The Role of Regulation in the Mobile Operator Business in Finland 1985–2015

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Structured Abstract

Purpose: Mobile communication has grown beyond its original scope and scale, and mobile operators have played a significant role in this phenomenon. Since the mobile operator business is highly regulated, we analyzed the effects of regulation on the industry during the period 1985–2009. We also considered its potential effects in the years 2010–2015.

Methodology: The method selected for our research was the Delphi method. The challenge was that this 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 for example a scenario technique, to draw conclusions about its possible futures. Here we used the Delphi method for estimating past development also, i.e. experts' opinions of the causes and effects of laws and other regulations in the past few decades.

Findings: According to our 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. One significant finding of our study is that the regulatory framework for the mobile operator business has become more complex over the years and that this complexity is also likely to grow in the future.

Practical & Social Implications: Dynamic regulation has enabled strong competition in Finland's mobile operator market and at the same time a very high service level for subscribers. The Delphi method is proven to be a powerful tool also when examining past events, and we recommend Delphi for use in studies related to other sectors of administration and fields of business.

Originality: This paper enables better monitoring of the changes in regulatory framework over a long period in which several changes have been made, compared to previous studies which focus on a single regulatory action.

Keywords

Mobile communications; Mobile operator; Regulation; Delphi

1. Introduction

Mobile communication has grown beyond 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 [1, 2]. By 2007 the average number of mobile subscribers per 100 inhabitants in OECD countries was almost 100 [3]. In Finland, for example, it reached 114.5 in 2007 and 143.8 in 2009 [4, 5, 6]. In Finland in the 1980s, a state institution monopolized the industry. In the 1990s, 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 in 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 [7]. Since the directives and other EU regulation have been fully implemented in national regulation, EU-level regulation is not debated in this research (with 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 certain principles that have been jointly agreed upon.

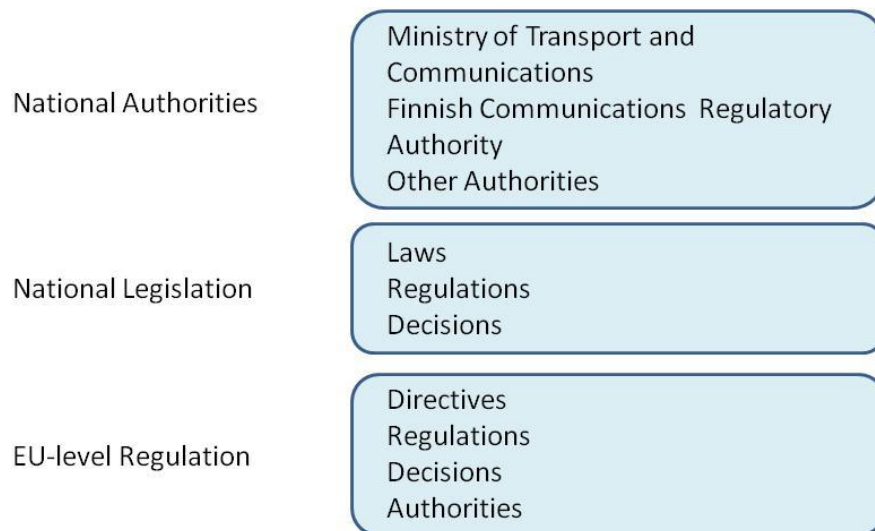|	
National Authorities	Ministry of Transport and Communications Finnish Communications Regulatory Authority Other Authorities
National Legislation	Laws Regulations Decisions
EU-level Regulation	Directives Regulations Decisions Authorities

Fig.1. Levels of regulation

The method chosen for this study was 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 the 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 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 [8]. At first, the method was used for military purposes as a tool to create 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 [9].

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 [9]. Because of this 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 a rapidly changing society. As a result of the work of U.S. researchers Harold Linstone and Murray Turoff [10, 11, 12] in particular, the method again became popular. Another of the new developers of the method is Dr. Osmo Kuusi [13].

Rather than 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 egalitarian 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 in the field of study in question, 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 rather than the position or authority of the panelist in question. In 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 [14].

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 others in their ideas about the future because of their exceptional understanding. According to Kuusi [13], an expert fit for a Delphi panel should be (1) at the highest level of his/her field of knowledge/science; (2) interested in a 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 [15, 16, 17]. If the expert panelists are required as representatives of their specific group of interest, or as a "tribe" of experts 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 the 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. Every information provider is at 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 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 both the Delphi process and 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 refine their answers and comments during the process. If this happens, it is a positive sign of listening and genuine dialogue. Between rounds, the manager (researcher) analyzes the results and formulates 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 the claims, only 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 [18].

