The Dynamic Effects of Government Policies on Korean Telecommunication Services Market

: Focusing on the Regulations of Mobile Phone Service

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ABSTRACT*: The government regulation policy, in the mobile phone market which is characterized by its 'asymmetric' stance, has provoked debates on many issues amid pros and cons. For that, many previous studies have endeavored to point out the limitations of asymmetric regulations and suggested the improving measure tools, most previous studies showing common shortcomings. This study aimed at evaluating the government regulation policies over the mobile phone market, by analyzing in advance the efficacy of any potential regulation policies, and by estimating the timeliness of the enforcement. To achieve this objective, an empirical research was conducted with an effort to analyze the level of customer satisfaction(CS) on the mobile phone services and the gravity of each CS related factors and a simulation model based on the system dynamics methodology was developed to test the impact of governmental regulation policies being enforced under various scenarios of the mix of government policies.*

KEYWORDS : *Government Regulations, Telecommunication Services, Mobile Phone Services, System Dynamics*

1. Introduction

The government regulation policy, in the mobile phone market which is characterized by its 'asymmetric' stance, has provoked debates on many issues amid pros and cons. For that, many

previous studies have endeavored to point out the limitations of asymmetric regulations and suggested the improving measure tools, most previous studies showing common shortcomings, which are summarized as the following:

First, most of the preceding studies ended up providing just the conceptual explanations for the shortcomings and the efficacy of the regulation measures that have become the main issues. They did not give any visible explanations of the impact that the presented alternatives could give. Second, since regulation measures generally do not apply individually but collectively, it becomes very important to estimate the impact that would come from the mix of many regulation policies. Nevertheless, most preceding studies ended up uttering a single and respective regulation issue instead of handling a multiple of them collectively. Third, literature reviews on the government regulation policy have to begin with the basic understanding of the competitive market structure. To do so, it is necessary to analyze how all related variables are interrelated dynamically. Most of the preceding studies, however, failed to note the market structure or at the best ended up noting through their static view rather than dynamic point of view.

Above all, debates over the government regulations on the mobile phone market so far have focused on the market structure shared by the incumbent mobile carrier(SKT) and the competitive mobile carriers(KTF & LGT), thereby overlooking the effects and benefits to consumers. As a result, despite the government's active intervention, the service quality and the satisfaction felt by the mobile phone service users were still being estimated as very poor, leading them to question for whose benefit the government regulations are being enforced.

Consequently, with these limitations, it has failed to present comprehensive and systematic policy practice directions for the ongoing major regulation issues that are either now in application or being reviewed for future application to the mobile phone market, with contrasting views and opinions coexisting and their gaps not being ironed out yet.

So a holistic review on the governmental regulation policies on the current mobile phone market and an empirical and dynamic analysis of their impact on the market remains as a very important task with a view to setting directions of the desirable regulatory policies for the future.

Accordingly, this study aimed at evaluating the governmental regulation policies over the mobile phone market by analyzing in advance the efficacy of any potential regulation policies, and by estimating the timeliness of the enforcement. To achieve this objective, an empirical research was conducted with an effort to analyze the level of customer satisfaction(CS) on the mobile phone services and the gravity of each CS related factors, and a simulation model based on the system dynamics methodology(Forrester 1961; Goodman 1989; Richardson and Pugh 1981; Sterman 2000) was developed to test the impact of governmental regulation policies being enforced under various

scenarios of the mix of government policies.

2. Current status of the Korean mobile phone service market

The entrance of Shinsegi Telecom in April 1996 put an end to the monopoly of SKT. After the introduction of digital service, the entry of the three PCS carriers in 1997 triggered a full-scale activation of the market. Competitions among carriers quickly brought down subscription fees, and led to a struggle for securing new subscribers by such means as subsidizing the purchase of mobile devices. All these developments contributed to the rapid growth of the mobile phone services market. The growth rate of the subscriber base was 114% from 1996 to 1997, and 105% from 1997 to 1998(Choi et al, 2001). Now, the number of phone mobile subscribers exceeds over 30 million, surpassing the wire-line subscriber base.

