

2. Mobile number portability (MNP)

Generally, subscribers are required to give up their number when switching providers. MNP brings a new opportunity to customers by giving them the right to keep their mobile telephone number when switching between mobile telecommunication service providers. The main regulatory objectives of MNP are to bring considerable benefits to consumers of mobile services: lower price, higher quality, greater choice and a greater range of services. Subscribers would be allowed to take advantage of the choices in a more competitive telecommunication market. NERA/Smith (1998) proposed a classification of five potential benefits of introducing MNP: (1) avoided costs of number change in the absence of MNP; (2) benefits of moving to a more preferred operator and obtaining services from them when MNP is introduced (Buehler & Haucap, 2004); (3) intensified competition among providers of mobile telecommunication services benefits non-switching consumers as well as those who actually switch (Aoki & Small, 1999; Galbi, 2001); (4) avoided costs of finding changed number (OFTEL, 1997); and (5) increased investment in number value due to reallocation of property rights (Gans & King, 2001). While the first two benefits are private, the rest of the benefits resulting from the strengthening of competition and increased investment incentives are public. The later ones accrue regardless of whether customers actually port their number or not, but result from the option to do so.

MNP from a property rights perspective suggests that the property rights of a mobile telephone number are reallocated from operators to customers. This contributes to the bargaining power of consumers. MNP, though limited, was first implemented in Singapore in 1997. The United Kingdom and Netherlands first implemented MNP in Europe in 1999. Nowadays, except for a few EU member states, the rest have introduced MNP. The USA and South Korea (both in 2004), and Japan (2006) followed suit.

MNP has been investigated from different perspectives in different countries. In some countries, results show positive effects upon MNP implementation, whereas in others, the expected results have not been achieved. Lee, Kim, Lee, and Park (2006) investigated the customer behavior toward MNP in Korea. MNP has lowered the switching costs considerably since its implementation. More than 70% of the population preferred to retain the number. On the other hand, 88.6% of the population will not switch to another service provider unless there is some compensation for the switch. Gerpott, Rams, and Schindler (2001) studied customer retention, loyalty, and satisfaction in the German mobile telecommunication market and the results show that it is important for customers to retain their numbers over a long period. On the other hand, US mobile subscribers have an indiscriminate attitude to MNP service which means that MNP does not have a direct effect on the subscribers' switching decisions (Shin, 2006).

Though some studies positively assess MNP, on the other hand, other studies highlight the negative aspects of MNP. Reinke (1998) argues that even if MNP can increase the competition in the telecommunication market, the means by which number portability is implemented may either insure or threaten competition and universal service. Less benefit from MNP is received in a well developed telephony market with high penetration rates. The introduction of MNP in the EU has a negative impact on prices although liberalization of telecom has a positive impact on the demand for mobile services (Grzybowski, 2005). Shin's (2006) study reveals that MNP indirectly enhanced switching barriers through increased subscriber's lock-in strategies and other hidden costs that makes subscribers stay with current carriers. MNP may deteriorate the customers' price information if the consumer is ignorant of relevant pricing (Gand & King, 2000). Summarizing

previous studies on MNP, findings show that switching cost has been the most common obstacle for subscribers to change carriers. The following section shows the methodology to estimate MNP using a conjoint analysis.

3. Data background

The mobile telecommunication market of Uzbekistan is the fourth biggest market by the number of subscribers in Central Asia and Eastern Europe after Russia, Ukraine and Poland. The roots of the mobile telecommunication sector are traced back to 1991 when the first mobile company Uzdunrobita was established. In 1996, the Uzbekistan government opened the door for foreign investment to enter the mobile telecommunication market. Various exemptions were introduced to lure investors. Hereon, five new mobile network operators, such as Unitel, Coscom, Rubicon Wireless Communication (later Perfectum Mobile), Buztel and Uzmacom, launched service in 1997. Since 2004, one more operator has appeared in the mobile telecommunication arena. Uzbektelecom provides services to the customers in CDMA450 standard.

The process of sector consolidation and ousting of small operators can be observed in the mobile telecommunication service market in Uzbekistan. Right now, the mobile telecommunication service market consists of three GSM operators: Uzdunrobita, Unitel, Coscom, and two CDMA operators: Perfectum Mobile and Uzbektelecom Mobile. They provide mobile telecommunication service to the 27-million people of Uzbekistan. In 2004, MTS, the largest mobile network operator in Russia and CIS, purchased Uzdunrobita and gained access to 52% of market. The company provides services under the MTS Uzbekistan brand. In 2006, another Russian-based company VympelCom (Beeline), announced purchase of Unitel and two other small operators, Buztel and Uzmacom. This made them the second largest mobile network operator in Uzbekistan. The brand of the company is yellow and black stripes. Services are offered under the Beeline brand. Recently, the Swedish-Finnish company, TeliaSonera, reached an agreement to purchase 26% of Coscom.

