A SUSTAINABLE VILLAGE PHONE MODEL TO SERVE THE RURAL DEVELOPING WORLD

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Abstract:

Wireless technologies have created an unprecedented opportunity for rural customers in the developing world to solve their communication and information problems in an instantaneous, interactive and customized way. The framework of the study focuses on existing mobile village phone model in Bangladesh and suggests ways to make it sustainable through mobile information services marketing. The study has treated 'village phone' as a cost effective and interactive channel through which various time befitting information can be marketed to serve customers in the rural settings.

Keywords: Developing countries, information, services marketing, grameen village phone, sustainable development.

INTRODUCTION

"If we stop thinking of the poor as victims of or as a burden and start recognizing them as resilient and creative entrepreneurs and value –conscious consumers, a whole new world of opportunity will open up"(Prahalad, 2005). 'Village phone' is such a weapon of social revolution in rural Bangladesh that fights against poverty by facilitating entrepreneurship, reducing transaction costs, and substituting for slow, unreliable transport and postal systems. By leapfrogging fixed infrastructure and leveraging existing wireless infrastructure, Village Phones offer a viable strategy for increasing teledensity in developing countries and helping the poor lift themselves out of poverty (Keogh and wood, 2005). Under this mechanism, a large number of rural women in Bangladesh have turned themselves into entrepreneurs (called as phone ladies) by selling phone services in the rural community. It is a tool to empower the nation's rural women with earnings, information, dignity and status. The business model is standing on a partnership among the village phone company (Grameen Telecom), telecommunication provider (Grameen Phone), micro finance institute (Grameen Bank) and phone users to provide communication solution (see Figure 1). Until recently, the model had been working well while the handset costs were very high, maintaining activation was a challenge and competing brands and their network coverage were largely unavailable. But recently the drastic reduction in GSM handset prices, the emergence of microelectronic recharge, intensive competition among competitors on reduced price per minute and wide network availability of competing brands have questioned the sustainability of the existing village phone model. So to deconceptualize, reconceptualize and to universalize a radical village phone model for the rural developing world, this paper has come up with a sustainable village phone model on mobile information services. The primary objective of the paper is to add sustainability to the existing village phone model through mobile information services. To achieve the primary objective, the secondary objectives are:

 a. To assess the needs of the customers in the rural community for mobile information services.

 b. To determine the quality of information in terms of functional and technical dimensions.

 c. To determine the regulatory issues that influence the flow of information to the rural community.

BACKGROUND STUDY

Village Phone and its genesis:

Village phone is the name of a communication umbrella in rural Bangladesh to empower the rural community to access into telecommunication facilities and to solve their day to day problems. The business model is standing on a profitable partnership among the village phone company, telecommunication provider, micro finance institute and phone users to present a win-win situation. By leapfrogging fixed infrastructure and leveraging existing wireless infrastructure, Village Phones started its journey in 1997 to offer a viable strategy for increasing teledensity in developing countries and helping the poor lift themselves out of poverty (Keogh and wood, 2005).

Village phone model and its Mechanism:

In Bangladesh most of the people live in rural villages and until recently they were disconnected from urban cities and deprived of modern amenities due to lack of telecommunication facilities. With the advent of mobile communication, the situations improved a bit but telecommunication facilities remained beyond the reach of general people.

INSERT FIGURE 1 HERE

In that critical situation Grameen village phone came up with a unique business model (Figure 1) to bring the village people under the communication network by facilitating entrepreneurship through interacting with micro finance institute(Grameen Bank) and mobile operator (Grameen phone). To implement the model successfully, Grameen Bank (a micro finance organization) played a crucial role to interact with the customers at the bottom line, selling airtime and making financial transactions. These deep links into the community are essential for introducing new services which act as channel to market telecommunication services to the rural people. By utilizing microfinance institutions as a channel to market, Grameen phone in Bangladesh was able to tap a market that was previously inaccessible because of the prohibitively high cost of developing and maintaining a channel to this enormous market. As a

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member of a microfinance institution (Grameen Bank), a potential village phone operator uses a loan to purchase everything needed to start their business. The Village Phone starter kit costs approximately US$200-US$250 and includes a mobile phone, prepaid airtime card, external Yagi antenna, charging solution, signage, marketing collateral, and other materials necessary to get started. The Starter Kit is created by the "Village Phone Company" (Grameen Telecom) which establishes relationships with microfinance institutions to bring this product to their customers. The Village Phone Company negotiates wholesale airtime rates from the Telecommunications Provider (Grameen phone) who provides access to existing telecommunications infrastructure for the Village Phone Operators. Individual villagers in rural areas can then visit their local Village Phone Operator and make an affordable phone call.

INSERT FIGURE 2 HERE

With proceeds from the business, the village phone operator contributes to their loan repayment and also purchases additional prepaid airtime cards. The microfinance institution earns money from the loan and also a percentage of the revenue from airtime sales. The Telecommunications Provider earns money through volume sales of airtime, and the Village Phone Company earns enough money to continue to promote and expand the program. There are no subsidies in this model. It works because it is designed so that all parties in the partnership will enjoy win-win situation (see Figure 2) (Keogh and wood, 2005). For village phone operators and the various organizations involved, the business model initially worked successfully as the telecom generated profit, the microfinance institution made money on its repaid loans, the village operators generated an income, and villagers in the community could make calls at discounted rates what they could not do before. In fact, Grameen's Village Phone Program has mirrored tremendous mobile phone growth in Bangladesh, expanding ten-thousand-fold in 10 years to include about 280,000 operators, mostly women known as "phone ladies"(shaffer, 2007). It has won fame because of its reputed earning power, "The typical village phone lady has an average income three times the national average." Nicholas P. Sullivan writes in his book 'You can hear me now', "It is widely accepted that village phone ladies can make anywhere from $750 to $1,200 a year."