This high rate of growth, however, came to an end with the new millennium, when the market, nearing its maturity phase, started to slow down (ETRI, 2002). The diffusion rate of mobile phone services having surpassed 70% of the total population, factors such as the discontinuing of subsidies for mobile device purchases after June 2000 reduced the increase of subscriptions to a marginal level, and some carriers even experienced a decrease in subscriber numbers.

This is evident in support of the assertion that the mobile telecommunication services sector had reached its saturation point in terms of customer numbers, in other words, attained market maturity. In addition, over-investment and excessive competition, combined with the deterioration of profitability for latecomers to the industry, have led to a market restructuring(Kim, Park & Jeong, 2003). The most noteworthy current development in the Korean mobile phone services is the introduction of mobile number portability in 2004.

Table 1

Trends in the Korea mobile phone service market

Year	*1999*	*2000*	*2001*	*2002*	*2003*
Subscriber numbers(thousands)	23,443	26,816	29,045	32,342	33,591
Penetration rates(%)	50.0	56.6	61.4	68.3	69.9
Sales(million USD)	7216.0	9785.5	1140.0	1150.7	1285.5
Monthly ARPU(USD)	30.7	36.4	39.2	35.6	37.4

Source: Reconstructed from the homepage of ministry of information and communication (http://www.mic.go.kr)

3. **Causal Loop Diagram of Competition structure**

Since PCS service was introduced in 1997, domestic mobile phone markets have expanded rapidly and become saturated; As of June 2003, the number of subscribers have exceeded over thirty three million and seventy percent of the people in the country have now joined PCS providers. Therefore, it has become more difficult to collect new subscribers. The Korean mobile phone markets, SKT, KTF and LGT now have an oligopolistic economy structure and zero sum, that is, the market expansion of a competition company leads to a market reduction of the counter-company.

In such a saturated condition, customers leaving a company are flown into the counterpart and this secession is inversely proportioned to customer satisfaction and customer loyalty. Customer satisfaction is when a supplier meets the expectations of the consumer. Customer loyalty can be defined as a function of customer satisfaction, transition barrier, sound of customer, and complaint (Fornell, 1992). In the case of a mobile phone user, it would be the rate of the customer's satisfaction that affects the secession of the customer.

On the other hand, under competitive environment, it is useless to consider only the rate of the customer’s satisfaction because a loyal customer’s satisfaction doesn’t mean superiority over competition or a guarantee of re-purchase. The concept of Customer Value Added (CVA) can be used to complement these issues. CVA(Customer Value Added) is the evaluation index of customer's satisfaction introduced by AT&T in 1993. This CVA evaluates the level of customer satisfaction and service of my own company and competitors and produces worth-what-paid-for(WWPF). Then that exponential value is divided by the weighted average of the competitor. this measured CVA is meaningful to allow feedback and effectively analyze direction and intensity of the activity of customer satisfaction by relatively comparing and grasping the present position of its company and main entrepreneur, understand merits and demerits of its company and competitors and establish a competition strategy according to goods, customer, and region. According to this, CVA of its company is proportional to its company inflow of the customer of the other company.

In this study, switching cost also has a positive relation with customer loyalty and CVA is influenced positively with customer satisfaction. The customer satisfaction of its company is influenced by a communication charge, service quality, and brand power.

Inflow of new customers is affected positively by word of mouth which is strengthened by the market share in each service entrepreneur. These assumptions are based on a preceding research

which indicated that mobile phone users who were satisfied with the quality factors recommended the service to others.

Therefore, in the case of the competition model by the churning brand, the previous customers of the other company could be distributed into other companies as a function of their market share.

Actually, taking a look at the probability of the churning brand according to the mobile phone service provider studied by preceding research, we can recognize that it is similar to the market share of big 3 in the mobile phone service market represented by Table 2.

Customers of each service provider is a base of interests of each company. On the other hand, the more customers secured, the more interests are secured. And the interest feedback loops to the QoS for customer's satisfaction are the Brand Power and the investment for increasing of Brand churning. So, that makes network effects - to reinforce of each mobile company's customer's satisfaction and market share.

