describe the effects of regulation acts in the past and to express their thoughts on how the proposed changes in regulation would affect the industry in the near future. The questionnaire was "accessible" on the Internet for three weeks. 13 panelists took part in this Delphi round.

The goal of this Delphi round was to

1. *Determine the effects of past events in regulation.*
2. *Find out the panelists' opinions on the current (2009) regulatory circumstances.*
3. *Raise discussion on proposed changes in regulation.*

3rd Delphi round

The third Delphi round was also carried out using an Internet-based questionnaire. In it, the panelists were be asked to define the most significant of the proposed changes, i.e. the changes in regulation currently in progress, and which will have consequences in the future. Finally, the panelists were encouraged to describe the possible regulatory environment in Finland in five years' time.

The aim of this Delphi round is as follows:

1. *Determine the most important of the proposed changes in regulation.*
2. *Find out the panel members' opinions on the effects of the proposed changes.*
3. *Ask the panelists to describe and make an estimate on the regulatory framework in 2015*

4. Results

The Delphi process and its analysis revealed that regulation has a decisive role in the development of the businesses of operators. These results indicate the following changes to be the most significant having had the following impacts:

- Mobile network operation was subjected to license in 1990 and private companies were able to apply for a license. This change in the law accelerated the increase in the number of subscriptions in Finland for example, so that Finland became the top country in subscriber density in the second half of the 1990s. The number of mobile phones per household exceeded the number of fixed-line telephones as early as 1999. The figure was then over 80 mobile phones per 100 households [21]. The panelists estimated that this was achieved up to four years earlier when two operators were competing for customers compared to a single operator scenario.

- The raft of "service operator decisions" for the fixed-line operators made by the Ministry of Transport and Communications in the later half of the 1990s

contributed to "non-network" mobile operators' action on a large scale in the early years of the present decade. In addition to the increased supply, this contributed significantly to the price of mobile services, because the service operators entered the market competing particularly on price [12].

- Mobile number portability was implemented in Finland in 2003, in a way that operators were not allowed to charge customers. This means that the subscriber may choose to switch operators and keep their mobile number and pay no charge for it. This was likely to increase users' sensitivity to changing operators, which continues to have a depressive effect on the price of services. Operator switching has been quite popular in Finland. The phenomenon is known as churning. In 2004 and 2005 more than every fourth (25%) subscriber switched operator. In the last couple of years, the churn has been around 8% [14]. This means that 8% of subscribers switch to another operator.

- Finland prohibited the bundling of subscriptions and terminals by law in 1999. It was again permitted in 2006 for 3G handsets. This speeded up the spread of third-generation networks. Along with price, operators also competed on "coverage and footprint." In 2006, the number of 3G terminals and other equipment was estimated to be a few hundred thousand and in 2009 the number stands at more than 2.5 million. Within only three years, a third of Finnish subscribers have switched to 3G terminals [5].

The following observations were made concerning recent and current regulatory actions:

- EU-level regulations have been established as a framework under which the industry is regulated nationally. The exception is the EU's Roaming Regulation, which is binding upon operators directly as it is. The cost of EU citizens' calls made in another EU country and the prices of SMS messages as well as mobile data services were to be lowered while maximum prices were set. This regulation may be a sign of the EU's willingness to intervene directly in its members' businesses. For instance, a new model for pricing international data roaming has been under discussion in the EU. For example Hammainen et al., [6], have introduced a model for the flat rate pricing of mobile data roaming.

- New 4G radio spectrum allocations were sold in November 2009; for the first time Finland used auctioning rather than the previously used "beauty contests". The first reactions to the auction have been positive. For the winners it is also possible for the first time to sell over their spectrum. It is supposed that allocations will be used more effectively.

As results of the future orientated questions the panel suggested that the following proposed changes in regulation up to 2015 should be considered important:

- Mobile content services may be threatened: Banking Service Law Reform may bring difficulties for third party mobile content providers because operators will possibly be regulated like banks when billing for third party services. This

may cause too many extra costs for operators, who then may make the content services correspondingly more expensive.

- The presently designed "strong electronic authentication" by mobile phone may have positive implications for operators and also for the development of the information society.

