Tözer, Ayhan

Conference Paper

Assessment of First Comer Advantages and Network Effects; the Case of Turkish GSM Market

21st European Regional Conference of the International Telecommunications Society (ITS): "Telecommunications at New Crossroads: Changing Value Configurations, User Roles, and Regulation", Copenhagen, Denmark, 13th-15th September 2010, No. 35

Provided in Cooperation with:

International Telecommunications Society (ITS)

Suggested Citation: Tözer, Ayhan (2010) : Assessment of First Comer Advantages and Network Effects; the Case of Turkish GSM Market, 21st European Regional Conference of the International Telecommunications Society (ITS): "Telecommunications at New Crossroads: Changing Value Configurations, User Roles, and Regulation", Copenhagen, Denmark, 13th-15th September 2010, No. 35, International Telecommunications Society (ITS), Calgary

This Version is available at:
https://hdl.handle.net/10419/44317

21st European Regional ITS Conference
Copenhagen, 13-15 September 2010

'Assessment of First Comer Advantages and Network Effects; the Case of Turkish GSM Market'[1]

Ayhan TÖZER
ICT Expert
Information and Communications
Technologies Authority of Turkey
& Phd Student at METU, STPS Department.
atozer@btk.gov.tr

Abstract

First comer advantages and network effects are frequently stated as among the most important determinants of market structures and this is particularly relevant for network economies including telecommunications markets. Connected to this, regulatory tools such as number portability have frequently been used to reduce market imperfections resulting from these effects. Within this context, this paper aims to analyze the role of these factors in creating the current market structure of Turkish GSM sector. By examining relevant data such as development of market shares in a historical perspective and by making use of consumer surveys, it is concluded that the dominant operator has benefited from being first comer in the market and established a stable market share (power) due to network effects that are used by this firm deliberately to entrench its position especially in the form of switching costs, scale economies, brand image and tariff (on-net vs. off-net pricing) differentiation; however, it is also observed that introduction of number portability lead to reduction in switching costs, increasing market competition.

Keywords: First comer advantages, Network effects, Mobile telephony (GSM),number portability, Competition, Regulation and Consumer preferences.

[1] The views and statements expressed in this article are those of the author and do not reflect those of Information and Communications Technologies Authority.

1. Introduction

This paper begins with the brief review of 'first comer advantages' and 'network effects' along with the discussion of new product (service) diffusion in a related market. In addition to this, one of the competition tool namely number portability has been analyzed in terms of its costs and benefits to see the effectiveness of this instrument in reducing first comer advantages and network effects. Afterwards, the structure and concentration level of Turkish GSM market have been discussed in different perspectives to explore the role of these advantages. In this context historical developments and market shares of the operator's have been assessed to give a general picture of the sector. Then, some of the structural reasons for the poor competitive performance have been stated in general terms. In the fourth part recent implementation of number portability and differentiation strategies used by the three operators have been evaluated in terms of services offered, pricing plans and promotional activities such as mobile handset provision. Finally, consumer preferences have been studied to give some explanations to the current structure of the market by using consumer surveys.

2. Review of Theoretical Concepts

It can be argued that diffusion of new technology[2] (in the form of new product and/or new service) creates a new market/s in which competitors struggle to gain market share at the expense of each others. Before analyzing this process in a case study, it may be suitable to begin with brief evaluation of these topics.

2.1. Diffusion (of new product and/or service)

As known by everyone, for any innovation to be successful in market place people should demand it. In other words without diffusion, innovation would have no major economic and social impact in any society (Hall, 2005). Here diffusion is defined as the process by which market actors adopt a new product (service)[3] or substitute

[2] In the article, innovation is used in the meaning of new product and service to create a new market, e.g. mobile telephony technology leading to mobile telephony services (voice, data transmission etc.) and related products such as mobile handsets.

[3] In this context, new products and services are used interchangeably, since it is especially difficult to differentiate between mobile technology, mobile telephony service and handsets (products) in general terms for

previous (older) product by the new one. However, the speed of diffusion process differs between each product and service depending on various factors. Indeed, Geroski (2000) mentions the fact that in some cases it takes very long period of time for new products (technologies) to be adopted by people *(even by those who seem most likely benefit from their use)*. In this respect, Rosenberg (1972) similarly have made the observation that while this process takes time in general terms, there exists wide variations in the adoption rate of different products. On the other hand, learning of how to use these new products and continuous feedback relations between users and producers (firms) lead to -again continuous- improvements in the original products. Related to our main topic, evolution of mobile telephony (GSM) can be given as an example of the role of both supply and demand side influences (and their interactions) on the continuous improvement of these products such as development of short message services (sms) and later multimedia messaging services (mms) and other various value added services (internet banking, gaming applications etc.) used from a mobile handset along with the improvement of data transmission capacity of mobile telephony (3G technology).

As stated above, diffusion speed of a new product depends on various factors. According to Rogers (1995), there exist five analytical categories to account for the adoption rate in personnel level; relative advantage of innovation, its compatibility, complexity of innovation, triability and observability. The rapid diffusion of mobile telephony all over the world, in fact is due to the relative advantage (mobility in the first place, of course) of this new product over the comparable product (and to some extent substitutable), fixed telephony[4]. Furthermore, related to the second characteristics, mobile telephony is compatible with potential users' way of doing things and with social norms. In addition to these factors, both triability (that can be tested by users) and observability (evaluation after trial and learning from other people's experiences) features of this new product all have played roles in the rapid diffusion process virtually in every country of the world. On the other hand, it is

our purposes. In other words, from the demand side perspective, the important thing for a consumer is to use this technology to make calls, transmit data etc. without taking into consideration many technical details.

[4] After nearly twenty years from the commercial implementation of GSM; more than 700 GSM Networks in various countries of the world are expected to carry more than 16 billion minutes of calls and six billion text messages, GSM's global subscriber base is forecast to have grown by 1.2 million and more than six million GSM handsets are estimated to have been manufactured in just 'one day' time period according to Telecommunications predictions of Deloitte Touche (2008).

evident that external factors also influence this process. Promotion activities of companies like advertising campaigns, provision of free handset in return for a predefined contract period can all be stated for examples of this external category used by producers to increase adoption rate of this new product.

In this context, another interesting phenomena is that old technology itself reacts to the new one and this also has an effect on the adoption rate. Of course for the complete struggle and elimination of old technology, it should be perfect substitutability relationship between them as in the example of ice harvesting industry in which the availability of electric refrigerators effectively end the harvested ice era (Utterback, 1994). In our case, there is no perfect substitutability relation available, but it is seen that more and more people have been using mobile telephony instead of fixed one (i.e. fixed to mobile substitution). For this reason, there has been a continuous product improvement in this category also, with particular emphasis on the (still) superior features like data transmission (internet usage) capability (e.g. upgrade of copper line capacity, namely ADSL technology) of the fixed line. In addition to this, because of convergence there have been some attempts to develop hybrid service offerings (e.g. Turk Telekom's service offerings together with GSM operator Avea in Turkey) by fixed line operators to create alternatives to the customers.

In many empirical analyses, it is generally observed that diffusion path usually follows an 'S-shaped' curve. Starting from what can be called experimental users and from very low levels, diffusion speeds up in later periods and the level stabilizes as approaching satiation. Apart from the above mentioned issues both in individual and social dimensions, one can observe different shapes (varying steepness) of S-curve in each specific case by considering different economic factors such as costs (financial costs, uncertainty) and benefits of new technology.

Having discussed the diffusion process of a new product in general terms, it may be appropriate to proceed with one of the important determinants of diffusion rate; 'network effects'.

2.2. Network Effects

Network effects can be seen as the process by which the value of a product (and firm's market share) increases through increase in diffusion rate of this product; while -at the same- time consumers make their adoption decisions depending on the increasing diffusion rate, further expanding the network. According to Goolsbee and Klenow (2002) network effects occur when the value of participating in a network increases as more people participate in the network. Birke and Swan (2005) asserts that main assumption of the network effects literature is that *the size of the network matters to the individual customer* and that *utility is a function (in linear or logistic form) of network size*, to varying degrees depending on industry specific characteristics (e.g. availability of substitutable products complicates and in many cases slows the adoption decision). For example, in literal networks such as telephone or e-mail systems as well as in complementary goods such as DVD and DVD players, one can find such a relationship between adoption and value of the network. Indeed, this is particularly relevant for network goods including mobile telephony and internet in which the availability of use (communication compatibility in our case) depends on the existence of an established user base. In other words, the value of a mobile telephony network increases proportionally as more people decide to subscribe to it, and in this process potential users –to a large extent- make their decisions (of course there are many other factors; price, quality, coverage etc.) by looking into the network size of alternative operators. As in the case of information cascade process (Geroski, 2000; 618-619), when network effects (externalities) present, 'initial choice' of product has critical importance since this creates 'lock in', in turn leading to 'bandwagon' result, that accelerates the adoption rate of the product.