Therefore, the key to the success of the carrier depends on a confirmed customer and Average Return Per Unit(ARPU) and also the ARPU is proportional to the Minutes of Usage and Price per customer. However the price has a positive relation with ARPU and a negative relation with MOU simultaneously so the effect of the price on ARPU could vary. Actually, in the case of SKT, it could keep ARPU after providing a 14 percent discount. The reason was the not much large real charge reduction width by the existing discount package management with the 5% level, but the largest cause was analyzed by being in the rise of MOU by charge reduction.

Table 2

Probability of churning brand according to mobile phone service provider

Classification		Conversion probability	
SKT	011	0.2765	0.4751
	017	0.1986	
KTF	016	0.2048	0.3616
	018	0.1568	
LGT	019		0.1633

* Source : Reconstructing "communication market structure analysis and Prediction through customer churning brand model"(Kim et. al., 2000)

* Conversion probability : probability changing into other service in a whole secession customer

Figure 1 is a causal map of the market competition structure designed by integrating a causal relationship between variables produced from previous research.

Present domestic mobile phone service providers are three companies (SKT, KTF, LGT) but it is designed with a two company competition to simplify it. That is, A and B denote its company and competitor respectively.

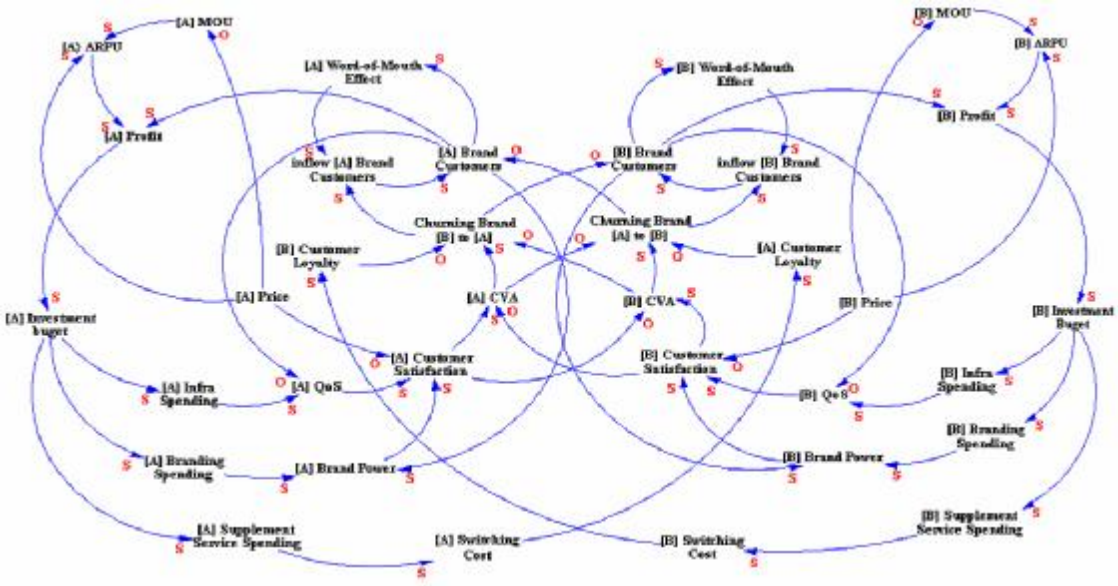

Figure 1 Causal diagram of mobile phone company market's competition

The causal relationship in the integrated causal diagram of Figure 1 is explained as follows.

① Its company ([A] Brand Customer) is increased by Brand churning (Churning [B] to [A])

② Its company ([A] Brand Customer) increases collecting of new customers through Word - of-Mouth Effect([A]) and has a positive relationship with Brand power ([A] Brand Power).

③ Churning [B] to [A] has a positive relationship with CVA([A] CVA) its company and negative relationship with customers' loyalty([B] Customers Loyalty) of a competitor.

④ CVA([A] CVA)of its company has a positive relationship with its customer satisfaction and a negative relationship with customers Satisfaction ([B] Customers Satisfaction)of a competitor.

⑤ Customers Satisfaction of its company([A] Customers Satisfaction) depends on its price ([A] Price), its service quality([A] QoS), and its Brand

⑥ The price of its company([A] Price) has a negative relationship with the Minutes of Usage and has a positive relationship with the Average Return Per Unit ([A] ARPU). Average Return Per Unit ([A] ARPU) has a positive relationship with its customers ([A] Brand Customers) together with its profit ([A] Profit).