As a whole, the regulation of the mobile operator industry has changed very often. This means that the players in the field have to be very active when planning their businesses. The other significant feature of the regulatory framework is that it has changed to become more and more complex over the years.

5. Conclusions

The Delphi method, which is generally used in future orientated research, is here proved to be an effective method also when used for examining past events. In this Delphi research the most significant changes in regulation have been drawn up. The expert knowledge of panelists has been shown to be very extensive. In this particular study the panel was also quite unanimous on matters concerning the effects of regulation changes.

Mobile communication based on NMT technology emerged in Finland at the beginning of the 1980s. Business was monopolized by a state institution. At that time there was no legislation concerning the mobile operator business. When a legislative proposal was introduced to the Finnish parliament in the middle of the 1980s, the government argued that the purpose of the new law was to promote versatile telecommunications enabled by a uniform system run equally and economically everywhere in the country. In fact, the private sector tried unsuccessfully to get a radio spectrum for the mobile business for several years.

Those were also the main arguments of the government when introducing the law renewal (amendment) at the very beginning of the 1990s when mobile networks were made subject to license. The private sector was finally given the possibility to start the mobile operator business. GSM technology took over NMT rapidly. During the 1990s clauses were included in the law in which competition was encouraged between the actors in the field and between different technologies. During the early 2000s, such factors as the development of the information society, network business, and content providers have been seen when introducing several renewals to legislation. On the other hand, it can be seen that the liberalization of regulation started in the late 1980s, has changed into a new kind of regulation that is very specific, with hundreds of clauses in many separate laws.

One of the biggest regulation changes was made in 1990 when mobile network operation was subjected to license and private companies were allowed to apply for a license. Within just a few years, the number of mobile phones per household exceeded the number of fixed-line telephones, exceeding a density of 80 %. In this particular matter the majority of panelists argued that competition accelerated this achievement by at least three to four years.

The service operator business model together with a free-of-charge operator switch with number portability affected the prices of mobile services dramatically during the first half of the present decade. The price of mobile calls had already decreased in the 1990s but hypercompetition between operators forced prices down by more than 40 % in the five years from 2001 to 2005. The share of 3G terminals reached a level of 30 % of all mobile devices in the three years between 2006 and 2009. The share started to increase rapidly, practically from zero, right after the bundling of subscription and terminal was allowed in April 2006.

These findings lead to the conclusion that regulation authorities can strongly steer the operator business. Steering in this case not only represents permission or prohibition of something but also guidance of the actions of operators. The other significant feature of the change is that the regulatory framework has become more complex over the years.

In summary, in addition to a fixed-line in almost every building in Finland, there are three competing nationwide mobile networks which all also provide at least some kind of Internet connection for most of the subscribers. When also taking into account the fact that Finland has proven to be one of cheapest countries regarding mobile calls, it can be stated that the general purposes of the regulator have been actualized. However, this research does not concentrate on evaluating the regulation, but a part of the research material will be used for further research in evaluating, for example, the operators' views on the necessity of certain parts of the regulation.

References:

[1] Bell W., "Foundations of Futures Studies". *Human Science for a New Era. Vol. 1 Hostroy, Purposes, and Knowledge*. Transaction Publishers, New Brunswick and London. pp. 261-272. 1997.

[2] Gordon, T., J., "The Delphi Method in Futures Research Methodology-V3.0." *The Millennium Project*. Eds. J. C. Glenn and T. J. Gordon. Retrieved 10/26/09 World Wide Web, http://www.millennium-project.org/millennium/FRM-V3.html

[3] Gordon T.J. and Helmer O.; *Report on a Long-Range Forecasting Study*. RAND-paper P-2982 Santa Monica, CA. 1964.

[4] EU, *Legislation in force*. Retrieved 10/26/09 World Wide Web, http://eurlex.europa.eu/en/legis/index.htm

[5] Ficora, "Markkinakatsaus 2/2009". Retrieved 10/2/09 World Wide Web, http://www.ficora.fi/attachments/suomihmv/5k8xdfAS2/Markkinakatsaus_2_2009_markkinat_ja_investoinnit.pdf

[6] Hämmäinen, H., Verkasalo, H. and Renjish Kumar, K.R., "Flat-rate Pricing for International Mobile Data Roaming." *EuroCPR2009*, March 29-31, 2009, Seville, Spain. 2009.