4. Methodology and analysis

Conjoint analysis (CA), also called conjoint measurement (CM) or choice experiment, is a statistical technique used in market research to determine how people value different features that make up an individual product or service. Originally, CA was developed for psychometric research that is applied to measure consumer's perceptions and preferences (Anttila, van den Heuvel, & Moller, 1980; Johnson, 1985). This makes it an appropriate technique to assess subscribers' attitude towards a new service such as mobile number portability. CA has been widely applied in marketing (Green & Srinivasan, 1978; Huber & Train, 2001), transportation (Hensher, 2001; McFadden, 1974; Train, 2003), and environmental management (Hurlimann & McKay, 2007).

CA models the nature of consumer trade-offs among multi-attribute products or services. Respondents are shown a set of products created from a combination of levels from all or some of the constituent attributes. Then they are asked to rank or rate the products they are shown. The method measures the importance individual respondents attach to various product attributes and the utility that consumers attach to the different levels of the various attributes, based on their valuation of the complete product (Malhotra, 1996; Tull & Hawkins, 1993). Thus, CA enables the marketing researcher to identify the attribute combinations that confer the highest level of utility to the consumer and to establish the relative importance of attributes in terms of their contribution to the total utility derived by the specific respondent.

van den Berg, Al, Brouwer, van Exel, and Koopmanschap (2005) pointed out the important advantages of CA: Respondents, while answering, make a trade-off between different aspects of the scenarios presented. More information about a respondent's preferences is collected since they evaluate different scenarios. The heterogeneity of a commodity is better captured. A disadvantage of CA is the relatively large burden it puts on respondents. The more cards given for ranking, the more problematical it is for respondents who can become bothered by the survey.

The CA method is based on a number of assumptions (Ness & Gerhardy, 1994) such as all products can be defined as a set of attributes; alternative versions of the same product can be defined as a set of different attribute levels; consumers evaluate the utility of the different attribute level combinations in order to make a purchase decision; and when consumers choose between alternative products, they trade-off different attribute level combinations.

In conjoint analysis a set of hypothetical product alternatives is presented to respondents, composed by means of selected product attributes and attribute levels that define the product. The respondents express their overall judgments of these hypothetical product alternatives. The original evaluations of the respondents are then decomposed into separate compatible utility scales, enabling the researcher to gather information regarding the relative importance of various attributes of a product and to provide information about the value of various levels of a single attribute (Green & Wind, 1975; Lehmann, Gupta, & Stechkel, 1998).

4.1. Identifying the attributes

The first stage is to establish the attributes for the study. It is critical to the success of the conjoint exercise to select only necessary attributes for survey questionnaires (Auty, 1995). Many attributes have potential influence on a subscribers' decision to switch to another provider. Attributes were selected after scrupulous reviewing of related literature and getting feedback from subscribers. The following attributes (dependent variables) were selected for investigation: the company name (COM), monthly mobile phone expenses (PRI), discounts within the same network (DIS), call and service quality (CSQ), and availability of a number portability service (MNP). The authors believe that these attributes have key influence on choosing MNO.

Independent variables were considered in order to analyze the relationship between respondent's preferences and their socio-economic characteristics such as age (AGE), sex (SEX), education (EDU), and monthly income (INC). In total, five dependent and four independent variables were selected for the study.

4.2. Assigning levels to the attributes

The second stage is to assign levels to the attributes. Levels chosen for each attribute must be defined in a way that is meaningful to respondents. They should assure that attributes are measured objectively and are able to be controlled. Thus, the most critical attributes should be selected and the number should be limited as much as possible. All attribute levels are shown in Table 1. The companies (COM) selected for the study are GSM mobile network operators: Uzdunrobita, Unitel and Coscom. CDMA operators (Perfectum Mobile and Uzbektelecom Mobile) were excluded due to their small market share at the time of study. Another reason for exclusion is higher switching costs when switching from a CDMA operator to that of GSM and vice versa compared to those that occur among GSM operators.