⑦ Increase of its profit ([A] Profit) increase its investment budget ([A] Investment Budget) and the investment budget ([A] Investment Budget) is invested into Infra Spending, Branding Spending, and Supplement Service Spending.

⑧ It increases [A] customer satisfaction by [A] Infra Spending and Branding Spending increases [A] QoS and [A] Brand Power respectively. [A] Supplement Service Spending) reconsiders [A] Customer Loyalty by increasing [A] Switching Cost.

Many positive-feedback, self-reinforcing loops exist in the causal diagram designed with these causal relationships (R1-R10). Figure 2 emphasizes the positive-feedback loop existing in the causal map.

In figure 2, the self-reinforcing system represents a positive feedback loop. The more customers there are, the more profit is made. The more profit made, the more investment. The more investment, the higher the customer satisfaction which leads to even more customers.

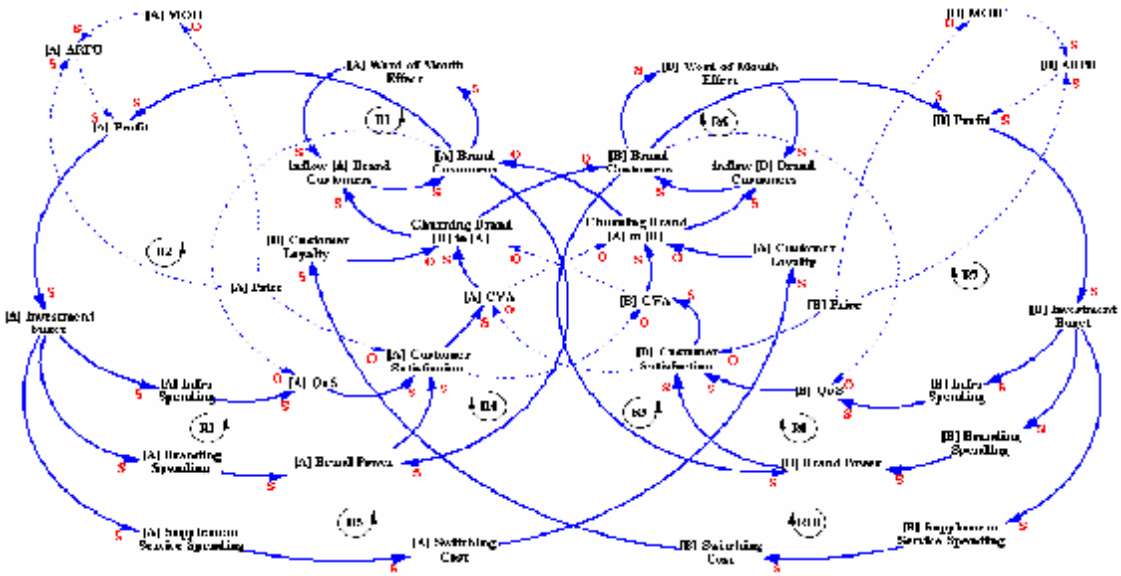

Figure 2 Positive Feedback Loops and Reinforcing Effect

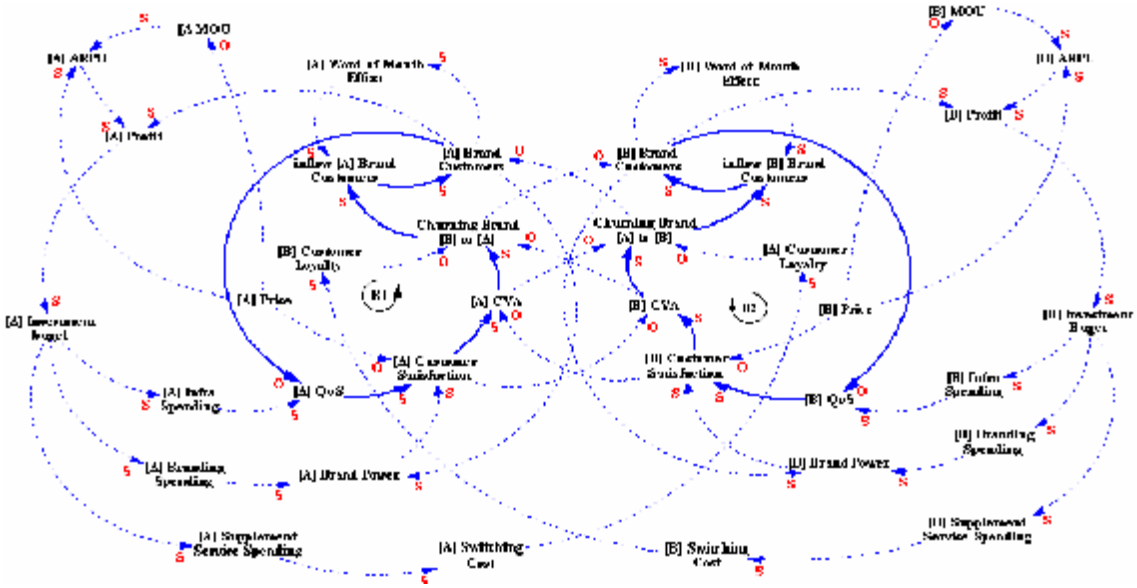

Figure 3 Negative Feedback Loops and Balancing Effects

On the other hand, Figure 3 shows a negative feedback loop leading a system to balance. A negative feedback loop (B1, B2) is caused by the reduction of QoS due to a deficiency of service capacity. That is, generally a high market share isn't easily able to offer the service in which many customers can be satisfied in the industry by which desire of a customer is not uniform and supply is standardized and to give a customer high satisfaction in the opposite case.

A deficiency of service capacity is regarded as NP(Network Performance), QoS consists of Service Support Performance, Service Operability, Serviceability, and Service Security Performance. Such NP and QoS is not an individual concept but the mutual complement property.

Such NP and QoS have the mutual complement-character which is not an individual concept, and such general service quality has positive relationship with customer satisfaction and a direct influence on customer loyalty (Bitner, 1990). This deterioration in the quality rapidly causes customer secession and conversion for the competitor simultaneously.

When considering only the positive feedback of Figure 2 in the beginning stage, as the leading company which has a high market share raises customer satisfaction and the customer market share continuously strengthens itself, the gap between the leading company and the late-coming work company becomes larger. Ultimately, it is thought that only one company will survive.