PROBLEMS WITH THE EXISTING VILLAGE PHONE MODEL

The current reality, however, is somewhat different. According to Grameen Telecom, (village phone company), profits per operator have been declining for years and in 2006 averaged less than $70. "The program is not dead," says its manager, Mazharul Hannan, chief of technical services at Grameen Telecom, "but it is no longer a way out of poverty". The reasons are simple (Shaffer, 2007):

- Intense competition among existing competitors on '*reduced call rates'* reduces the revenue of village phone operators at a higher rate.
- The drastic reduction in the *GSM handset prices* (witness the latest motophone at USD 30 to 40) making phones available to everywhere.
- *Segmented offerings* by different operators to low income users reducing the flow of customers to village phone operators.
- *Unfriendly policies of Govt.* (High tax on sim cards and mobile phones) making village phone unattractive to the prospective entrepreneurs.
- *Negative social factors* (i.e. religion) influencing the adoption of village phone to the prospective entrepreneurs as most of them are women.
- *Lack of true entrepreneurial spirits* (i.e. tenacity) increasing the dropping rate of village phones after adoption.

The growth in Bangladesh of village phone operators has started to slow as the country is starting to approach a saturation point. But there is undoubtedly still a window of opportunity for shared phones and that window can be huge in some countries (shaffer, 2007). Village phone businesses may not be as lucrative as it was a few year ago, but still we can make it sustainable by marketing mobile information services through this channel (Akter & Kondo, 2007).

THE PROSPECT OF MOBILE INFORMATION SERVICES MARKETING THROUGH VILLAGE PHONE

The Mobile Marketing Association (MMA, 2008) defines mobile marketing, as "It is the use of the mobile medium as a communications and entertainment channel between a brand and an end-user. Mobile marketing is the only personal channel enabling spontaneous, direct, interactive and/or targeted communications, any time, any place." Mobile marketing is one of the components of direct marketing which share some distinctive characteristics to make it different from others. This medium is non-public as the message is normally addressed to a specific person, it is customized as the message can be prepared to appeal to a particular individual, it is up-to-date as the message can be prepared very quickly and finally it is interactive as the message can be changed depending on the person's response. At present, mobile marketing channel has been mainly used in promotion such as in competition and in lotteries (Pura & Minna 2002). However, the market seems to be ready for information marketing through establishing a network of collaborative information providers. Information can be produced and marketed as a product (kotler & keller, 2006). The production, packaging and distribution of information are one of our society's major industries (Shapiro & varian, 1998). With the advent of mobile technology, the marketing of information services has got a new rhythm. Moreover, the main reasons underlying the high expectation laid to mobile channel refer to its high reach, low cost and high retention rates (clickatell, 2002). Additionally, the mobile channel, especially SMS is seen as immediate, automated, reliable, personal, discreet, and providing mobile phone users a direct call to action that would via other channel be almost impossible (Barnes & Scornavacca, 2004).

For rural customers, our village phone model can act as a dynamic platform to fight against poverty by serving the community as an umbrella of information. The 20 biggest emerging economies include more than 700 million households, with a total annual income estimated at some $1.7 trillion (Prahalad & Hammond, 2002). But the success of mobile network operators (MNOs) in penetrating these low-income

customers has been very disappointing. Most companies choose to focus on the middle and upper income segments of the developing world because of non-existent distribution channels, illiteracy, poverty, and sometimes even war or violent insurgencies can stifle the enthusiasm of companies in serving people living in poverty. Underlying these reasons is an assumption that the poor cannot be targeted for a profitable and attractive market segment. Indeed, most MNOs have elected to ignore these consumer segments and focus on the 'low hanging fruit – customers in the middle and upper income brackets. But there are some burning examples in some parts of the world where these customers have been served profitably and which eventually turned them into change agents by connecting the society under one umbrella by effectively ensuring the 4As – availability, affordability, awareness and acceptability. This new channel of communication allows villagers to learn the fair value of their rice and vegetables, cutting out middlemen notorious for exploiting them. They can arrange bank transfers or consult doctors in distant cities.

Since most of the rural customers in the developing countries are disconnected from modern communication vehicles (TV, Internet or daily newspapers), the mobile communication channel like village phone can empower customers with right time information to solve all their problems at the robust pace. "….In the developing world, things are very different. Mobile phones are increasingly recognized as powerful tools in the fight against poverty, since they reduce transaction costs, facilitate entrepreneurship and substitute for slow, unreliable transport and postal systems (The Economist, 2005)."

Now if we focus on information marketing through village phone, then it largely depends on its 'quality', which can be categorized into technical and functional quality. Technical quality refers to the network performance of the operators which include bandwidth and network coverage (Siau and Shen, 2003), network congestion (Naghshineh and Schwartz, 1996), call dropping probability (Markoulidakis, Dermitzakis, Lyberopoulos and Theologou, 2000), voice quality (Moller, and Raake, 2002), database availability and reliability (Wirth and Guitierrex, 2005), data transfer delay (Ghribi, and Logrippo, 2005),

Network security (Wee, J. and Guitierrez, J.A, 2005), jitter or variation in response time, data loss rate (Knoche, & Meer, 1997), software reliability (Murthy, 1998), reliability of data transfer (Hannikainen et al. , 2002) and efficient service restoration (Douligeris, 1994). On the other hand, functional quality refers to the reliability, responsiveness, access, communication, competence, understanding and security of information (Parasuraman and Zeithaml, 2006), currency, error & accuracy and specificity of information (Malhotra, 2004), customization (Ghobadian and Jones 1994), ease of use (Dabholkar, 1996), affordability, availability, access and awareness (Prahalad, 2005). In addition to information quality, social factors and regulatory issues also influence the flow of information marketing over the ubiquitous platform.

Above all, to serve the developing segment with right time information, mobile operators (in our case, village phone) need to align IT and business to create enterprise data models and information architectures (Murphy, 2006). Village phone need to conduct these activities holistically and within the context of overall information — not just data folks concentrating on data and content experts concentrating on unstructured information. And only then, we can come up with a sustainable village phone model on mobile information services.