There are two kinds of network effects; direct and indirect types (Birke and Swann, 2005). Direct network effects arise in situations where users benefit directly from other users of the same network. One can find this type of benefits in virtually every network industry including telecommunications markets in which a subscriber to a network can communicate to another one in the same network without bothering additional costs (off-net vs. on-net pricing) and technical arrangements (compatibility and interconnection). On the other hand, indirect network effects appear since more and more complementary products have been developed in response to increasing

network size (to satisfy demand). The struggle between VHS and Betamax video (VCR) systems can be given as an example where indirect network effects were crucial for the selection of dominant design; in this case VHS format although it was not on the technical frontier in the words of Tushman and Anderson (1990). Furthermore, we have been witnessing another similar 'era of ferment' in the category of new generation DVD systems, namely; HD DVD and Blue Ray systems. Here, owing to Sony's deal with Warner Bross to market their films in Blue Ray format led to elimination of another system (Dubner, 2008), showing the importance of complementary products in the context of indirect network externalities. Birke and Swann (2005) claim that, indirect network effects are not as important as direct network effects for the mobile telephony market; however with the advent of 3G technology, availability of more data services (complementary services creating indirect network effects) may increase the adoption rate of this next generation system (increasing the importance of indirect effects).

2.2.1. Role of standards and entry regulation

Another important factor in the network effects is the 'technological standards'. Of course, if there is a predetermined standard, the diffusion speed increases since this will reduce uncertainties of consumers' (users) related to the new technology and at the same time increase the size of the market by reducing production costs (i.e. lower prices because of economies of scale). In fact, Gruber and Verboven (2001) affirm that *with standards the market should grow faster*, reducing the search and switching costs for the users. However, they also point out the negative aspects of selecting a standard (instead of market decision) in that this one may not be the optimal technology and once the decision is made then because of 'lock in', it will be very difficult to develop alternative technologies[5].

In standard setting process, governments are the main actors (in some cases together with firms, industry associations) to make the final decision. According to Gruber and Verboven (2001), there are various policy issues that governments should take into consideration when making a decision among alternatives. The main

[5] However, market process by itself also may lead to selection of inferior alternatives (not optimal in a sense) as seen –for example-in QWERTY keyboard selection over alternatives by the market.

question in the first place is the decision of whether a single standard or multiple standards should be adopted. Here, one should note the fact that international organizations, mainly International Telecommunications Union (ITU) has actively involved in the development of 3G standards and adoption of it by many countries throughout the world. As mentioned above, these two alternatives have both positive and negative consequences not foreseen at the time of decision. In this respect, they argue that setting a technology standard like GSM in Europe helps to develop the market faster than the historical examples where analogue (previous telecom) systems were competing in the market. Second question is related to the number of licenses (entry regulation) that can be given by the governments, subject to frequency limitations (i.e. technological limitations for the number of firms) and this decision is also important related to the diffusion process of this technology. Firstly, it is clear (and of course simple) that the actual timing is important for diffusion process to start at the beginning. Here regulatory decisions (license dates, delays) are the main factors for the introduction of this product since no one can provide mobile telephony service without a license from government (related agency, whether a ministry or an agency). Besides this, Gruber and Verboven (2001) mention that *competition speeds up diffusion* indicating the importance of several competing firms in the market. Apart from this timing of these licenses are also crucial for the creation of the market (i.e. simultaneous or sequential entry), and this will also be analyzed the 'first comer advantages' context, after looking some case studies in different countries. Thirdly, the license conditions (whether it is given by auctions, beauty contests, first come first served etc.) play a role in both creation of market and in diffusion process. Although not related to our main topic, it is sufficient to say that giving too much emphasis on state revenues (i.e. fee for GSM frequency) may lead to investment failures of licensees later on since these huge license fees can impose heavy burden as in the case of Germany's experience in 3G auctions[6], which in turn lead to slow diffusion rates of new technology.

[6]For example, please see 'ITU chief criticized handling of 3G auctions' available at http://www.3gnewsroom.com/3g_news/nov_02/news_2749.shtml, '3G Cost billions: Will it ever live up to its hype.' available at thttp://www.iht.com/articles/2006/07/30/business/3G.php?page=3

2.2.2. Case-1: United Kingdom's GSM Market

Birke and Swann (2007) have evaluated network effects in the UK mobile telecommunications market. Firstly, it is argued that there are network effects that bring about by mobile phone operators in the market. As mentioned above, these effects are especially important for these networks in that operators can further manipulate these effects to augment their benefits and these strategies are called 'tariff-mediated network effects' by Laffont et.al. (1998). More specifically, a firm is able to differentiate between on-net (calls to the same network) and off-net (calls to other networks) prices by setting these prices higher. It is expected that this ability coupled with other factors such as the initial size of network (i.e. mostly due to first comer advantages) and existence of switching costs give competitive advantage for bigger firms in terms of bigger network and economies of scale.

Within this context, it is stressed that since users can call each operator (network), the important thing is the difference between on-net and off-net prices as compared to network sizes of each operator and they test the effect of this differentiation in UK GSM market. According to their results, *the high price of off-net calls can not only be a result of market power, but can be significant source of market power which can be used to pre-empt entry by new competitors.* One may argue, here, that this ability can be seen as a strategic asset of the firm by which competitive advantage is achieved and sustained in the market. In fact, creating entry barriers are among the strategies that can be adopted by incumbent firms once a market share is achieved in the context of competitive forces approach developed by Porter (Teece et. al., 1997). Secondly, they find that network affects in the GSM market seem to work both at the network level (size matters) and at the micro-level (in household, friend groups). Besides this, in another study by the same authors (2005) it is founded that social networks (in their case undergraduate students at the University of Nottingham Business School) strongly influence the selection decision of users more than the total size of network. In this study, it is concluded that students coordinate their subscription decision to minimize their expenditures (i.e. minimization of on-net vs. off-net differential) since most of the calls are made within this social groups along with household members.

From these discussions, it can be said that network externalities both because of the overall size of the network (including household members and friend group selection in micro level) and tariff- mediated network effects used by operators lead to increase (and decrease for some of others) in market powers of operators in the market. In this regard, one can ask the question that, 'to what extent is first comer advantage important for market structure?' or 'is there really a first comer advantage for any operator in the struggle (for market share) between undertakings in the market?'

2.3. First Comer Advantages

To begin with there exist many definitions of 'first comer' in the literature. First of all, it is seen that instead of 'first comer', alternative words may have been used in different articles but more or less in the same meaning, including; 'market pioneer', 'pioneer' and 'first mover'. For example, Golder and Tellis (1993) defined market pioneer as the first firm to sell in a new product category. Robinson and Fornel (1985) describe this as the first entrant in a new market.

According to Golder and Tellis (1993), order of market entry is critical to companies' survival and success. If early entrants have advantages in various aspects such as lower costs (due to scale economies), product quality (because of continuous improvement etc.), widespread distribution channels and brand name reputation, then we can say that these firms have benefited from early entry (of course there exists many other factors for success). In this context, Mathews (2002; 468) suggests that first mover advantages stress the barriers to entry established by first comers (firms) through above mentioned (scale economies etc.) factors. On the other hand, as found virtually in each issue in economics, there is also the other side of the coin. Again as stated in Mathews (2002) in some cases firms make strategic decisions to enter later than the pioneer firm to see the market evolution, demand for new product and to develop substitutable but cheaper (at the same time with equal and/or higher quality) products like IBM's late entry strategy in personal computer market [7].

[7] For our purposes I proceed with advantages of first mover concept that are discussed in the literature.

There are several reasons for the emergence of first mover advantages from both demand and supply side factors. Klemperer (1987) points out the importance of 'switching costs' in the demand side considerations. These costs benefit the first comer firms and consist of initial investments (by users) in adapting to a seller's products, learning effects and contractual obligations. Contractual obligations are especially important for telecommunications markets since it seen that every operator provide cost reductions, bundled offerings (e.g. free handset, provision of different services etc.) in return for longer term contracts to create switching costs for consumers. The extreme example for this marketing strategy can be found in the Turkish GSM market in which dominant operator provided certain handsets (e.g. Ericsson) with sim locks (i.e. these devices could only be used in this network) creating entry barriers to the other operator of this period (Telsim)[8]. However more moderate marketing strategies in the form of giving free handsets for one year contracts (with predetermined monthly fees) are the most common practices adopted by European operators in these countries. From this it is clear that due to switching costs, late comer firms have to convince (in fact compensate) the users of the first comer's network (services) to transfer to their networks.

As argued in network effects section, these externalities together with tariff- mediated marketing strategies (on-net and off-net pricing) also give advantages for first comers especially in telecommunications markets. Moreover, Schmalansee (1981) allege that uncertainty about the quality of late comer's products also benefits the first comer's market position. In practice, it is frequently observed that first comers (also for early comers) try to establish brand and quality image by aggressive advertising campaigns. On the other hand, scale economies, sunk costs and cost efficiencies (from continuous improvement and learning) emerge from supply side as benefits to first movers. In this respect, a potential (newcomer) firm should take into account sunk costs before entering the market since these cannot be recovered once they have been incurred and this factor has a definite effect on the entry decision of firms in certain markets including mobile telephony. Indeed, this was the main reason for lack of demand for the second GSM 1800 license in Turkey. Here Is Bank-Telecom

[8] Briefly, Telsim complained about this offering and claimed that this act violated Competition Law. In the end, Competition Authority decided in favor of this operator, and this enabled company to provide these handsets with its sim cards. (Competition Board decision No: 01-35/347-95)

Italia consortium got the first license in return for app. 2.5 billion US$[9] and this act can be considered as an effective strategic (and irreversible) commitment (Teece et.al., 1997) to preempt (deter) other market entry considering the amount of what can be called 'sunk cost' owing to the condition that the other license's minimum fee was also set 2.5 billion US$ according to auction procedure. Furthermore, scale economies are essential in telecommunications where scale economies lead to lower average costs for the incumbent operators. More specifically, Bijwaard et. al. (2008; 249) assert that fixed costs occupy main part of the total cost (in the form of creating and maintaining network) as opposed to small marginal costs in telecommunications markets. Related to this an operator with the largest market share (in many cases, it is expected that first comer has this advantage) has the lowest average cost enabling the firm to lower tariffs (further increasing its market share due to lower prices).