Such concepts make companies likely to carry out a bleeding competition to keep customers. A competitive subside provision strategy of the 3 carriers are typical examples reflecting this competition.

However subsidy provision of an equal level cannot have differentiation as a result, but comes to fall as only profitability aggravation. It comes to fall into the vicious circle which can not only offer the incentive for new customer collection but also spread the burden on its users.

Also, the increment of customers has a form that the market share of mobile phone companies is converged on a proper level by activating a balance loop like Figure 3.

4. **Simulation Results**

A simulation designed to track the variation in the number of subscribers and the market share for mobile phone services providers under multiple scenarios of combinations of government policies presents two implications: First, in relation to the introduction of Mobile Number Portability(MNP), had the system not been introduced one by one in turn, SKT, the incumbent mobile carrier in the industry would have had a good chance of strengthening its significant market power. Even in the case the system was introduced by turn, the competitive mobile carriers would be able to increase their market share in the initial stage, but starting from the temporal point that all the three mobile phone carriers are put under the MNP, the leading SKT's market share would rebound, and had they enforced the sequential introduction of the MNP one year earlier, the phenomenon would have proceeded more speedily. So the study found that with the introduction of the MNP alone, they fell short of controlling the incumbent mobile carrier's significant market power, but that still the sequential introduction of MNP would be most timely and most effective if they began introducing the system in January, 2004.

Second, the simulation found that the discriminating frequency usage fee and the interconnection charge would resolve the disadvantageous position for the competitive mobile carriers' in controlling the cost, providing them with some rooms for more price-cut or helping them accumulate the investment capital for their service quality improvement, thus providing the competitive mobile carriers with the chances of their developing competition edges that will continue and will be more fundamental than the introduction of MNP would give them.