It is a difficult task to decide on how many levels these attributes should include. It is required that the minimum amount of US\$ 5 must be deposited when getting a SIM-card with a phone number. Since subscribers are very price-sensitive and the price

Table 1
Attributes and levels.

Dependent variable	Level	Description
COM	Uzdunrobita Unitel Coscom	GSM Mobile network operator providing services in Uzbekistan
PRI	US\$ 5 US\$ 10 US\$ 20 US\$ 30	Subscribers' monthly expenses for provided services
DIS	Yes/No	Discount calls within the same network
CSQ	Satisfactory Intermediate Unsatisfactory	Call and service quality
MNP	Yes/No	Availability of the mobile number portability service

distribution range is very wide, the author decided to keep the range as narrow as possible without limiting its descriptive ability. Monthly expenses for provided services (PRI) were subdivided in four levels: US\$ 5, US\$ 10, US\$ 20 and US\$ 30.

Some tariffs imply discount calls (DIS) within the same network. As it was mentioned above, a price-sensitive user prefers to select an operator with whom his or her friends have signed a contract if discount calls are available. The subscribers' decision is based on the availability of discount calls.

Call and service quality (CSQ) is defined according to the subscribers' perception of call clarity, coverage, variety of value-added services and service quality. It is described by three levels: satisfactory, intermediate and unsatisfactory. MNP availability is the last attribute to be defined. At the time of study, MNP had not been introduced. A short introduction period of MNP is required in order to aid comprehension by respondents.

Independent variables were used to segment results in order to display any variance in preferences across individuals in certain demographic groups. Table 2 shows the different levels taken by each independent variable.

4.3. Choice of scenarios

The CA method presents respondents with multiple scenarios with different attributes represented in different levels. A full profile design which is all the possible combinations of levels and attributes consists of 144 ($3 \times 4 \times 2 \times 3 \times 2$) possible profiles. In order to reduce complexity and associated negative impacts, the number of profiles is to be reduced to a more acceptable number.

Table 2
Independent variables and levels.

Independent variable	Level	Description
AGE	0–25 26–44 45–65	Age (low age, middle age and high age)
SEX	Male Female	Gender
EDU	<High School >University	Education level
INC	<\$ 100 \$ 100–\$ 300 >\$ 300	Income per month in US dollars (low income, middle income and high income)

Table 4
Utility scores in each attributes.

Attribute	Level	Utility estimate	Standard error	Variance
Constant		4.216	0.671	
COM ^a	Uzdunrobota	0.136	0.174	1.3092
	Unitel	0.587	0.204	
	Coscom	-0.723	0.204	
DIS	No	1.568	0.261	1.5680
	Yes	3.136	0.522	
CSQ	Unsatisfied	2.607	0.157	5.2137
	Intermediate	5.214	0.315	
	Satisfied	7.821	0.472	
MNP	No	0.884	0.261	0.8838
	Yes	1.768	0.522	
PRI	\$ 5	-1.227	0.068	6.1374
	\$ 10	-2.455	0.136	
	\$ 20	-4.910	0.272	
	\$ 30	-7.365	0.408	

^a Attribute was effects coded in such a way that the coefficient of the “left-out” attribute’s level equals the negative sum of the “included” categories.

When survey results are segmented by age, the received sequence of importance scores resembles that which was done for all surveys. The only difference is observed in group ‘45–65’ who value MNP higher than call discounts. Also this group showed the greatest brand loyalty (COM). There were only 2 responses from subscribers older than 45; this is the reason why answers can deviate greatly from those with a high response rate. People with high education attach more importance to PRI while those with school education value CSQ. It can be explained that people with high school education start working earlier and their focus has been shifted from price to quality. Also subscribers from the school education segment are more company loyal users than those from the university segment.

While male’s preferences for PRI and CSQ were almost the same, female valuation of PRI was much higher than CSQ. It can imply

that females have other areas of interest where they can spend saved money. The other attributes didn’t show any significant differences. In the demographic groups divided by income, the “\$ 100–\$ 300” group prefers good PRI along with good CSQ while the other two were more concerned about PRI. People who earn less than \$ 100 appeared to be twice brand loyal than those with the income of more than \$ 300. The third group showed a certain indifference to attributes such as COM, DIS and MNP.

6. Concluding remarks

This study examines an overview of the current situation in the mobile communication service market of Uzbekistan followed by an MNP issue and its related studies. The study investigates the subscribers’ behavior and perception towards company loyalty, call and service quality, mobile phone expenses, availability of number portability service, and network discount in total and segmented by demographic groups. Also it gives suggestions to mobile network operators (MNOs) after the description of each attribute. For regulators are given some suggestions in the MNP context as follows.