In addition to these considerations, one can find numerous empirical analyses related to first comer advantages in the literature[10]. Lieberman and Montgomery (1998) draw some conclusions by reviewing the literature related to case studies. According to this, entry order effects occur, especially with respect to market share and first comer advantages vanish with the passage of time but are enhanced by longer lead times before competitive entry. This is especially relevant for telecommunications in which entry regulation result in longer lead times for incumbents (sequential licensing). Furthermore, the extent of first comer advantage differs between each product and geographic market. Lastly, they claim that other strategies (price, advertising, niche market selection etc.) are also crucial for market success in many cases. In fact, Golder and Tellis (1993) state the importance of continuous innovation in market competition in comparison to market entry sequence in some markets[11].

[9] Please see 'GSM ihalesinde satış gerçekleşmedi' available at http://haber.turk.net/FLS/16764/GSM-ihalesi-nde-satis-gerceklesmedi (in Turkish)

[10] On the contrary, some authors including Golder and Telis (1993) question the strong association between market entry and market share by pointing out the selection bias (i.e. in most of the studies the first entrants that have failed are left out of the sample). For this reason, they recommend extensive historical analysis in each case for the evaluation of this advantage.

[11] Although continuous improvement is still important for GSM market, I think that this is not a fundamental concern in telecommunications market, in which every firm provides (market) more or less same services as it is demonstrated in Turkey context (by examining different services -voice, sms, mms etc.- provided by each operator in this country).

2.3.1. Case-2: Early Mover Advantages in European Mobile Telephony Markets

Bijwaard et. al. (2008) studied the effects of first comer advantages in European mobile telephony markets in the beginning of 1990's. This time also coincided with liberalization attempts throughout the continent, including privatization of the incumbent and removal of monopoly rights of these incumbent telecom operators such as British Telecom in United Kingdom and Deutsche Telecom in Germany. However, GSM licenses were also given to these incumbents, making them first comers in these markets. Here one can see a distinctive feature of this market; market entry decision is not in the hands of any firm, governments determined the market entry timing, number of operators as mentioned in the previous part of this study. Apart from this, as expected, they state that in the initial stages, most of the demand was generated by firms and market size was gradually expanded starting from slow growth rates until the middle of 1990's and more precisely after 1996 diffusion rate has started to increase considerably, reaching more than 100 % penetration rates in many European Union countries. Their first observation is that most of the call volume was created by business sector in those times, and these firms naturally chose the network of the first comer operators. Secondly, they refer to quality differences between the first comers and later entrants since the latter needed time to build and improve (learning by doing in how to fix some errors) their networks and increase their coverage. This factor also undoubtedly worked in favor of the incumbent operators in each country of the continent. In addition to these factors, they argue that 'switching costs' and network effects'[12] further augmented the first mover advantages. In this context, other than contractual obligations used by operators, another factor may also have a role in switching costs; user's investment (in a sense) in their numbers. In fact, it is especially true for business people since it is widely known that 'phone number' has became an identity (or valuable asset) so without 'number portability'[13] (in the early days of market creation this was not possible due to technical constraints) this is also an important consideration for first mover advantages.

[12] Since these are discussed with related examples in previous sections, only some additional aspects have been evaluated in this part.

[13] Even number portability has its own costs and benefits, so one should not expect straightforward results from this policy instrument (e.g. it is not a uniform fact that market leader has lost market share after the implementation of number portability).

With these initial observations, they pass on the next stage of their analysis. It is indicated that penetration (adoption) rate has followed 'S-shaped' curve, though in different steepness in each case. Secondly, they construct a model and test the relation between market entry sequence and market share developments of operators. According to their results, firstly it is best to enter as early as possible indicating early mover advantages mainly in the market creation stage (mostly) due to switching costs. Secondly, it is more difficult to enter a concentrated market[14]. In their words, when the penetration rate is already large and other firms are operating in the industry, *the long run market share for the late entrants to be reached small as compared to incumbent operators' market shares.* Besides this, they argue that it is more difficult to gain market share when the market shares of other operators are highly unequal. Furthermore they give an explanation for the country level differences (not strong according to them) in terms of market structure etc. by emphasizing the relative strength of the national regulators[15]. Having stated these findings, it is also suggested that the decision related to licensing (i.e. simultaneous vs. sequential entry, license conditions and fees etc.) is crucial for later market structure and governments should very carefully devise this policy to avoid future problems (especially in terms of competition). The authors conclude with the limitations of their research by saying that the lack of data (e.g. pricing, costs, profits etc.) are the main reasons for not analyzing the effects of different developments in the market such as pre paid subscription and number portability on the market shares (and of course competitive level) of (first comers vs. late entrants) operators in the market.

Having seen the impact of first comer advantages and network effects on the market structure, it is clear that –in most cases- some form of regulatory intervention is unavoidable to increase the competitive level in the market. As known, these interventions range from ex- ante measures such as accounting separation, transparency requirements to ex- post ones including application of competition law. In this respect number portability can be seen as another regulatory tool that can be used for market regulation. Indeed if one takes into account the fact that having a unique telephone number is some kind of investment, then the ability to choose

[14] Here they use HHI index to calculate market concentration and I return this subject later in the main case study.
[15] They only argue that structural differences exist because of different competencies of regulators, but they do not make any (further) analysis in this subject.

alternative operators without changing this number will undoubtedly have beneficial affects to the competition by reducing first comer advantages and other network externalities.

2.4. Mobile Number Portability (MNP)

Number Portability can be defined as *a facility that enables the subscriber to change its operator, geographical position and/or service type without changing subscriber number*[16] , and the mobile term indicates that this process is applicable to only mobile numbers. As in all other regulations, the main aim of this tool is to increase consumer satisfaction by giving them more alternatives and increasing competition in the related market. In more detailed terms, there are five benefits accruing to consumers as a result of mobile number portability (Buehler et. al., 2006). In the first place, consumers that have changed their operators before the implementation of this process faced with switching costs. Secondly, those users that do not want to change their phone numbers (because of switching costs) but are unsatisfied with the services offered by their operators will have the ability to change them after MNP. On the other side of the coin, thirdly, callers do not have to bear additional search costs when calling others who change their operators with the same phone numbers (under MNP). More importantly, in the fourth category, all consumers –users- will benefit from increasing competition between operators (e.g. decreasing prices, promotional activities and campaigns). Indeed, Galbi (2001) emphasizes the fact that MNP lead to lower switching costs and this in turn force operators to devise more aggressive marketing campaigns to keep existing subscribers and to gain from rivals. Besides this, Viard (2004) also finds the competitive effects due to the introduction of MNP in the phone numbers starting with 800 in USA market. This study covers AT&T, MCI and Sprint and it is concluded that with the reduction in switching costs, the leading firm's ability to operate independently from other operators have been reduced to a considerable extent. Finally, consumer welfare is also increased by reallocation of property rights after the implementation of MNP. For the people using their phone numbers in their businesses, this is especially important since –in a sense- they have made an investment in those numbers by making advertisement etc.

[16] 'Ordinance on Number Portability' available at, www.btk.gov.tr

On the other hand, MNP has some costs that should be taken into consideration when making cost and benefit analysis[17]. These in general terms can be classified into direct and indirect costs (Buehler and Haucap, 2004). First category is composed of set up costs (initial investments) and variable costs occurred in each number porting process that also covers operational expenditures. The loss of operator transparency forms the second category. In other words, callers may not know whether the called numbers have been ported or not in advance and this lead to indirect costs for those people. In the Ovum (2000) report this is included in the MNP costs but no quantitative analysis have been made by stating the difficulty of estimating such costs. This issue is nevertheless important since due to 'consumer ignorance' problem (Gans and King, 2000) MNP should be implemented along with regulations on call termination prices. In addition to this- as in all categories- regulatory authorities and operators should use different media sources to inform consumers to reduce so called 'information asymmetries' to some degree. Thirdly, some warning mechanisms such as use of different dial phone or voice message should be used to inform users and to minimize consumer ignorance problem.

In practice, the impact of MNP on the market structure depends on several other factors and one can classify them in two categories. The first one can be called as external factors including regulatory environment (e.g., availability of cost accounting, call termination regulation etc.) and the competitive strategies and strengths of rival operators. In the second category, the issues in MNP itself will play a role in the forthcoming structural adjustment process and this includes various measures and procedures such as payment method (i.e. who pays the porting) and maximum allowed porting time and costing methodology[18]. Indeed, it is emphasized that easier and convenient (e.g. free of charge for consumers) porting procedures have led to more demand in turn increasing competition in the market (OECD, 2008). For instance, in Singapore -one of the first MNP implementing country- some of the set up costs were charged to the users, who wanted to port their numbers, and for this reason demand for MNP did not reach considerable numbers for the early

[17] One can find a few cost benefit analysis related to mobile number portability. For example, in the Korean market it was estimated that the cost of MNP was around 23,5 to 36,9 €, while the benefits were considerably above this figure (Nera and Smith, 1998). Another analysis made by Ofcom-previously Oftel- (1997) also confirmed this estimation; with the cost 36,4 € for set up and benefits (in total) were well above 110 €.
[18] Please see Annex-1 for some country examples for porting times.

implementation period in this country (Nera and Smith, 1998). However, looking into only ported numbers may not show the complete picture (i.e. benefits and competitive effects) taking into account the fact that users as a whole benefit from MNP as mentioned above, in the form of tariff reductions, new loyalty schemes, services and promotional offerings.