In this research, the changing operational environment of mobile operators in Finland over the time period of two decades has been analyzed using the modern Delphi, i.e. policy Delphi. Experts' opinions were explored and through the iteration process, systematically itemized, argued and reasoned during the process 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 enormously, 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. This is why regulation as a whole forms an essential part of the changing operational environment of operators.

The aim of the research was to examine what kind of regulation has been implemented on the Finnish mobile operator industry, how regulation affected the industry in the period of 1985–2009, and what might be seen in the regulatory framework in the next five years up to 2015. In order to research the effects of changes in regulation, the following research questions were posed:

1. *Which have been the most significant changes in regulation in the past?*
2. *What kind of impacts have those changes caused?*
3. *How will regulation influence the industry in the next five years?*

A three-round iterative Delphi study was conducted in 2009–2010. The first round was accomplished by means of recorded interviews in April 2009. The second round was carried out using an Internet-based questionnaire in August-September 2009. The third round was carried out in March-April 2010, also using the Internet-based questionnaire.

3.3. The panel of experts

According to e.g. Kuusi [13] and Gordon [19] 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 people with different working backgrounds and experience, to contribute information or judgments to a problem area that 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 [10].

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 of 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 the 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 [13, 19, 20, 21]. There were 14 experts on this 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 are described in Fig. 2:
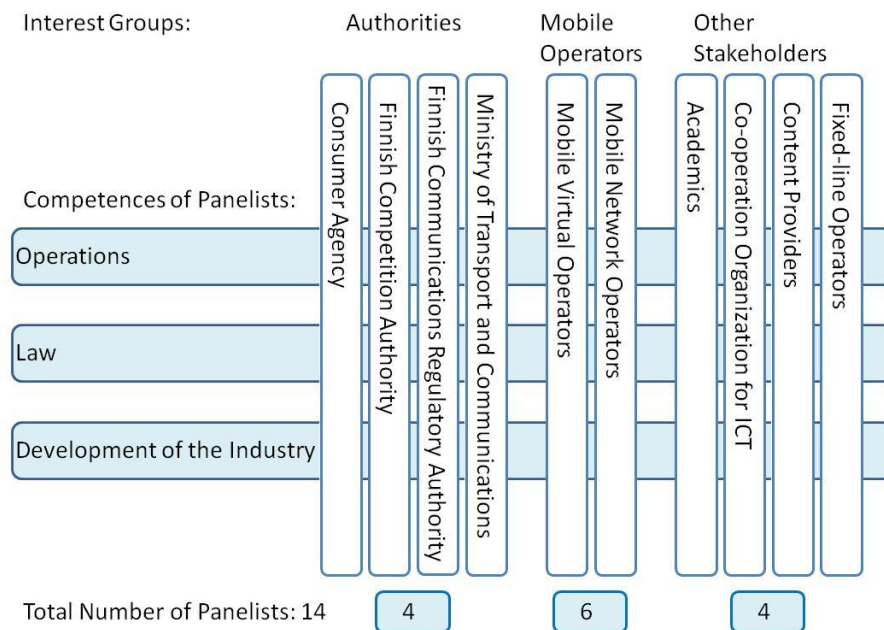

Fig.2. Panelists in the Competence/Interest Group matrix

Authorities

There are four bodies in this group. The Ministry of Transport and Communications is responsible for preparing laws and developing telecommunications as a whole. The Finnish Communications Regulatory Authority [22, 23, 24] 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 represented on the panel. In addition to network operators, there are also so called non-network mobile operators, which act as virtual network operator or service operator. During the last few years there have been 12–15 virtual network operators and service operators (which all together represent approx. 2% of the market share in 2009 but nevertheless have had a share of approx. 20% [25, 26]). Three non-network operators were randomly 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 [15, 16]. 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. However, 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 through the Delphi process were anonymous.