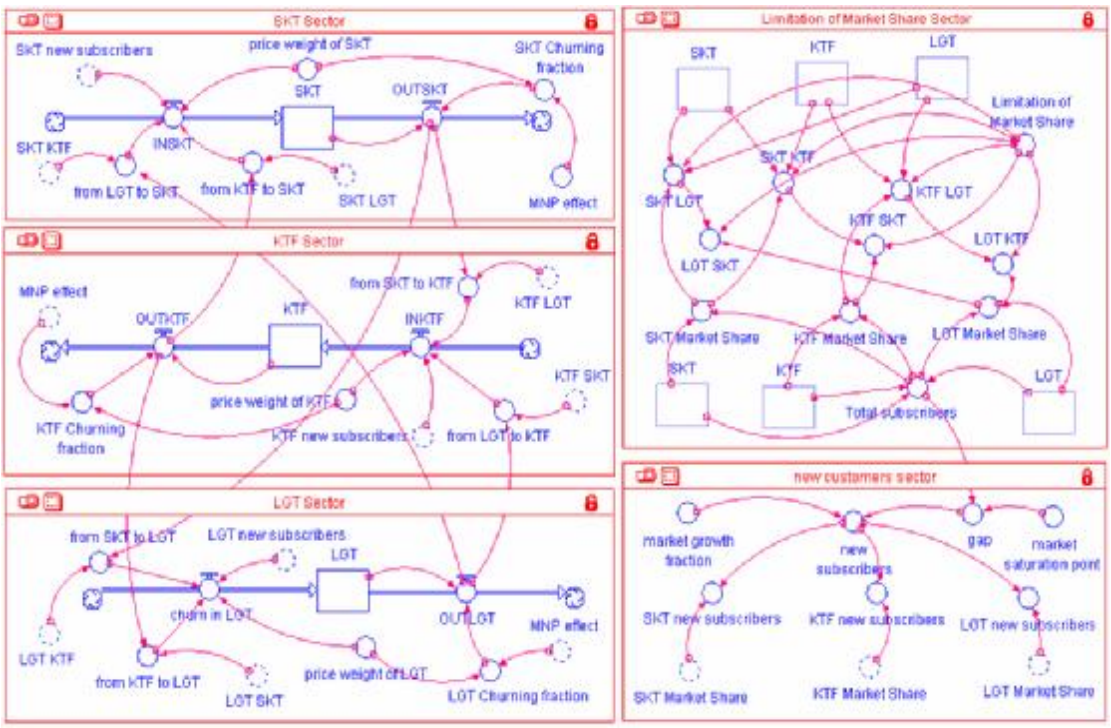

Figure 5 Stock-flow diagram for Simulation

Especially, a comparative analysis of individual regulation policy and their mix showed that if the competitive mobile carriers were encouraged to charge down by giving them preferential treatments in their frequency usage fee and their interconnection charge while introducing the MNP, the controlling effect over the incumbent mobile carrier's significant market power can come out more durably and more effectively, signifying that it is really important to analyze the complex impacts that may result from various policies rather than to analyze the individual regulation policy enforced by the government.