After discussing network effects and the effects of MNP, it may be appropriate to start analyzing our main case study to see the impact of first comer advantages, network effects and the initial results of MNP.

3. Turkey's GSM Market

The telecommunications market is one of the fastest growing sectors of the Turkish economy. Growth was mainly fuelled by major capital investments in the second half of the '80's and the '90's that aimed the expansion and modernization of the telecommunications infrastructure and the diversification of available services. Turkey got acquainted with mobile telecommunication technology in the year 1986, during the initiation stage of "Nordic Mobile telephone" (NMT) systems' utilization. Through NMT, service furnished to nearly 114.000 subscribers[19]. With the second half of the 90's with the advent of GSM technologies, telecommunication market became one of the most attractive sector in the economy. Furthermore -in 2000's- with the liberalization of other telecom markets and the establishment of Telecommunications Authority (TA)[20], the number of entries (in different sub segments) have been increased, leading to a path of more competitive (though in varying degrees and in many cases not effective) telecommunications market relative to monopoly period.

In the field of GSM technology, mobile telecommunication services started with licenses which were granted to two operators namely Turkcell and Telsim in 1994. In this context, Burnham (2007) asserts that the acceleration in mobile phone subscribers after 1998 was stimulated by increased competition following the termination of Turk Telekom's (incumbent operator) control over mobile phone tariffs

[19] Please see '3G mobile telecommunication systems and studies in Turkey regarding the submittal of UMTS licenses' available at http://www.tgm.gov.tr/tkekseni2/ing/3ging.HTM

[20] This name is changed to 'Information Technologies and Communications Authority' from Telecommunications Authority at the end of 2008, but for the sake of simplicity TA abbreviation is used in this work.

and the issuance of 25 year licenses to these two operators. There were not any other operators until 2001. The bidding for the third license for installment and operation of a GSM 1800 network was won by Turkiye Is Bankasi and Telecom Italia Mobile consortium (Aria) in 2000. Finally, Turk Telekom (fixed incumbent operator) started to operate the fourth mobile operator as Aycell in 2001 (OECD, 2002). However, Aycell and Aria established AVEA mobile subsidiary company as a result of merger. The last development in the mobile telecommunication sector was to sell of Telsim, the second biggest mobile operator, to Vodafone. Vodafone made the highest bid of $4.55 billion (2.6 billion pounds) in an open auction tender[21]**.** Currently, three GSM operators exist in Turkey.

3.1. Market penetration and fixed to mobile substitution

Before proceeding with the market structure, I want to briefly analyze the diffusion of GSM in the country and the observed trend of fixed to mobile substitution. There were two operators in the market until 2000 and it is observed that growth in absolute terms accelerated after 1998.

Table 1: The Number of Mobile Subscribers (till 2000) (000)

Years	1994	1995	1996	1997	1998	1999	2000
The number of mobile phone subscribers	175	437	806	1,610	3,506	8,122	16,133

Source: Atiyas, Doğan (2007)

After 2000, late comers entered the market, further increasing the total number of subscribers, as seen in the Table-2.

[21]Please see 'Vodafone pays 4.55 bln for Turkey's Telsim' available at http://www.talktalk.co.uk/business/news/reuters/2005/12/13/vodafonepays455blnforturkey39stelsim.html

Table 2: The Number of Mobile Subscribers (from 2000 to present) (mil)

Years	2001	2002	2003	2004	2005	2006	2007	2008	2009*
The number of mobile p.subs.	19,58	23,3	27,9	34,7	43,6	51,2	62	62,8	63,7

* As of 09.2009

Source: ICT (Telecommunications) Authority (www.btk.gov.tr)

On the other hand, in the fixed line telephony market, the total number of subscribers has been stabilized between 18-19 million starting from 2002. Furthermore, the number has been decreased below 18 million for the first time in 2008, indicating the pressure of mobile communications alternative to the fixed one *(Table 3)*. Indeed, the fixed line operator's voice revenues have also declined in recent years as opposed to increasing share of data transmission (internet) services in the total revenues of the incumbent operator[22].

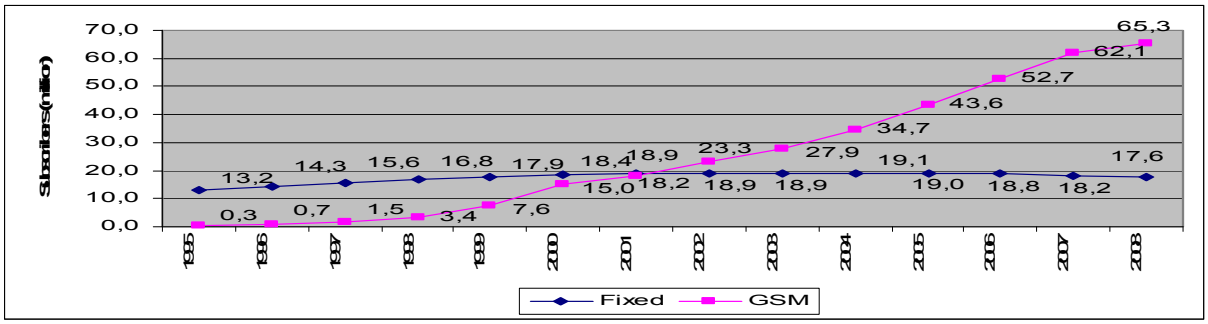
Table 3: The Number of Fixed Line Subscribers (mil)

Years	2002	2003	2004	2005	2006	2007	2008	2009*
The number of fixed line subscribers	18,91	18,92	19,13	18,98	18,83	18,20	17,63	16,8

* As of 09.2009

Source: ICT (Telecommunications) Authority (www.btk.gov.tr)

Figure 1: Market trends in both services



[22] Turk Telekom Annual Reports 2007, 2008.

One can easily observe from the above figure that the penetration rate of mobile telephony (GSM) has been continuously increasing since the introduction of this service, following s-shaped pattern. Furthermore, the number of mobile subscribers would reach around 63 million by the end of 2008. With penetration rates exceeding 90%, it may not be wrong to say that the fixed to mobile substitution process will increase further in the medium term.

3.2. Market Share Developments

As mentioned above, GSM services were started in 1994 by two companies, Turkcell and Telsim[23] through joint venture agreements with the incumbent operator, Turk Telekom. According to revenue sharing agreements with Turk Telekom, 33% of the revenues were retained by these operators with the condition that all network investments made by them, but the ownership of these infrastructures remained in the incumbent firm (Yılmaz, 2000). The revenue agreements were replaced by 25 year licenses for 500 million US$ (for each license) in 1998. According to Atiyas and Doğan (2007), this can be regarded as the turning point in the market since after obtaining these licenses the ownership of network was passed to these operators, increasing both investment levels and price competition[24]. More importantly, between November 1995 and July 1996 the activities of Telsim were suspended and this effectively made Turkcell as the first comer in the market due to the fact that (as shown in the above examples) during the first phases of the diffusion process, it is more easier to increase market share by creating consumer loyalty (switching costs, contractual agreements[25], brand name image as opposed to bad reputation of the other firm due to this suspension). Hence, although the number of subscribers has been continuously increasing, the market shares of the operators are more important for the competitive level of the market itself. In this respect, Table 4 shows market shares of the mobile operators in the duopoly period (1994-2000).

[23] Turkcell started operations as a partnership between Sonem Holding (now Telia Sonera) and Cukurova Holding while Telsim was founded by Rumeli Holding (a Turkish group owned by Uzan family).
[24] Before this time, tariffs were determined by Turk Telekom.
[25] As mentioned in the previous part, provisions of handsets were the main promotional activities during this period. In fact, Turkcell's distribution of some brands of GSM handsets such as Ericcson and excluding the other operator led to complaints and Competition Authority's investigation related to this issue.

Table 4: Market Shares of Early Comers (1994-2000)* (%)

Years	Turkcell	Telsim
1994	78	22
1995	68	32
1996	80	20
1997	77	23
1998	69	31
1999	69	31
2000	69	31

Source: Competition Authority (Board Decision: 01-35/347-95)
*In terms of number of subscribers.