3.5. Delphi rounds of interviews and questionnaires

1st Delphi round

Since the panel was relatively small, it was decided to carry out the first Delphi round by means of recorded interviews. All 14 panelists were interviewed for 1.5–2 hours. The interviews were recorded, transcribed, and documented. Based on a desk study an inclusive listing of the changes in regulation was made before the beginning of the 1st round of interviews. 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 focused on during 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 Internet-based Delphi software. This software has been developed by the Finnish Delphi Community (see http://www.edelphi.fi). The main features of the software are user administration, questionnaire creation, and organization of answers and comments. In addition, the software has various reporting possibilities. 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 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 the proposed changes in regulation.*

3rd Delphi round

The third Delphi round was also carried out using an Internet-based questionnaire. The questionnaire included 15 questions and claims. In it, the panelists were asked to define the most significant of the proposed changes, i.e. the changes in regulation currently in progress, which would 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 was 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.*

3.6. Evaluation of the research process

The research started with a desk study on the mobile operator industry in Finland, which analyzed changes in regulation in a period of over two decades, starting from the second half of the 1980s and ending in 2009 [23, 24]. Next, a number of companies were analyzed and various data from the industry as a whole was collected. Among other things, the collected data (which are presented together with other results of the research in Chapter 5) included the services offered, the number of subscribers, as well as the usage and average prices of services [4, 5, 6, 22, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35]. The final research questions were then created on the basis of the research problem [36].

The first Delphi round was done by interviewing all panelists personally. Interviewees had the possibility to express their opinions on the research subject freely. Questions and claims for the next two Internet-based questionnaires were then formulated based on the desk study and information from these interviews. This was intended to increase the validity of the study. Questions and claims for the third round questionnaire were formulated iteratively based on information from earlier rounds. Panelists gave focused answers and comments on the first Delphi round, which they shared with the other panelists in the second and the third Delphi rounds.

From the reliability point of view, a great deal of attention was paid to the selection of experts for the panel. First of all, it was carefully considered in which organizations there might be the best understanding of the topic of the study. Secondly, top-level managers of these organizations were asked to recommend persons with the best possible expertise in the research area for the panel. The selected experts have an average of more than 20 years' experience in the industry, which was considered to be adequate for the objectives of the study.

Thirdly, in order to ensure the experts' suitability for this research, they were asked to assess their own skills in the desired competence areas. Responses were on a scale of 0 to 5. The averages of the responses by interest group were then calculated and are shown in Table 1.

Table 1. Panelists' self assessment of their competences

| Competence Area: | Interest Group: | | | |
	Authorities	Mobile Operators	Other Stakeholders	Average
Operations	3.50	4.67	4.50	4.22
Law	4.25	4.00	4.00	4.08
Development of the Industry	3.50	4.00	4.00	3.83
Average	3.75	4.22	4.17	4.05

The answers ranged between 3.50 and 4.67. Of course, not all of the panelists were expected to have expertise in all of the desired competence areas, but in any case, the results varied relatively little. This was considered to increase the reliability of the research results. Fourthly, there was only one dropout during the whole Delphi process. All 14 experts participated in the first two Delphi rounds and 13 also in the final third round. It was considered that the personal interviews at the beginning of the Delphi process increased the commitment of the experts to the research.

4. Results

Before the Delphi process, the changes in regulation over the past twenty years were examined in a desk study. Changes have taken place at all levels of regulation. Firstly, legislation has been changed numerous times. Secondly, the sector-specific regulatory authority Ficora (Finnish Communications Regulatory Authority) 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 of interviews.

The Delphi process and its analysis revealed that regulation has a decisive role in the development of the businesses of operators. The results of the first two Delphi rounds and the desk study indicated that the following changes were the most significant, having had the following impacts:

Mobile network operation was subjected to license in 1990 and private companies were then 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 in the second half of the 1990s Finland became the top country in subscriber density [29]. The total number of mobile subscriptions in 2009 was 7.7 million [6]. The density of subscriptions (the number of subscriptions/100 inhabitants) exceeded 100 by 2005, standing at 143.8 in 2009, Fig.3 [5, 6, 32, 33, 34].
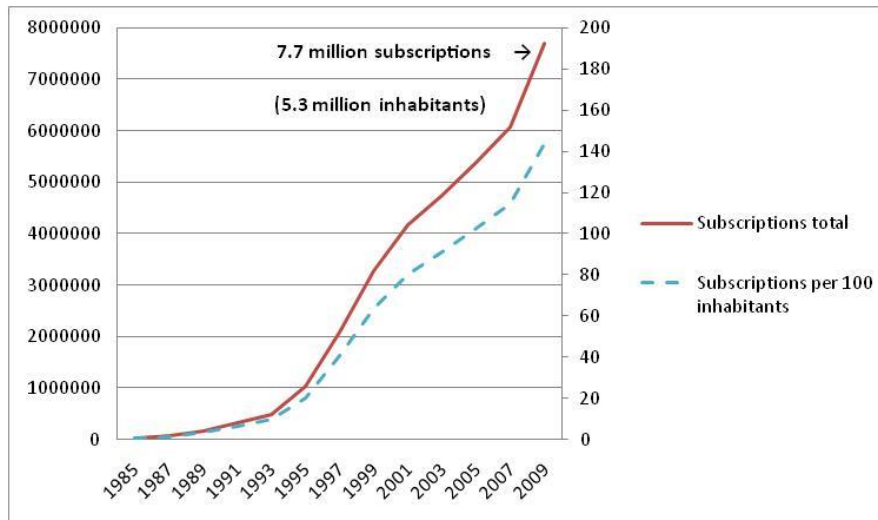

Fig.3. Subscriptions total and the density of subscriptions 1985–2009

The number of mobile phones per household exceeded the number of fixed-line telephones as early as 1999. The figure was then 80 mobile phones per 100 households as shown in Fig.4 [4, 31]. The panelists estimated that this achievement was accelerated by up to four years when two operators were competing for customers compared to a single operator scenario. By 2009 there was at least one mobile phone in almost all households while there was a fixed-line telephone is only in every fourth household, Fig.4. [33, 34].
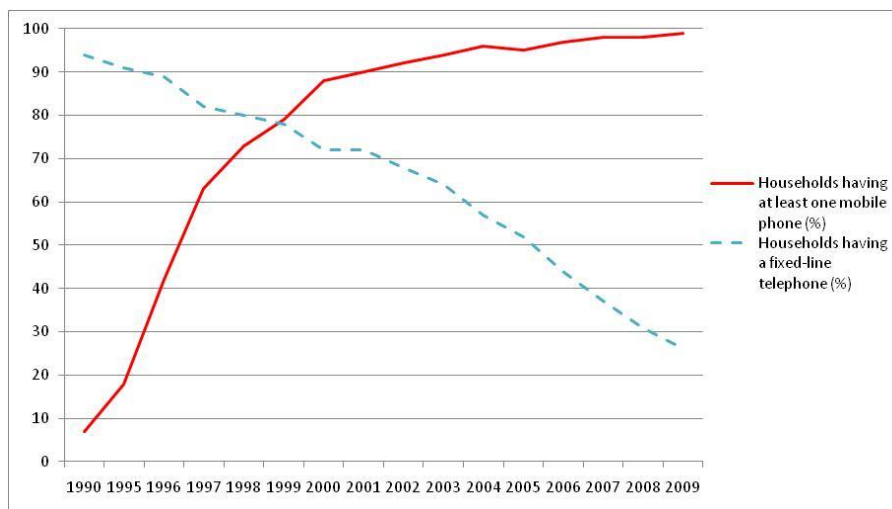

Fig.4. The number of phones in households 1990–2009

The raft of "service operator decisions" for fixed-line operators made by the Ministry of Transport and Communications in the latter half of the 1990s contributed to action by non-network mobile operators on a large scale in the early years of the millennium. The number of operators at various points of time is presented in Fig.5.

Network operators	1	2	3	3
Non-network operators	0	0	15	12
Total number of operators	1	2	18	15
	Up to 1990	1991–2000	2003	2009