PROPOSED SUSTAINABLE VILLAGE PHONE MODEL ON MOBILE INFORMATION SERVICES MARKETING

INSERT FIGURE 3 HERE

The model conceptualizes and articulates all the relevant variables regarding information needs assessment, information qualities (technical and functional) and regulatory issues which affect the flow of information to the rural market. The uniqueness of this model lies in its integration of all the related variables which influence the information value chain in our target market. On the one hand, the technical quality of information influences the process of information flow and on the other hand, the functional attributes play an important role to satisfy the customers' needs. Moreover, the ultimate acceptability of this service depends on customers' willingness toward particular type of information. Above all, the regulatory issues (e.g. taxes on mobile phones, simcards and mobile information services) also play a pivotal role to influence the marketing of information services through mobile channel.

METHODOLOGY

Initially we applied exploratory research design (secondary data analysis, focus group discussion and depth interview) to bring out all the related variables regarding information needs, information quality (technical & functional) and regulatory issues that affect the flow of information services through village phone in the developing segment of Bangladesh. Depending on the exploratory findings, we developed the analytical model on four dimensions (see Figure 3). For regulatory issues in the analytical model, we made our qualitative analysis on depth interview due to small number of sample elements. But for the rest of the issues, we formulated the relevant variables and pertinent research questions for quantitative analysis. The study took place between February 2007 and July 2007.

Questionnaire design

We developed a preliminary version of the questionnaire in English on the basis of past research and insights from the in-depth qualitative interviews. Then we translated next into the local language (Bangla) and retranslated until a panel, fluent both in English and Bangla that the two versions were reasonably comparable, agreed it. We also rated the scale items on five-point Likert scales in a structured format. Each item was anchored at the numeral 1 with the verbal statement 'Strongly Disagree' and at the numeral 5 with the verbal statement 'Strongly Agree' (Elbeck 1987; Steiber 1989). We used multiple items to establish appropriate measurement properties (reliability and validity) of the selected constructs. And then we pre-tested the questionnaire several times to ensure that the wording, format, length, sequencing of questions, were appropriate. During each successive pre-test, we obtained feedback from approximately 4 mobile services users. Such feedback was instrumental in defining the quality of the measures.

Sampling and data collection

Because of resource and time constraints, and the preliminary nature of this investigation, only 175 interviews were planned from 5 rural settings in Bangladesh. To obtain a probability sample, we devoted considerable effort in selecting the appropriate sampling plan. We defined the population as mobile services users through village phone for the past 1 year. Initially, we randomly selected 5 rural areas in which village phone was used extensively and these were *Dhamrai, Gajipur, Keranigonj, Savar*, and *Tongi*. From each area, we approached at least 30 people randomly for data collection under mall intercept technique. So altogether we approached 175 samples out of five regions in which the valid response rate was approximately 60 %; so finally it turned into 105 sample elements for data analysis. We gave a letter of introduction to the interviewers from a well-recognized private university in Bangladesh so that residents could see that the study was authentic. Additional data collection was not pursued due to severe time constraints. Of the total number of completed surveys, 5 were considered problematic due to excessive missing data, 'don't know' or N/A answers, and response biases. The data from these surveys

were not included in the data set. Thus, a total of 100 surveys were analyzed for mobile information services' needs assessment and functional quality of information. In addition, to test the variables regarding technical qualities of information, we collected data from 40 technical people who were serving the mobile phone industry and in this case the response rate was 75%, so finally it turned into 30 sample elements for data analysis.

Data Analysis

For data analysis, initially, we applied descriptive statistics to evaluate the average response rates by using mean values. Therefore, we conducted factor analysis to develop the significant factors on all the interrelated variables .Here we applied principal component method using varimax rotation (Malhotra, 2004). For the sake of convergent validity, 0.4 was used as a factor loading cut-off point and factors including less than three items were eliminated (Jabnoun, 2003). And in this way, we determined the predominant factors on significant variables for each dimension of our analytical model.

EMPIRICAL FINDINGS

Descriptive Statistics:

In this case, we have taken into account the mean values of all the variables under the major dimensions of our analytical model (Information needs assessment, functional quality and technical quality) to measure the importance of each variable.

INSERT FIGURE 4 HERE

- *Information needs assessment:* In case of information needs assessment, the descriptive statistics in Figure 4 clearly indicates that information regarding government issues (3.06) and hobby (3.01) are not so much important to the rural customers like other information. Since most of the

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customers in the developing segment are very much concerned with their livelihood; so information regarding hobby, amusement or regulatory issues are not significant to them.

INSERT FIGURE 5 HERE

- *Functional quality of information:* For functional quality, we focus on descriptive statistics in Figure 5, which clearly shows that customized information (3.21) and location based information (2.93) have got the lowest ratings. This result reflects that in rural areas, most of the consumers prefer to have general information which solve their day to day problems.

INSERT FIGURE 6 HERE

- *Technical quality of information:* For Technical quality, if we look at the descriptive statistics in Figure 6, it is quite evident that most of the variables have got relatively higher ratings. So it means that all the technical qualities are very important to the operators for the effective delivery of information to the customers in the developing world.

Results of Factor Analysis

The results of factor analysis are summarized in Table I for the major dimensions of our analytical model which includes information needs assessment, the functional quality of information and the technical quality of information.

INSERT TABLE I HERE

- *Information needs assessment:* We have conducted factor analysis over the variables of Information needs assessment and we have extracted 3 factors which explain 70.84% cumulative variance (see Table III). The overall factor analysis is significant as the KMO statistics is greater than .50 and the chi square statistics is significant as the probability is less than 0.05 (Malhotra, 2004). (See Table II).