[7] IDEAN, "Mobile Content Services Market in Finland 2009 – 2010". Retrieved 10/5/09 World Wide Web,http://www.idean.com/wpcontent/uploads/2009/06/mobile_content_services_market_in_finland_2009-2014.pdf

[8] Kuusi, O.; *Expertise in the future use of generic technologies. Epistemic and methodological considerations concerning Delphi studies*, HeSE Print, Helsinki. 1999.

[9] Linstone H. & Turoff, M. (eds.); *The Delphi Method: Techniques and Applications*. Addison Wesley Publishing Co, Advanced Book Programme. Retrieved 10/26/09 World Wide Web, http://is.njit.edu/pubs/delphibook/

[10] *Millennium project*. Retrieved 10/11/09 World Wide Web, http://millennium-project.org/

[11] Mintc; *Televiestintätilasto 1998*. Liikenne- ja viestintäministeriö, Edita, Helsinki. 1999.

[12] Mintc; *Prices of Mobile Calls 2005*, Ministry of Transport and Communications, Helsinki. Retrieved 8/7/09 World Wide Web, http://www.lvm.fi/fileserver/Julkaisuja%2079_2005.pdf

[13] Mitroff I. and Turoff M., "Philosophical and methodological foundations of Delphi" in *The Delphi Method: Techniques and Applications*. Eds. H. Linstone and M. Turoff. Addison Wesley Publishing Co, Advanced Book Programme. Retrieved 10/26/09 World Wide Web, http://is.njit.edu/pubs/delphibook/

[14] Numpack Oy, "Statistics in English Q3 2009". Retrieved 11/15/09 World Wide Web, http://www.numpac.fi/index.php?site=128.

[15] OECD, "OECD Communications Outlook". Retrieved 9/20/09 World Wide Web, http://www.oecd.org/document /20/0,3343,en_2649_34225_43471316_1_1_1_37441,00.html

[16] Okoli, C., and Pawlowski, S.D., "The Delphi method as a research tool: an example, design considerations and applications". *Information & Management 42*, pp. 15 -29. 2004.

[17] Tapio, P.; *Limits to Traffic Volume Growth. The Content and Procedure of Administrative Futures Studies on Finnish Transport CO2 Policy*. Acta Futura Fennica, no 8. Finnish Society for Futures Studies. 2002.

[18] Tapio, P.; *Disaggregative Policy Delphi: Using Cluster analysis as a tool for systematic scenario formation*. Technological Forecasting and Social Change, Turku. 2002.

[19] Tapio, P., Varho, V. and Vinnari, M., "Finding a Balance for Qualitative and Quantitative Information in Delphi Processes", in *Future of the Consumer Society. Proceedings of the Conference "Future of the Consumer Society," 28–29 May 2009, Tampere, Finland.* Eds. M. Koskela and M. Vinnari.FFRC eBooks 7/2009. Finland Futures Research Centre, Turku School of Economics. 2009.

[20] Tallberg, M., "Mobile market in Finland" in *Topical Evolution Paths of Mobile Multimedia Services*. Ed. S. Luukkainen. Publications in Telecommunications Software and Multimedia, Helsinki University of Technology, Helsinki. 2007.

[21] Tilastokeskus, "Kuluttajabarometri: Joidenkin laitteiden ja yhteyksien yleisyys kotitalouksissa 9/1997 - 8/2009". Retrieved 11/19/09 World Wide Web, http://tilastokeskus.fi/til/kbar/2009/08/kbar_2009_08_2009-09-01_tau_003.xls

[22] Turoff, M. and Lindsay H., A., "Introduction" in *The Delphi method: techniques and applications*, Eds. H. Linstone and M. Turoff. Addison-Wesley, London. 1975.

[23] Turoff, M. and Starr, R. H., "Computer Based Delphi Processes", in *Gazing Into the Oracle: The Delphi Method and Its Application to Social Policy and Public Health*. Eds. Adler and Ziglio. London, Kingsley Publishers. 1996.

[24] Turoff, M., "Delphi for Foresight". Lecture given in the Millennium seminar at the University of Helsinki, Finland, on the 6th of November 2009. Retrieved 11/19/09 World Wide Web, http://edelfoi.ning.com/video/delphi-for-foresight