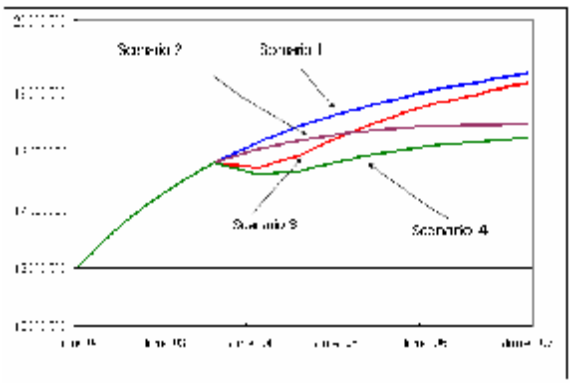

Figure 6 SKT the number of subscriber graph

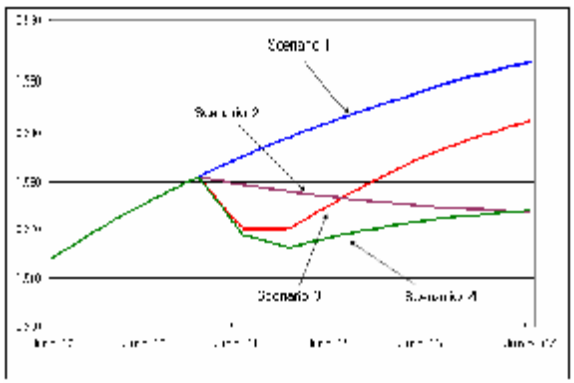

Figure 7 SKT market share graph

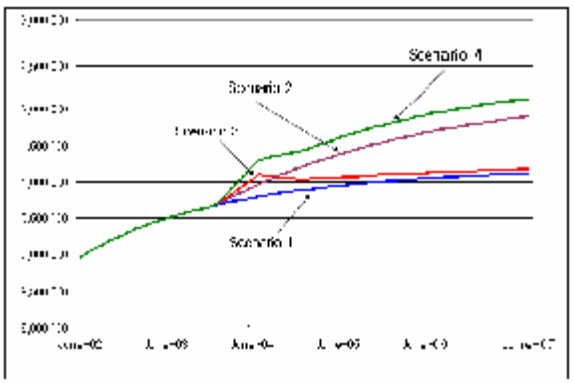

Figure 8 KTF the number of subscriber graph

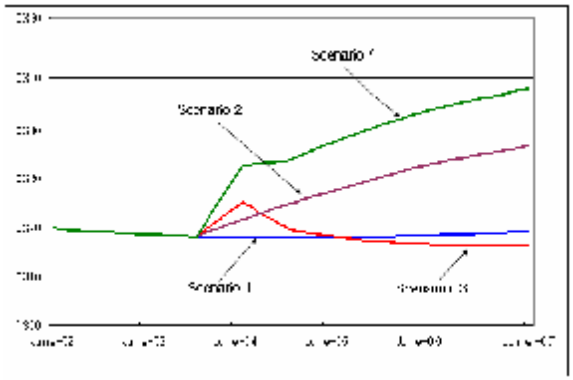

Figure 9 KTF market share graph

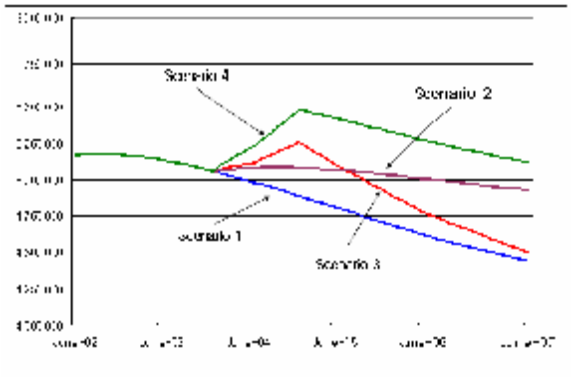

Figure 10 LGT the number of subscriber graph

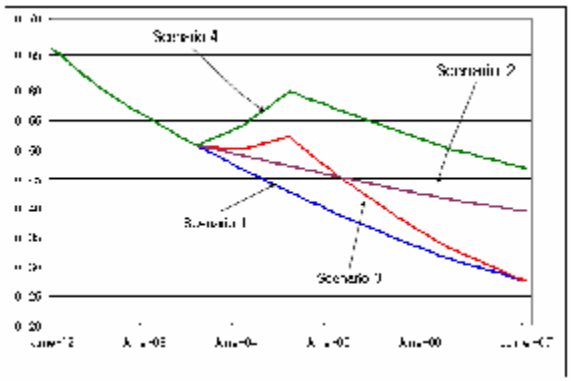

Figure 11 LGT market share graph

Scenario 1: not conducting of government policies
Scenario 2: PCS carriers' price reduction by 10% in 2004(KTF & LGT)
Scenario 3: Sequence introduction of MNP in 2004(in order SKT, KTF, LGT, interval is six months)
Scenario 4: Sequence introduction of MNP with PCS carriers' price reduction by 10% in 2004

5. **Conclusion**

Based on the results of the simulation analyses, it was pointed out that the focus of the governmental regulation policies should shift from the protection of the competitive mobile carriers to the customer protection. In the same token, the study gave its emphasis to the basic principle of regulation which mitigates the economic regulation while tightening up the social regulation.

6. **References**

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