INSERT TABLE II, III, IV HERE

We have categorized 3 factors(Table IV) in which the first factor is *information about necessity* which explains 33.87% variance and includes variables regarding information on seeds(.961), fertilizer(.924), market price(.959) and education(.674). The second factor is *information about connectivity* which explains 19.37% variance and includes variables regarding information on weather (.881), health care (.770) and news (.883). The third factor is *information about administrative issues* which explains 17.60% variance and includes variables regarding information on finance (.845), governmental issues (.818) and hobby (.710).

- *Functional quality of information:* We have also conducted factor analysis over the functional quality of Information. We have extracted 3 factors which explain 61.92 % cumulative variance (see Table VI). The overall factor analysis is significant as the KMO statistics is greater than .50 and the chi square statistics is significant as the probability is less than 0.05. (See Table V).

INSERT TABLE V, VI, VII HERE

We have categorized 3 factors(see Table VII) in which the first factor is *simple & affordable information* which explains 29.95 % variance and includes variables on affordability(.878), awareness(.869), currency(.841) and accuracy(.741). The second factor is *easy& available information* which explains 17.95% variance and includes variables on availability (.932), understandable (.902) and

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easy to use (.621). The third factor is ***precise information*** which explains 14.03 % variance and includes variables on preciseness (.451), customization (.689) and location specific (.707).

- **Technical quality of information:** Finally we have conducted factor analysis over the Technical qualities of Information. In this case, we have extracted 4 factors, which explain 68.12 % cumulative variance (see Table IX). The validity of the overall factor analysis is significant as the chi square statistics is significant at the 0.05 level (See Table VIII).

INSERT TABLE VIII, IX, X HERE

We have categorized 4 factors (See Table X) in which the first factor is **network *dynamism*** which explains 21.84 % variance and includes variables on network coverage (.883), network congestion (.901), call drop rate (.834) and handset quality (.523). The second factor is ***service effectiveness***, which explains 18.27 % variance and includes variables on database reliability (.604), software restoration (.938) and software reliability (.884). The third factor is ***data delivery mechanism*** which explains 15.148 % variance and the includes variables on bandwidth (.887), database availability (.929) and response time (.587) and the last factor is ***service recovery*** which explains 12.86% variance and includes variables on data loss rate(.902), voice quality (.720) and variation in response time(.522)

GUIDELINES TO INFORMATION MARKETING

For information services, information regarding agriculture and health care should get the priority for our target market. For functional quality of information, affordability (price), availability (placing), acceptability (attractive product), awareness (promotion), simplicity, preciseness and easy to use information can play a predominant role to market these services to customers. For technical quality of information, network dynamism, service effectiveness and data delivery mechanism should be emphasized for establishing competitive advantages in the market. And above all, for favorable regulatory policies, mobile marketers should promote the benefits of wireless information communication to the regulators focusing on the sustainable development of the society.

CONCLUSION AND SCOPE OF FURTHER RESEARCH

Mobile information services have shown greater enthusiasm among the rural customers in the developing Bangladesh. The market is quite ready to accept these information services, which has become evident in our analysis. The research has also clearly highlighted a strong need to integrate information needs assessment, information quality and regulatory issues as these are essential for the smooth flow of information through village phone to the developing segment. Our study has established a platform to do further research on this arena which may cover internal management issues, entrepreneurial factors and social dimensions that might influence the value chain of this ubiquitous information delivery channel.

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Figure 1: Existing business Model and Interaction among the parties of village phone model (Keogh and wood,

2005)

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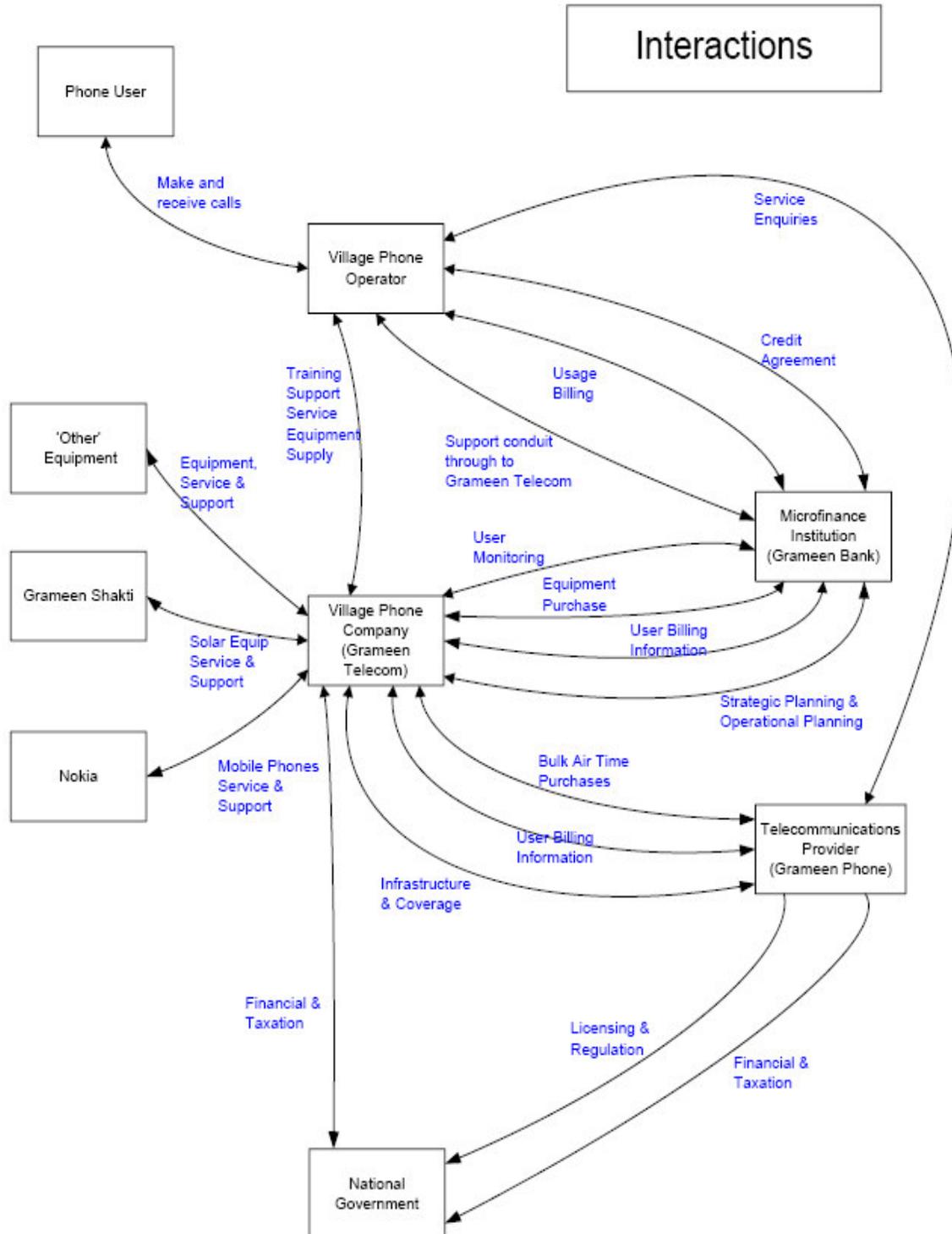
Figure 2: Initial win-win situation among the parties (Keogh and wood, 2005):