Besides, in terms of usage minutes also Telsim was far behind the market leader, as seen in the following table;

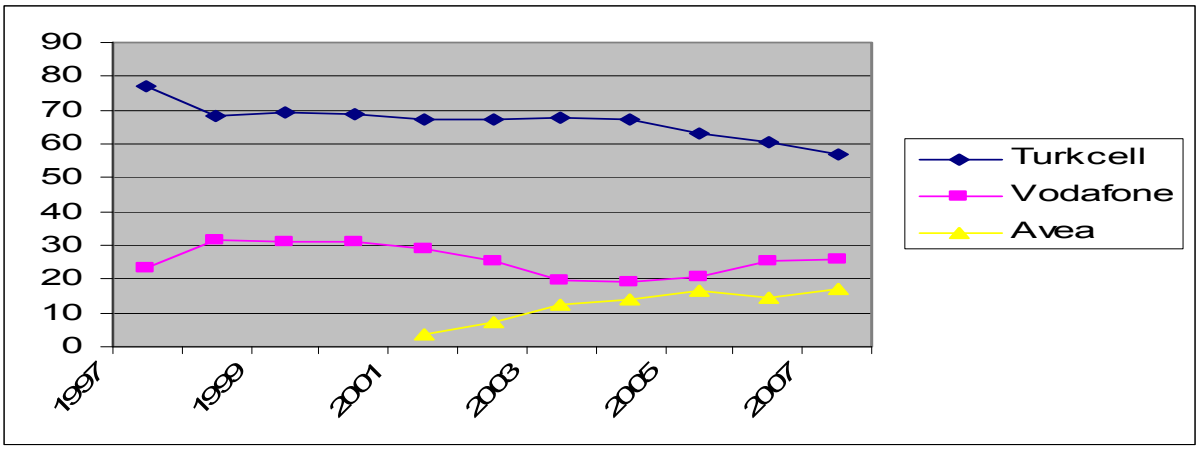
Table 5: Call Minutes per User (min)

Years	Turkcell	Telsim
1998	164	69,3
1999	132,9	59,14
2000	125	45,57

Source: Competition Authority (Board Decision: 01-35/347-95)

The call minutes per user clearly showed that the market power of Turkcell, in fact was much more than the market share figures. One can also deduct from this, that more valuable (in terms of expenditure levels) customers such as business people (as in the case of other European incumbent firms stated above) selected Turkcell's network, further increasing the total traffic volume.

Figure 2: Mobile operators' market share from 1997 to 2008.

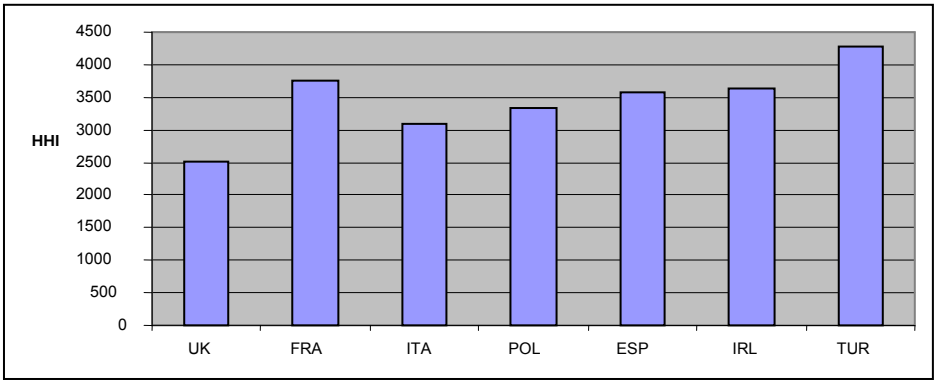


Source: www.internethaber.com, www.hangioperatorcom, www.turkcell.com.tr, www.gedik.com.tr, www.itu.int

After the introduction of GSM 1800 operators[26] in 2001, it can be seen from Figure 2 that some minor changes have occurred throughout the period. Dominant operator Turkcell's market share has been declined slightly since 2003 (but still well above 50 % percent level). Indeed, Burnham (2007) argues that the rapid growth of mobile telephony in Turkey has been led by Turkcell in recent years. On the other hand, Vodafone, which is a relatively newcomer to the market, has begun to increase her market share since 2004. It is expected that the operators will be faced with more competition in the short term especially after the introduction of number portability. Additionally the entry of Vodafone which is the world's largest mobile phone company may increase the competition in the market in the long run. As indicated above although the dominant operator's market share has decreased from app. 80 % levels to app. 55-58 % range, the competitive performance of the sector is still far from satisfactory compared to other country's statistics. In fact by using Herfindahl-Hirschman Index (HHI), one can conclude that this market is among the most concentrated ones throughout the world, as shown in the following figure.

[26] Eventually they merged into one operator, Avea and Telsim was sold to Vodafone as mentioned in the market evolution section.

Figure 3: HHI levels in different countries



Source: Int. Communications Market, OFCOM 2007 and author's own calculations.

Of course, there are various reasons for this outcome. As seen from the previous discussion, in the early market creation stage, temporary suspension of the activities of Telsim clearly gave first mover advantages to Turkcell and it was evident that this firm, by devising efficient strategies (handset provision etc.), further increased its market power (as indicated in market share and call volume data). Secondly, the latecomers also struggled to achieve market shares and the merger of Aria and Aycell in 2004 apparently demonstrated the inability of these companies to compete with market leader.[27]In this context Atiyas and Doğan (2007) argue that the most important reason for this outcome is the first comer advantage given to Turkcell due to licensing policy of the government. Furthermore, they conclude that network externalities and switching costs along with regulatory delays (e.g. roaming, number portability etc.) have all contributed to this asymmetrical market shares. Without going into detailed discussions, one can mention two regulatory failures (due to incumbent operator's strategies) in the competition policy. First one was the inability of the regulatory authority to impose roaming obligations on the incumbent operators. Here the delaying tactics (court procedure, application to international court of arbitration) of the market leader were the crucial factor and could be regarded as pre- emptive strategy from the view point of this operator. Secondly, the increase of interconnection rates from 1,4 US cent/min to 20 US cent/min (increase of app. 14 times) just after the market entry of new comers gave additional competition difficulty

[27] Before the merger, Aria (Telecom Italia) threatened to apply to international arbitration court for violation of license agreements. Afterwards the two prime ministers of each country met related to this issue and in the end the merger decison was made as a compromise (solution). Please see for details 'HSBC Daily Bulletin- 13 May 2003' available at, http://www.hsbc.com.tr/HSBCYatirim/Arastirma/pdf/sabah_bulteni/13-05-03.pdf (in Turkish)

because of the (much) stated on-net and off-net tariff differentials. This act was also investigated by Competition Authority[28] and again with a considerable time delay, regulatory authority finally set termination charges of each operator[29] [30]. These regulatory experiences indicate the fact that, what matters more is the initial license policy and with sequential entry (in fact with a long lead time for incumbents) the efforts to create more competition in the market would most likely fail (in more optimistic terms; costly, time consuming and ineffective). In the end, it can be said that both the introduction of new technologies and further regulatory intervention is necessary for the establishment of more effective competition in Turkish GSM market. In this regard; introduction of 3G, number portability, mobile virtual network operator services are very important new technology tools that must be implemented effectively in the very short term[31]. From this, the auction of 3G licenses made in September 2007, but after the announcement that leading GSM operator got the license, TA cancelled this auction. The main reason behind this was that only one operator entered the auction and the authority believed that the dominant position of this undertaking would be further increased if the auction had not been cancelled[32]. Afterwards another auction was made in November 2008 and each three (existing) operators got 3G licenses[33]. Here also Turkcell got the most valuable license (giving more bandwidth capacity), indicating its plans to offer alternative data services in the future. Unfortunately, there was no demand for the fourth 3G license. I think that this was expected taking into consideration the historical developments and current market situation. Thirdly, it can be argued that that, mobile virtual network service (MVNO) may contribute to the competitive level of the market -for near future- from the point of view of the development of service based competition by means of increasing service diversification in the mobile market. As stated by OECD (2007) allowing market entry to MVNOs is important and these newcomers should be subjected to light handed regulation. In this context also, the regulatory work has

[28] No infringement of Competition Law was found in this investigation by the Board in spite of the findings of the report (i.e. competition experts' findings).
[29] 13 cent/min. for calls terminating at Turkcell and Telsim networks, 17 cent/min. for calls terminating at Aria and Aycell Networks.
[30] For more detailed discussion of these topics, please see Atiyas and Doğan (2007) and Atiyas (2005).
[31] Among these regulatory work, MNP will be evaluated in a more detailed way in the next subsection.
[32] Please see, '3G İhalesi yine iptal' available at http://www.teknotimes.com/Telekom/Cep-Telefonu/21.html (in Turkish)
[33] Please see, '3G'de beklenen oldu' available at http://turk.internet.com/haber/yazigoster.php3?yaziid=22530 (in Turkish)

been continuing and it is important that regulatory authority supports the market entry (e.g. provision of access etc.) of these new operators against the existing GSM operators.

3.3. Mobile Number Portability

Legislation related to number portability had been completed much earlier but (again) Turkcell had appealed to the court and this further delayed the process. With this delay, mobile number portability has been finally introduced as of November 2008[34]. In what follows, this legal background and current situation have been evaluated to see the market reaction and the effect of MNP on the market structure. In fact, related legislative work had been started in the year 2005 and MNP ordinance came into force as of February 2007. This ordinance covers all three basic ways of number portability; address, service and operator change. However, only principles and procedures of operator change (with the same number) have been defined in detailed terms. Besides this, both mobile and fixed number portability[35] are addressed in this ordinance.