First, PRI appeared to be of high importance in almost all groups except the “high school” education group where people gave their preferences to CSQ. In a country, where prices are relatively high compared to salaries, PRI will always play the main role when selecting a MNO.

Second, the attribute with a significant impact on customer satisfaction and their choice appeared to be call and service quality (CSQ). This suggests that, while mobile carriers have improved call quality by investing in equipment, call clarity and coverage still remains very important. Service quality is the area where mobile carriers must strive to reduce customers’ inconvenience by providing them with more convenient methods of payment and speedy complaint processing.

Third, the attribute significantly affecting the choice of customers is a company’s name (COM). In almost every demographic

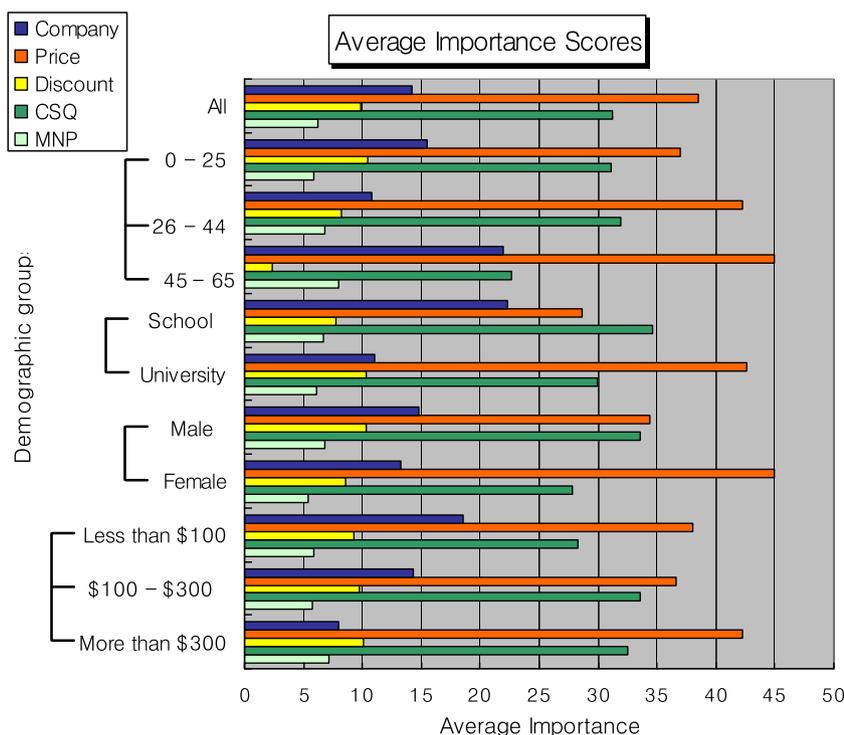


Fig. 1. Average importance scores.

group there is a significant gap between demographic groups that are brand loyal and those that are not. Mobile carriers may devise different strategies for various subscriber groups to minimize churn rate within each group of subscribers. Along with competitive prices and good call and service quality, they may start to subsidize subscribers' cellular phones and introduce a mileage system.

Fourth, the DIS showed stable importance score across all demographic groups. By offering discounts that can concretely compensate customers, mobile carriers can grow their subscribers' base and maintain current subscribers.

Fifth, the lowest importance score was attached to MNP in almost every group. It can be explained by the fact that this service had not been introduced by the time research was performed. In order to avoid discrepancy between assumed MNP benefits and the actual situation, regulators should not just enforce number portability, but they should rather seek to reduce customer ignorance and raise customers' awareness on MNP. In addition, regulators should not only develop effective policies and regulations, but also come up with detailed and thorough technological, economical and regulatory plans.

MNP is an inevitable step to come, but it is a complicated and costly regulatory measure. As a result, it should be designed in such a way that it will benefit all players: state, MNOs, and subscribers. Therefore, it is very important to perform an empirical analysis of the impact of MNP before its implementation and afterwards to know the situation and what kind of steps should be done to make it more beneficial for all participants.

This study can be considered as an attempt for the future of research of MNP impact in Uzbekistan. It would be interesting to further investigate MNP using different methods such as customer satisfaction including customers' behavioral and psychological characteristics. Also no interest is drawn to the prediction of the overall effect on the process of market saturation and liberalization.

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