Partner	Essential service provided	Winning strategy
Telecommunication Company(GP)	Communication structure coverage to the rural areas	New revenue generated from airtime sales from a previously inaccessible market.
Microfinance institution(GB)	Provide loans to village phone operators so they can purchase equipment to start a village phone business.	Income from loans and airtime sales and a new product to market to clients.
Village phone operator(phone lady)	Affordable telecommunications to members of their community.	Profitable business which earns a steady income.
Community members	Customer base for village phone operators.	Access to affordable telecommunication.
Village phone company(GT)	Crafts and manages relationships, facilitate supports, manage overall program.	Sustainable operation.

Figure 3:   Sustainable Village Phone Framework on Mobile Information Services:

Technical quality	Information needs assessment		Functional quality
Bandwidth Network coverage Network congestion Network survivability Call dropping probability Voice quality Database availability and reliability Software reliability Data transfer delay Jitter Network security Data loss rate Efficient service restoration Quality of handset	Seeds Fertilizer Weather Market price Health care Study	Hobby News Financial Shopping Government Location based	Affordability Availability Awareness Acceptability Reliability Responsiveness Understanding Currency Error & accuracy Specificity Customization Ease of use

Factors affecting the growth of Mobile Information Marketing

Regulatory issues

Vat on services
Taxes on sim cards
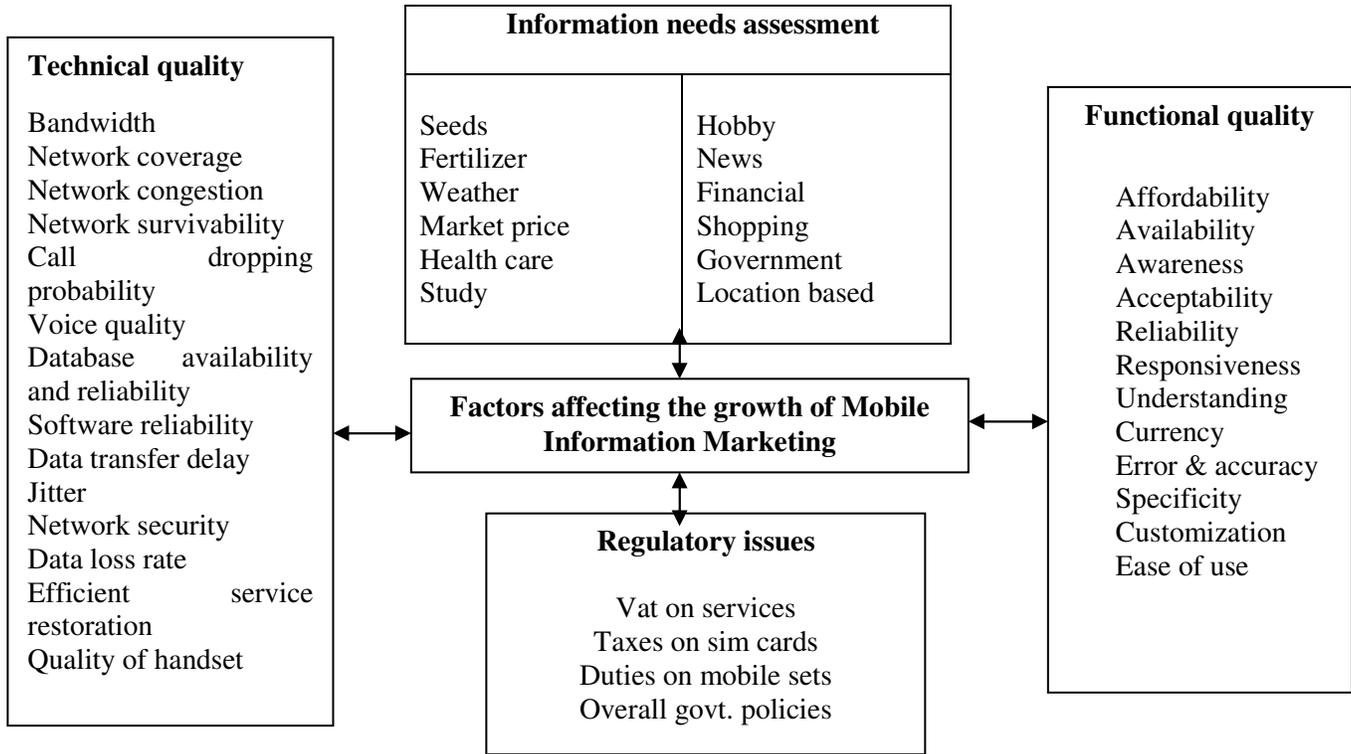Duties on mobile sets
Overall govt. policies