As expected, the first comer opposed MNP and tried several measures to stop or at least delay the implementation date. Indeed, Turkcell applied to the Council of State against the MNP ordinance in March, 2007 and they claimed that since 0530- 0539 number range given to them by concession agreement dated 1998, they had property rights and these were not transferable to other operators. On the other hand smaller operator, Avea worked and lobbied in favor of MNP. One can only look at one of the speeches of the CEO of Avea in this period to see their attitude; '…we are astonished to see Turkcell's actions to stop (delay) MNP which will bring freedom to choose for consumers…and we continue our efforts to provide MNP to all users in spite of this opposition and delaying tactics.'[36]

[34] http://www.tk.gov.tr/Basin_Duyurular/Duyurular/nt/ntasinabirligi.htm (in Turkish)
[35] The implementation of fixed number portability is not started yet, it is planned that this will come into effect in 2010.
[36] Please see, CEO of Avea, Mr. Türktan's speech available at http:// turk. internet. com/ haber/ yazigoster. php3 ? yaziid= 19707 (in Turkish)

In the meantime, another regulatory development closely related with MNP was the 3G auctions and it can be said that owing to these delaying tactics, the first auction made in September 2007 were cancelled. Only Turkcell entered into this auction and the other two operators did not participate and indicate that unavailability of MNP were their main reasons for this action.[37]

After this painful period, MNP finally started in November 2008 and available data from media indicate that leading operator has gained the most subscription (219,622), followed by Avea (110,727) and Vodafone (82,654, in fact on the other side this operator lost 202,662) showing the results of one month period. Nevertheless with aggressive advertising and promotional campaigns smaller operators gained competitive advantages and they eventually surpassed the first comer operator in terms of ported numbers. In overall figures, after one year of the start date, total number reached to app. 8.8 million as of November 2009. This figure corresponds to nearly % 14 of 67 million mobile users in this country and such a big amount in one year time period shows the effect of MNP in market dynamics.

Table 6: Ported Numbers between operators (as of Nov, 2009)

Operator	Avea	Turkcell	Vodafone	Gain
Avea		1.723.745	1.124.089	2.847.834
Turkcell	1.283.422		1.440.947	2.724.369
Vodafone	993.022	2.262.267		3.255.289
Loss	2.276.444	3.986.012	2.565.036	

Source: www.turk.internet.com and operator web sites

Table 7: Ported Numbers between operators (as of Nov, 2009) (%)

Operator	Avea	Turkcell	Vodafone
Avea		61	39
Turkcell	47		53
Vodafone	31	69	

Source: www.turk.internet.com and operator web sites

[37] Please note that, after the implementation of MNP, 3G licences have been given to each existing GSM operator in the country.

As evident from tables 6-8, Turkcell got approximately same numbers in percentage terms from other operators and other operators captured mostly from the dominant operator.

Table 8: Ported Numbers between operators (as of Nov, 2009) (%)

Operator	Gain	Loss	Difference
Avea	32	26	6
Turkcell	31	45	-14
Vodafone	37	29	8

Source: www.turk.internet.com and operator web sites

Although the total number and market dynamics can be considered as beneficial to market competition, one can add some other explanations for this figure. For instance it is suggested that authorized operator's subscription (consumer relation) offices have acted to increase MNP numbers to get bonus and premiums from this process. Taking into this, a new measure has been enacted to stop second porting after the first MNP made by a user for three month period (i.e. waiting period)[38].

After observing the recent developments and some of the possible reasons of poor competitive performance, it may be suitable to pass on the demand side of the issue.

4. Strengthening the First Comer Advantage in Turkish GSM Market; Consumer Preferences

This part starts with the analysis of the differentiation strategies used by the three operators. Then, by making reference to the consumer poll (from now on stated as TA's survey)[39] conducted by TA and more recent one made by the author, consumer preferences are assessed to give some explanations to the current structure of the market.

[38] Please see, '1. yılın sonunda numara taşınabilirliği sonuçları' available at www.turk.internet.com (in Turkish)
[39] In this survey, interviews and face to face conversations were made with 4322 households. The time period of the survey is 05.08-02.12.2006.

4.1. Differentiation Strategies

All GSM operators have marketing strategies more or less same with each other. At most there exists a time lag between the first application and matching applications and strategies will be adopted by others. For instance, when mobile handsets were started to be given to subscribers, the others followed with the same strategy without much delay. With this observation in mind, each firms strategies in terms of services, tariff (pricing) packages and promotions (mobile handsets etc.) will be analyzed in general terms, starting with evaluation of each operator's web site in terms of services provided to users (Annex-2).

For the tariff packages, comparison is very difficult to make since many kinds of differentiation exist among the operators. The main separation is the post- paid and pre- paid differentiation. In these two categories one can find various packages ranging from nearly unlimited calls (e.g. 1000 minutes) with a predetermined fee to same network vs. different network (on-net vs. off-net) usage plans. In this context, Atiyas and Doğan (2007; 514-517) argue that *high termination charges have restricted the ability of the operators to compete aggressively by lowering tariffs and they instead have developed various menu of tariffs for subscribers with different profiles for off net calls.* In fact one can see this by taking examples from the tariff packages. For instance, Avea has devised a tariff package under the name of 'public sector tariff' giving the subscribers 1000 minutes of talk in the same network with a fee of app. 9,23 euro[40]. On the other hand, Turkcell's comparable tariff package costs were discontinued to give priority to other tariff packages devised after the implementation of MNP. However the trend is interesting because of the tendency to lower tariffs for same network calls in the name of 'public' etc. This is clearer if we compare these tariff packages with the previously applied ones; e.g. in one of the previous packages; Turkcell charged the same amount for 1200 minutes instead of 200 minutes of call[41], also Avea previously applied 600 minutes limitation to a comparable package currently offering 1000 minutes of talk. These can be regarded as 'matching strategies' and may be given an indication that demand elasticity in the market is high. Apart from this, as mentioned previously, the effect of MNP has been

[40] The fixed fee is 19,39 TL including VAT and special tax for 1000 min. free call. (1 €= 2,1 YTL)
[41] These tariffs were closed to new subscriptions.

very interesting to see on the tariff structures of the operators. After MNP, all operators are starting to offer 'to every direction'[42] tariff packages. In this category, although not exactly same, one comparable tariff package is selected for comparison in the below table.

Table 9: New Type (every direction) tariffs

Operator	Fixed fee (€)	Given talk time (min)	
		On- net	Off- net
Avea	14,3	1250	250
Vodafone	14,3	3000	300
Turkcell	7,14	150	

Source: Operator web sites

Another effect of MNP is the introduction of promotional campaigns to get new customers and new customer loyalty schemes to existing subscribers that have less switching cost concerns. For instance, Avea offers reductions in monthly bills for their customers who are promising to stay in the network for predetermined periods. Besides this, all three operators have devised various 'transfer advantages' to attract other operator's users to their networks (Table-10).

Table 10: Promotion campaigns

Operator	Transfer advantages
Turkcell	1000 min free usage
Avea	1200 min free usage
Vodafone	1500 min free usage

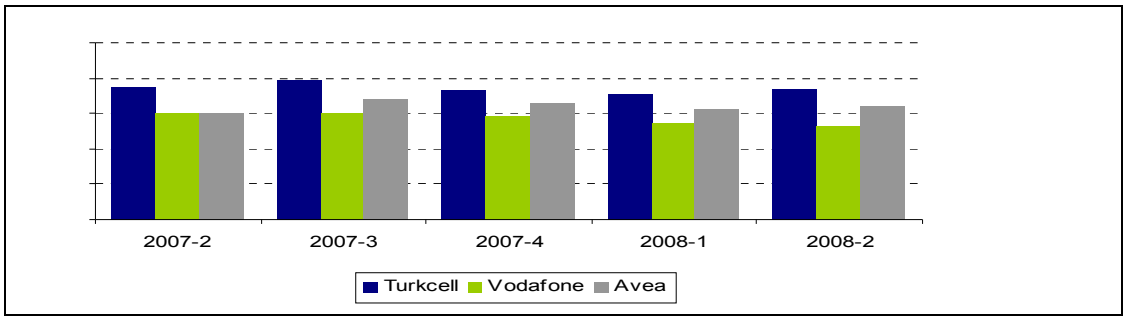
Source: Operator web sites

For the promotions other than tariff plans, the operators distribute mobile handsets in various contractual agreements. In this category, Vodafone seems to be more aggressive and among other offers (starting from as low as 15,8 euro for Vodafone 225 handset) have begun begin to provide popular 'apple iphone' handset in the country along with the market leader, Turkcell. Without going into further detail,

[42] It means same price for on net and of net calls.

although it is very difficult to draw concise borders and using the terminology of Limkeatcherdchoo et. al. (2005), it can be argued that Avea (the smallest one in terms of market shares) is more concerned with the price competition by devising low cost tariff packages. Turkcell, on the other hand, seems to be targeting what is called the crème de la crème portion of the customers. To give an example, one can make reference to the CEO of Turkcell, Mr. Ciliv's statements related to the marketing strategy. According to him decreasing market share of the company (app. 2-3 % in the last year) is not so important since they are targeting valuable (in his words) customers. Indeed, a very rough comparison[43] of ARPU levels of operators may be used to prove this statement.

Figure 4: ARPU Levels



Source: Presentation of M.Gungor from TA, Cebit 2008.