Fig.5. The amount of operators at various points of time

Up to 1990 there was only one mobile operator in the country This operator was a state institution. For the following decade there was a duopoly and since the year 2000, there have been several, even nearing 20 operators [5, 6, 25, 26, 37]. Notable also is that state is not major owner in any of the current operator. In addition to the increased supply, this contributed significantly to the price of mobile services, because the non-network operators entered the market competing particularly on price, a fact noted by the Delphi panel. The price of calls has decreased continuously ever since competition began in 1990 (except the year 2007); see Fig.6. [28, 31, 35, 38, 39].
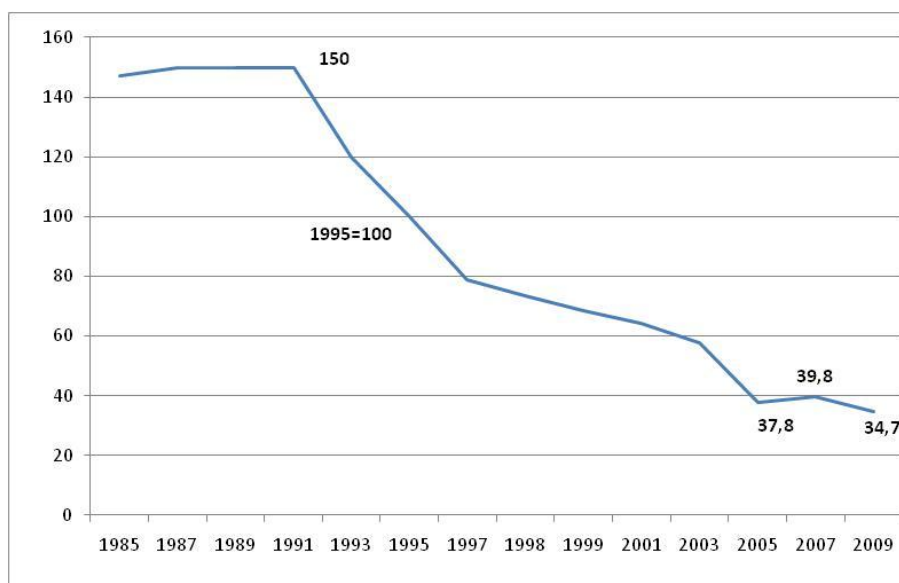

Fig.6. The price index of mobile calls

The index that illustrates the price of mobile calls (year 1995=100) fell 56% from 150.0 to 66.1 between 1991 and 2000. In only in three years, 2003–2005, the index decreased 35% from 57.7 to 37.8.

Mobile number portability was implemented in Finland in 2003, in a way that operators were not allowed to charge customers for it. This means that the subscriber may choose to switch operators and keep their mobile number at no charge. This was likely to increase user 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% [40]. For example, Buehler et al. [41] and Maicas et al. [42] have argued that the churn in Finland has been the highest in Europe.

Finland prohibited the bundling of subscriptions and terminals by law in 1999. It was again permitted in 2006 for 3G handsets [23, 24]. The Delphi panel argued unanimously that 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 stood at more than 2.5 million. Within only three years, a third of Finnish subscribers had switched to 3G terminals [22].

In the second Delphi round, the panelists made the following observations 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 [3, 23, 24]. 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. Hämmäinen et al. [43] 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 initial reactions to the auction have been positive. For the winners it is also possible for the first time to sell their spectrum to other operators. Former operators were obligated to return the unused part of spectrum to the Ministry of Transport and Communications. It is supposed that this possibility will allow these allocations to be used more effectively.

The second and third Delphi rounds generated the following suggestions for change, which should be considered important in regulation up to 2015:

Mobile content services may be threatened: Banking Service Law reform may create difficulties for third party mobile content providers because operators may be regulated like banks when billing for third party services. This could cause too many

extra costs for operators, who may then make content services correspondingly more expensive.

The "strong electronic authentication" by mobile phone introduced in 2009 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 business. The other significant feature of the regulatory framework is that it has become more and more complex over the years.

5. Conclusions

The Delphi method, which is generally used in futures-oriented research, has proven to be an effective method also when used for examining past events. In this Delphi research the most significant changes in regulation have been compiled. The expert knowledge of panelists proved 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. The business was then 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.

These were also the main arguments of the government when introducing the amendment at the very beginning of the 1990s that made mobile networks subject to license. The private sector was finally given the possibility to start the mobile operator business. GSM technology rapidly took over from NMT. 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 amendments to the legislation. On the other hand, although the liberalization of regulation started in the late 1980s, it has changed into a new kind of regulation that is very specific, with hundreds of clauses in many separate laws.

One of the biggest regulatory changes was made in 1990 when mobile network operation was made subject 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 free-of-charge operator switching and number portability affected the prices of mobile services dramatically during the

first years of the millennium. The price of mobile calls had already decreased in the 1990s but the hyper competition 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 is that the regulatory framework has become more complex over the years.

In summary, there are three competing nationwide mobile networks in Finland, each of which also provides at least some kind of Internet connection for most of their subscribers. There are also several non-network mobile operators, which also operate practically all over the country. Given that Finland has become one of the cheapest countries regarding mobile calls, it can be considered that the general purposes of the regulator have been achieved. Although this research does not concentrate on evaluating the regulation as such, 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.

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