Figure 4: Information Needs Assessment: Descriptive Statistics

Figue 4: Information Needs Assessment
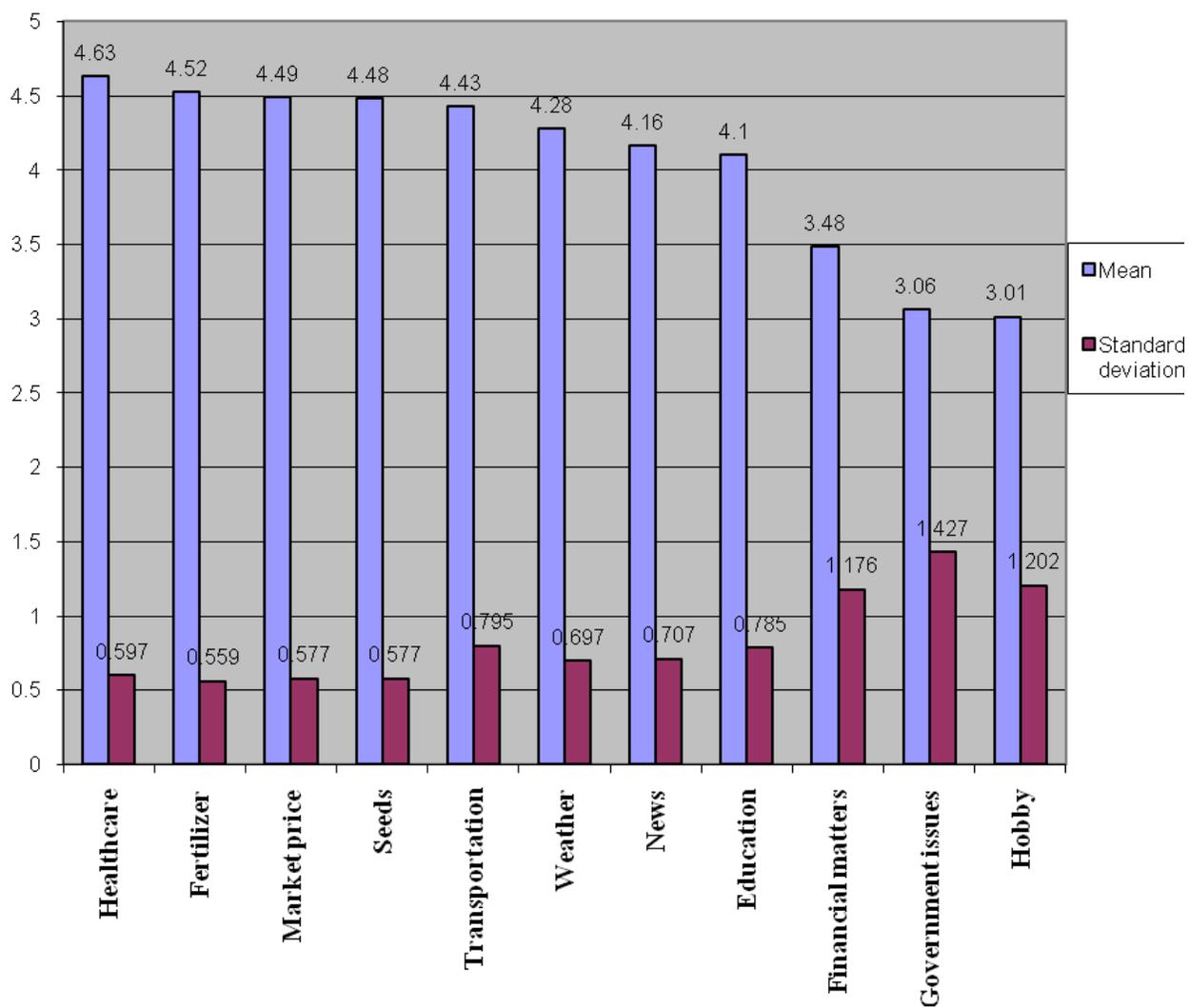
Figure 5: Functional Quality: Descriptive Statistics