4.2. Evaluation of Consumer Preferences

According to the TA's survey results consumers give more importance to coverage, quality of service and tariff packages in selecting GSM operators. In the report it is stated that consumers give 4.5 to coverage, 4.42 to quality of service, 4.28 to tariff packages, 4.25 to network externality (i.e. calling family members, friends etc. in the same network), 4.24 to customer services, 3.95 to promotions, 3.04 to value added services such as game, melody etc. and 3.85 to brand name of the operator out of the 5 total score. The more interesting finding is what can be called customer loyalty. The results indicate that nearly 70 % of mobile phone users did not change their operator before this time.

[43] Exact comparisons can not be made in this category since ARPU of the operators is not publicly available.

For the selection of tariff packages, network externalities are very important and consumers want to speak with their family members and close friends. In parallel with the survey findings, all three operators have tried to benefit from this phenomenon by devising various on net- off net tariff packages. It is evident that dominant operator with the largest subscriber base has more advantage in this respect and is able to hold existing customers relatively more easily than the other two operators. In fact, the survey indicates the fact that approximately 80 % of the respondents know the on net- off net price differentials and act accordingly to minimize their expenditures.

The other survey[44], although very limited compared to TA's in terms of scale, made by the author also confirms the fact that for consumers that have permanent income levels, coverage and quality of service come first in selecting the operator. This, of course, does not mean that pricing is not important, but for some customers even brand image etc. is a factor in selecting an operator. In general terms, pre- paid customers are in relatively lower income levels and tend to put much emphasis in minimizing communication expenditure. In this category, communication with messaging is more common. These expenditure patterns are not surprising taking into account the relatively unequal income distribution of the country. In addition to this, one can observe the increasing popularity of so called 'public tariffs' that allowing virtually unlimited calls (though in varying degrees) between the subscribers of the same package. As argued in Birke and Swann (2007), the survey shows that popularity (preference) of these tariff packages among consumers have been continuously increasing, which shows the importance of close group (i.e. household members, friends and/or colleagues in business) in making subscription decisions. Apart from this, it is observed that some people try to minimize their expenditure by using different operators when making off-net calls, and this is especially more common among the people who are informed (knows) about on-net and off-net pricing strategies of the operators. For number portability's effect on users, because of the size limitations of the survey, it is difficult to find any definite pattern but in any case this new application has lead to reduction in switching costs, in turn creating more competition in the market. In very general terms, those people in higher income

[44] The survey questions can be found in annex-3.

brackets give more value to their numbers and for them, quality and coverage concerns are important factors along with tariff levels to change their networks. Contrary to this, for the people in the lower income brackets, other than those subscribed to pre- paid tariffs, new promotional packages and transfer advantages are considered as important factors to number porting decisions.

On the other hand, even this limited evidence suggests that people mainly use mobile telephony for voice transmission and for message sending (sms) purposes. Both because of price and download capacity (speed) concerns, most people do not prefer to use internet from their handsets. This may also give an indication for operators that with the start of 3G, those who develop more alternative data services (e.g. mobile TV) at more competitive prices may be able to gain market share[45] at the expense of others.

One final consideration from the survey findings is that both public institutions (TA) and the operators should use all possible means to inform the consumers about the coverage, quality of service and of course tariff options. By this way, customers will have more information and can make better decisions in selecting their operator. In fact, in the 2008 work plan of TA, it is stated that studies related to the public availability of quality of service criteria of GSM operators would be completed before the end of 2008, but actual implementation is not observed yet (may be due to some regulatory delay).

5. Conclusion

In sum, it is not wrong to say that Turkcell- the dominant operator- due to her first comer advantage- has established very well known brand name and reputation in terms of coverage and quality of service throughout the country. Apart from ex ante issues such as roaming, number portability etc., consumers appreciate the services offered by this operator though in varying degrees depending on their income levels, as seen from the survey results. Turkcell's leading role in the e-commerce services

[45] I mean, one can think 3G as a new sub segment of market in which interested users are more informed and price sensitive. In this respect, any operator can attract these groups of consumers at the start, by implementing aggressive campaigns.

can be given as an example for showing that consumers that have relatively higher income levels tend to prefer this operator compared to others.

Before concluding, it can be argued that introduction of number portability and MVNO services supported by other measures such as the availability of quality of service data may contribute to the competitive performance of the sector. In fact, as the new tariff packages, promotions and changing user attitudes due to decreasing switching costs indicate; MNP has a definite effect- from the start- on the competitive level and dynamics of the market. However, it is too early to draw definite conclusions from the implementation of number portability, also due to lack of publicly available data which is (as well as) a serious problem in other categories including market shares, traffic volumes for researchers in this area. In this respect, the regulatory authority should disclose more market data and at the same time force operators to give (publish) public more information including quality of service indicators to decrease (in some degree) so called ‘information asymmetries’ in the market.

References

Atiyas I. (2005), 'Competition and Regulation in the Turkish Telecommunications Industry', TEPAV.

Atiyas I., Doğan P., (2007), 'When good intentions are not enough: sequential entry and competition in the Turkish mobile industry', Telecommunications Policy 31.

Bijwaard G.E., Maarten C.W and Emiel M. (2008),'Early mover advantages: an empirical analysis of European mobile phone markets', Telecommunications Policy 32, pp. 246-261.

Birke D., Peter Swann (2005), 'Social Networks and choice of mobile phone operator' Occasional Paper Series of the University of Nottingham'.

Birke D., Peter Swann (2007), 'Network Effects and the Choice of Mobile Phone Operator' in Innovation, Industrial Dynamics and Structural Transformation, edited by F.Malerba, U.Cantner, Springer Press.

Buehler S., Haucap J. (2004), 'Mobile number portability', Journal of Industry, Competition and Trade, 4:3, 223-238.

Buehler S., Dewenter R., Haucap J. (2006), 'Mobile number portability in Europe', Telecommunications Policy 30, 2006, 385-399.

Burnham James B. (2007), Telecommunications policy in Turkey: Dismantling barriers to growth, Telecommunications Policy 31.

Competition Authority's Board Decision (Competition Board decision No: 01-35/347-95) available at, www.rk.gov.tr, last visited: 25.12.2010.

Cullen International (2008-2009), 'Statistics on telecommunications markets in EU'.

Deloitte Touche (2008), 'Telecommunications Predictions', TMT Trends.

Dubner, S.J. (2008) ,'What Are the Lessons of the Blu-Ray/HD-DVD Battle?', The New York Times, available at http:// freakonomics .blogs .nytimes. com/2008/03/04/what-are-the-lessons-of-the-blu-rayhd-dvd-battle-a-freakonomics-quorum/, last visited: 15.01.2010.

Galbi D.A. (2001) 'Regulating prices for shifting between service providers' Information economics and policy, 13, 393-410.

Gans, J.S. ve King, S.P. (2000). Mobile network competition, customer ignorance and Fixed to mobile call prices', Information economics and policy 12, 301-327.

Geroski P.A. (2000), 'Models of Technology Diffusion', Research Policy 29, , pp. 603-625.

Güngör M. (2008), 'Telecommunications Markets in Turkey', Presentation in Cebit.

Golder N.P., Gerard J.T. (1993), 'Pioneer Advantage: Marketing Logic or Marketing Legend', Journal of Marketing Research, 30:2, pp.158-170.

Goolsbee A., Peter K. (2002), 'Evidence on Learning and Network Externalities in the Diffusion of Home Computers', Journal of Law and Economics Vol.45, pp.317-343.

Gruber H., Frank V. (2001), 'The evolution of markets under entry and standards regulation-the case of global mobile telecommunications', Int. Journal of Industrial Organization 19, pp.1189-1212.

GSM Operator's web sites (for tariff and service packages) available at; www.turkcell.com.tr, www.avea.com.tr, www.vodafone.com.tr, last visited 05.01.2010.

GSM Auctions and related issues (2G and 3G) in Turkey, available at, http://haber.turk.net/FLS/16764/GSM-ihalesi-nde-satis-gerceklesmedi, http://challengestempsreel.nouvelobs.com/french_news/art_12005.html, http://www.teknotimes.com/Telekom/Cep-Telefonu/21.html, http://turk.internet.com/haber/yazigoster.php3?yaziid=22530, http://www.talktalk.co.uk/business/news/reuters/2005/12/13/vodafonepays455blnforturkey39stelsim.html, last visited Dec., 2009.

Hall B.H. (2005), 'Innovation and Diffusion', The Oxford Handbook of Innovation, edited by Fagerberg J., David C.M. and Richard N., Oxford University Press,.

HSBC Daily Bulletin- 13 May 2003' available at, http://www.hsbc.com.tr/HSBCYatirim/Arastirma/pdf/sabah_bulteni/13-05-03.pdf, last visited 04.01.2010.

Information and Communication Technologies (Telecommunication Authority) Authority, 2008 Work Plan and number portability info available at www.btk.gov.tr

Information and Communication Technologies (Telecommunication Authority) Authority, 'Survey on the determination of mobil and fixed line telephone user profile and preferences in Turkey', 05.08-02.12.2006, available at www.btk.gov.tr

Klemperer P.D. (1987), 'Markets with consumer switching costs', Quarterly Journal of Economics, 102 (2), pp.375-394.

Laffont J., Rey P. and Tirole J. (1998), 'Network Competition: II. Price Discrimination', Rand J. Econ 29 (1), pp.38-56,

Limkeatcherdchoo S., Whalley j. and Ackermann F.(2005), 'Differentiation strategies in the UK mobile communications market: services, packages & prices', paper presented in16th European regional conference of ITS.