Figure 5: Functional Quality
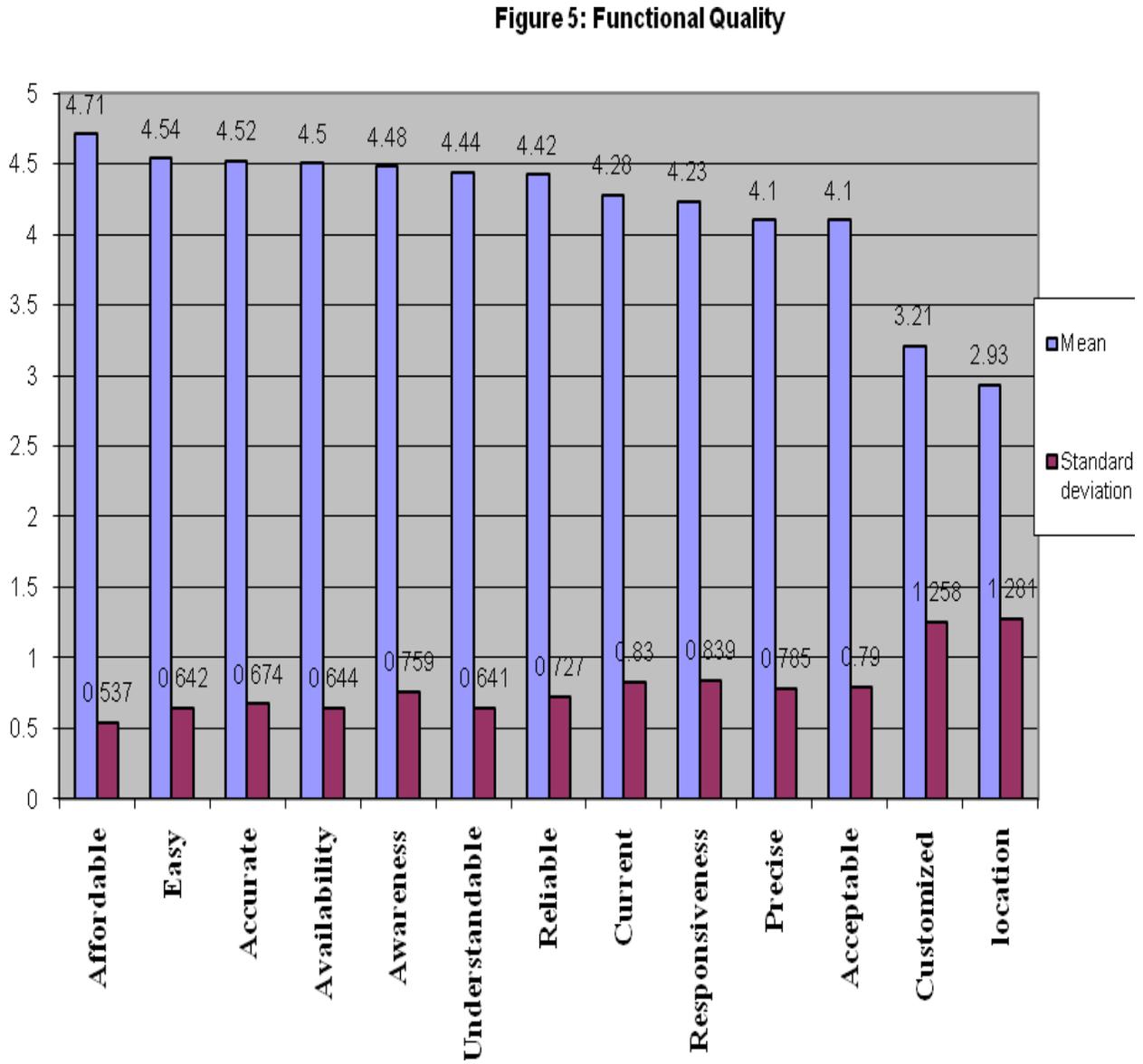
Figure 6: Technical Quality: Descriptive Statistics

Figure 6: Technical Quality
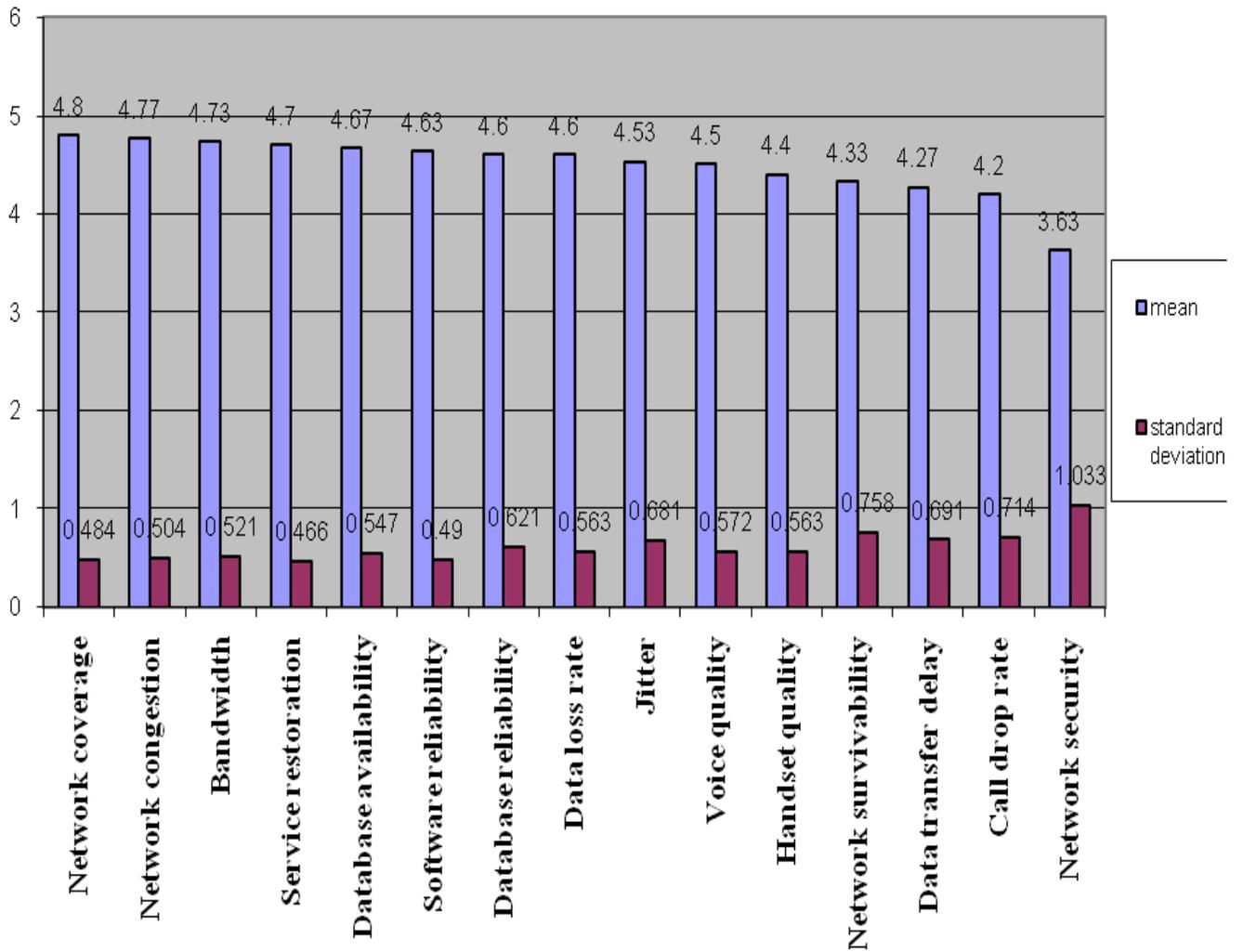
Table I Factor Analysis Summary:

Information needs assessment (70.8% variance)	Functional Quality of information (61.9%)	Technical quality of information (68.1%)
Information about necessity (33.8%)	Simple & affordable (29.9 %)	Network dynamism (21.8 %)
Information about connectivity (19.3%)	Easy& available (17.9%)	service effectiveness (18.2 %)
Information about administrative issues (17.6%)	precise information (14 %)	Data delivery mechanism (15.1 %)
		Service recovery (1.8%)

Table II: Validity of Factor Analysis: Information Needs Assessment

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.692
Bartlett's Test of Sphericity	Approx. Chi-Square	875.100
	df	55
	Sig.	.000

Table III: No. of Factors: Information Needs Assessment

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.726	33.871	33.871	3.726	33.871	33.871	3.487	31.698	31.698
2	2.131	19.372	53.243	2.131	19.372	53.243	2.209	20.086	51.784
3	1.936	17.597	70.840	1.936	17.597	70.840	2.096	19.056	70.840
4	.935	8.501	79.342						
5	.757	6.886	86.227						
6	.522	4.744	90.971						
7	.494	4.491	95.461						
8	.299	2.714	98.175						
9	.109	.990	99.166						
10	.078	.713	99.879						
11	.013	.121	100.000						

Extraction Method: Principal Component Analysis.

Table IV: Factor Loadings: Information Needs Assessment

Table IV

Rotated Component Matrix ^a

	Component		
	1	2	3
information about seeds	.961	.107	-.136
information about fertilizer	.924	.131	-.139
information about weather	.306	.881	.033
information about market price	.959	.095	-.125
information about healthcare	-.128	.770	-.029
information about financial matters	.091	-.044	.845
information about education	.674	-.038	.232
information about news	.074	.883	.020
information about transportation	.291	-.074	-.316
information about governmental issues	.089	-.065	.818
information about hobby	-.347	.098	.710

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 5 iterations.

Table V: Validity of Factor Analysis: Functional Quality

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.581
Bartlett's Test of Sphericity	Approx. Chi-Square	774.178
	df	78
	Sig.	.000

Table VI: No. of Factors: Functional Quality

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.894	29.956	29.956	3.894	29.956	29.956	3.721	28.622	28.622
2	2.333	17.945	47.901	2.333	17.945	47.901	2.498	19.215	47.836
3	1.824	14.028	61.929	1.824	14.028	61.929	1.832	14.092	61.929
4	1.562	12.017	73.945						
5	.995	7.651	81.596						
6	.686	5.278	86.874						
7	.463	3.561	90.435						
8	.397	3.055	93.490						
9	.261	2.010	95.500						
10	.201	1.547	97.047						
11	.190	1.458	98.505						
12	.134	1.032	99.537						
13	.060	.463	100.000						

Extraction Method: Principal Component Analysis.

Table VII: Factor Loadings: Functional Quality

Rotated Component Matrix [a]

	Component		
	1	2	3
affordability affects information adoption	.878	.008	-.082
availability affects information adoption	.008	.932	.170
awareness affects information adoption	.869	.031	-.191
acceptability affects information adoption	-.619	-.139	-.190
reliability of the provider affect information adoption	-.606	-.033	-.435
responsiveness of the provider affect information adoption	.001	-.055	-.596
attitude toward understandable information	-.074	.902	.015
attitude toward current information	.841	-.133	-.021
attitude toward accurate information	.741	.277	.002
attitude toward precise information	-.098	-.559	.451
attitude toward customized information	-.042	.004	.689
attitude toward location based information	.078	.003	.707
attitude toward easy to use information	.406	.621	.038

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 4 iterations.

Table VIII: Validity of Factor Analysis: Technical Quality

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.559
Bartlett's Test of Sphericity	Approx. Chi-Square	281.546
	df	105
	Sig.	.000

Table IX: No. of Factors: Technical Quality

Total Variance Explained

Compone	Initial Eigenvalues			Extraction Sums of Squared Loading			Rotation Sums of Squared Loading		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.276	21.843	21.843	3.276	21.843	21.843	3.222	21.482	21.482
2	2.740	18.265	40.108	2.740	18.265	40.108	2.557	17.045	38.527
3	2.272	15.148	55.256	2.272	15.148	55.256	2.252	15.011	53.539
4	1.930	12.866	68.122	1.930	12.866	68.122	2.188	14.584	68.122
5	1.304	8.693	76.816						
6	1.066	7.110	83.925						
7	.719	4.792	88.718						
8	.493	3.285	92.003						
9	.346	2.306	94.309						
10	.319	2.126	96.434						
11	.255	1.700	98.135						
12	.146	.971	99.106						
13	.074	.494	99.600						
14	.032	.215	99.815						
15	.028	.185	100.000						

Extraction Method: Principal Component Analysis.

Table X: Factor Loadings: Technical Quality

Table X

Rotated Component Matrix [a]

	Component			
	1	2	3	4
the bandwidth affects information adoption	.035	-.118	.887	.025
the network coverage affects information adoption	.883	-.205	-.063	.060
the network congestion affects information marketing	.901	-.249	-.104	.097
the network security affects information marketing	-.649	-.342	-.040	-.103
the network survivability affects information marketing	.011	-.295	.071	-.100
database avaliability affects information adoption	-.013	.054	.929	-.109
database reliability affects information adoption	.197	.604	.241	-.055
data transfer delay affects information adoption	-.147	.084	-.050	-.662
data loss rate affects information adoption	-.283	.020	.068	.902
call drop rate affects information adoption	.834	.022	.040	-.158
voice quality affects information adoption	.239	.154	-.148	.720
efficient service restoration affects information adoption	-.069	.938	-.128	-.074
variation in response time affects information adoption	-.113	-.292	.587	.522
quality of handset affects information adoption	.523	.298	.354	.235
software reliability affects inormation marketing	-.152	.884	-.084	-.109

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 5 iterations.