Mathews J.A. (2002), 'Competitive Advantages of the Latecomer Firm: A Resource- Based Account of Industrial Catch-Up Strategies', Asia Pacific Journal of Management, 19 pp. 467-488.

Nera/Smith (1998), 'Feasibility study and cost benefit analysis of number portability for mobile services in Hong Kong', Final report OFTA, Nera/Simith, London

NMT Subcription numbers, available at, http: //www. tgm.gov.tr /tkekseni2 /ing/ 3ging.HTM, last visited 20.12.2009.

OECD (2002), 'Reviews of Regulatory Reform, Regulatory Reform in Turkey'.

OECD (2007), 'Mobile Multiple Play: New Service Pricing and Policy Implications'.

OVUM (2000), 'Mobile Numbering and Number Portability in Ireland', Report to the ODTR.

OECD (2008), 'Enhancing competition in telecommunications: protecting and empowering consumers', OECD Ministerial Meeting, Seoul Korea, 17-18 June 2008.

Robinson W.T, Fornell C. (1985), 'Sources of Market Pioneer Advantage Consumer Goods Industries', Journal of Marketing Research 25, pp.87-94.

Rogers E.M. (1995), 'Diffusion of Innovations', New York, Free Press.

Rosenberg N. (1972), 'Factors Affecting the Diffusion of Technology', Explorations in Economic History 10, pp.3-33.

Schmalansee R. (1981), 'Economies of Scale and Barriers to Entry', Journal of Political Economy, 89 (6) pp.1228-1238.

Teece D.J., Gary P., Amy S. (1997), 'Dynamic Capabilities and Strategic management', Strategic Management Journal, Vol. 18:7, 509-533.

Third Generation (3G) Mobile Telecommunication Systems and Studies in Turkey Regarding the Submittal of UMTS Licenses, available at, http://www.tgm.gov.tr/tkekseni2/ing/3ging.HTM, last visited 05.01.2010.

OFCOM (2007), 'Int. Communications Market', available at, www.ofcom.org.uk

Turk Telekom Annual Reports (2007, 2008).

Tushman M.L., Philip A. (1990), 'Technological Discontinuities and Dominant Designs: A Cyclical Model of Technological Change', Adm. Science Quarterly, Vol.35, No.4, pp.604-633.

Utterback, J.M. (1994), 'Mastering the Dynamics of Innovation, How Companies Can Seize Opportunities in the Face of Technological Change', Harvard Business School Pres.

Viard B. (2007), 'Do switching costs make markets more or less competitive? The case of 800-number portability', RAND Journal of Economics, 38-1.

Yılmaz K. (2000), 'Türk Telekomünikasyon Sektöründe Reform: Özelleştirme, Düzenleme ve Serbestleşme' in Izak Atiyas (ed) Devletin Düzenleyici Rolü, İstanbul: TESEV.

Annex-1: MNP Implementation in Europe

Country	Max. Porting Time (day)	Ported Numbers (000)
Austria	3	321 (end of 2007)
Belgium	1-2	151 (end of 2006)
Denmark	3-5	2.546
Finland	5	4.300
France	10	2.400
Germany	15-30	1.573 (end of 2007)
Greece	10	581
Ireland	2-8 (hour)	82
Italy	5	16.100
Luxembourg	3	72
Holland	10	2.180 (end of 2007)
Norway	5	3.400
Portugal	5-20	196
Spain	5	16.000
Sweden	5	3.070
Switzerland	5	151 (end of 2006)
England	2	---
Bulgaria	10	---
Croatia	5	41
Czech Republic	5	164 (end of 2007)
Estonia	13-15	37
Hungary	8	220
Lithuania	5	252
Malta	1	42
Latvia	10	24 (2007)
Poland	38	228
Romania	10	0.28 (2.800- first ten days/2008)
Slovakia	20	16
Slovenia	3	---
Macedonia	14	0.279 (279)

Source: Cullen International (2008-2009).

Annex-2: Services offered by GSM Operators***

Type of Voice Services	**Turkcell**	**Vodafone**	**Avea**
Call Catcher	Yes (no charge)	Yes (no charge)	Yes (with a charge)
Payment by the other party	Yes	Different form*	Yes
Answering Service	Yes	Yes	Yes
Call waiting/holding	Yes	Yes	NF**
Call Divert	Yes	Yes	NF**
Video Calling (3G)	No	No	No
Messaging & Mobile Internet Services	**Turkcell**	**Vodafone**	**Avea**
Text SMS	Yes	Yes	Yes
Voice SMS	Yes	Yes	Yes
MMS	Yes	Yes	Yes
Win. Live Messenger	Yes	NF**	Yes
Push to Talk	Yes	NF**	Yes
Web messaging	Yes	NF**	Yes
Mobile Internet	Yes	Yes	Yes
Other (Music, Game etc.)	Yes	Yes	Yes
New Application Services	**Turkcell**	**Vodafone**	**Avea**
E-commerce (E-Signature)	*Yes*	*NF***	*NF***
Services for Disabled	**Turkcell**	**Vodafone**	**Avea**
Support services, voice SMS etc.	Yes	NF**	NF**
Assistance Services	**Turkcell**	**Vodafone**	**Avea**
Directory service, mobile payment etc.	Yes	Yes	Yes

Source: Websites of the operators.
* Different kind of service is found and may be considered as having the same functionality.
** Not found in the web site, does not necessarily implies that the service and/or a substitute not available.
***Please note that in terms of services offered by operators, first thing to be mentioned is that the web sites of the operators are not comparable to get exact conclusions. Although somehow subjectively, Turkcell's web site is more user friendly and nearly all the things that the user want to reach can be found more easily than the other operators. In this category Avea's web site is the most complicated and the services offered by the company are not stated in a separate and clear format. In any case, Turkcell is also the leading operator in this category with the new and innovative services such as mobile commerce using e signature and forming a separate section for the disabled people in its website. On the other hand, Avea's implementation of some services is rather confusing taking into consideration that this operator's market share is the least among the three and one example of this is the offering of 'call catcher' service with a fee.

Annex-3: Survey Questions

1- What is your main source of income?
( ) Full time Job ( ) Part time Job ( ) Temporary (seasonal) job
( ) Family allowance ( ) Social Security payments (unemployment payments etc.)
( ) Other, please specify

2- Please indicate your income category (in TL)
( ) 50-250 ( ) 250- 500 ( ) 500- 1.000 ( ) 1.000- 1.500 ( ) 1.500- 2.000 ( ) 2.000- 2.500 ( ) 2.500- more

3- How much is your average monthly expenditure related to GSM?
( ) 10-30 ( ) 30-50 ( ) 50-75 ( ) 75-100 ( ) 100-150 ( ) 150-200
( ) 200 ve üzeri

4- To which operator are you subscribed?
( ) Avea ( ) Vodafone ( ) Turkcell

5-What kind of factors influenced your subscription decision? (Tick more than one if necessary)
( ) Quality of service ( ) Coverage ( ) Pricing ( ) Brand name
( ) Promotions ( ) My family, relatives (subscribed to this operator)
( ) Friend advice ( ) Advertisements ( ) Random Selection
( ) Other, please specify:

6- For what purpose are you using your mobile phone (and service)? (Please indicate the app. percentage of usage)
( ) Voice transmission ( ) Data (internet) transmission ( ) SMS
( ) Other, please specify

7- Are you aware of on net-off net price differentiation? ( ) Yes ( ) No

8- If yes, are you using different operators when making calls to different operators?

9- Have you ever changed your operator? If yes how many times?

10- What is the reason for changing your operator last time?
( ) Service quality is not adequate ( ) Price is more expensive compared to others ( ) Coverage problems ( ) Assistance services are not adequate
( ) My family, relatives (subscribed to this operator)

11- Which criteria are more important for you in selecting your current operator? (Please mark starting with 5 according to the importance)
( ) Quality of service ( ) Coverage ( ) Pricing ( ) Brand name ( ) Promotions ( ) My family, relatives (subscribed to this operator) ( ) Other, please specify:

12- If you have not changed your operator at all, please state the main reasons (starting from 1 indicating the most important one, if you select more than one) for this preference.
( ) Adequate pricing ( ) Better quality ( ) Better coverage
( ) My family, relatives (subscribed to this operator) ( ) number preference (i.e. using same number for years) ( ) Other, please specify:

13- What is your tariff package name? Please specify (e.g. kamu, kampüscell etc.):

14- If you are using 'public tariff packages' (kamu tarifeleri), what are the main reasons for selecting this tariff?
( ) My family, relatives (used this package) ( ) My friends, (used this package) ( ) My colleagues (used this package for business)
( ) Other, please specify:

15-Are you aware of number portability (MNP)?
( ) Yes ( ) No

16- If yes, please indicate the source of information?
( ) İnternet ( ) Newspaper ( ) Friend ( ) Other, please state:

17- Do you think that MNP will bring some benefits?
( ) Yes ( ) No

18- If yes, please indicate the most important benefits (starting from one)
( ) Lower tariffs ( ) Higher quality ( ) Promotions
( ) Other please state:

19- Are you considering to change your operator, after the implementation of MNP?
( ) Yes ( ) No