

## 3G/4G Mobile Network Band Wagon in Pakistan: A Mixed Method Inquiry into Consumer Adoption Attitude

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### ABSTRACT

**Purpose:** The purpose of this research was twofold; first to explore the basic level of understanding of 3G/4G and to identify the factors considered most important by consumers in shaping their adoption attitude. The second purpose was to investigate the applicability of factors identified by 3G/4G adoption literature in Pakistan.

**Methodology/Design:** Two separate studies were designed. In Study 1, nine focus group interviews were conducted with university students, general consumers and telecom employees of Islamabad. 9 factors were identified on the basis of importance given by respondents. In Study 2, we tested a model based on the previous literature with 610 mobile phone user of Islamabad.

**Findings:** Except two all hypothesis were accepted. Findings of both studies suggest essential factors in shaping up 3G/4G adoption attitude.

**Implications:** Managerial implications, limitations and future research directions are discussed at the end.

**Keywords:** *Social Influence, Innovation, Image, Price, Perceived-usefulness, Attitude-towards-use*

## 1. Introduction

Mobile services and the latest technology like 3G/4G have become an integral part of people's lives worldwide. Steady growth has been seen in 3G/4G adoption throughout the world. The range of 3G/4G diffusion exists at a different level in various countries. Significant regional differences exist in 3G/4G subscriber's number worldwide, about half of 3G/4G subscribers are found in the Asian region. Therefore, it is quite imperative to study 3G/4G technology acceptance in Pakistan. Given the importance of the phenomenon, the purpose of this research was twofold, first to explore the basic level of understanding of 3G/4G and to identify the factors considered most important by consumers in shaping their adoption attitude and secondly to the applicability of factors identified by 3G/4G adoption literature using the theoretical basis provided by

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technology acceptance model, technology acceptance model no 2 and the Unified Theory of Acceptance and Use of Technology (Davis, 1989; Venkatesh & Davis, 2000).

The current study develops an integrated technology acceptance model for 3G/4G mobile services, a theoretical framework to describe the social and psychological factors influencing user attitudes toward the 3G/4G services. By integrating the technology acceptance model and unified model to represent some unique features of the 3G/4G services under study, to achieve our purposes, we designed two studies. Study 1 is a qualitative inquiry and study 2 is a quantitative investigation. We first discuss the methods and results of study 1 which is followed by the findings of study 2.

## **2. Study 1: Qualitative Study**

A qualitative study has several objectives in sequence i.e. ‘to get an understanding of consumers’ usage patterns and preferences regarding current mobile network’, ‘to get an understanding of consumers’ basic level of awareness about 3G/4G mobile technology. ‘Analyzing important features and functions/utilities of the 3G/4G mobile network within consumer context in the formation of attitude-towards-use of technology’, and ‘identifying the level of consumers’ willingness to pay against their preferred 3G/4G network functions’. The reason behind conducting a qualitative study was the consistent criticism of statistical hypothesis testing procedure in social sciences when it comes to examining a new phenomenon (Moon, Habib,& Attiq, 2015). 3G/4G researches have flourished in previous years in countries that have adopted the 3G/4G technology. In Pakistan, 3G/4G is scheduled to launch in September (Zaidi, 2014).

Therefore, qualitative exploration of the phenomenon is required in Pakistan. Another reason to conduct the qualitative study was to use concepts identified in this part as an input in operationalization and development of research model.

### **2.1 Research Methodology**

#### **Study 1: Qualitative Study**

##### **2.1.1 Sample (Study 1):**

The target population was potential 3G/4G consumers of Islamabad. We further divided this population into three subcategories. The first category was composed of students of different universities of Islamabad. The second category included general consumers. Third category comprised of telecom sector employees. Mixed purposeful sampling was employed because it allows using two sampling techniques at the same time (Moon et al., 2018). For a selection of the sample in the first phase of data collection, researchers used their personal contacts to gather participants.

In the second and third phase of data collection, normal consumers and telecom employees were selected through snowball sampling whereas students were selected using convenient

sampling. 97 individuals participated in this study. Participants of the study consisted of 51 males and 46 females. Youngsters of age group 30-35 dominated the sample and majority of the sample had bachelors or higher degree. Only 13 respondents were not doing anything at time of the interviews. Other 84 participants were employed, had their business or were students.

### 2.1.2 Measures (Study 1):

In each focus group interview, fundamental questions about 3G/4G were asked. Questions included in these sessions were: what is 3G or 4G? What are its expected features? What do you think of 3G/4G? What may be its potential advantages and disadvantages? What would it do for you? Moreover, who would influence you to adopt 3G/4G? What feature do you consider most important that would make up your mind to adopt 3G/4G? All participants in the sample had to fulfill the criteria of selection i.e. participant must be a mobile phone user (especially smartphones).

### 2.1.3 Procedures (Study 1):

We conducted nine focus group interviews in few public and private Universities of Islamabad. Each interview was composed of 9 to 12 participants and lasted for an average of one hour. Interviews were conducted from June 2017 to August 2017. Participants were invited over lunch in university campus mostly on Saturdays, as it is the holiday in Islamabad. These interviews were conducted in three phases.

**Table 1: Sample Characteristics (Study 1)**

Participants profile		Phase 1 N=32	Phase 2 N=32	Phase 3 N=33	Total N=97
Age	1.20-25	10	7	8	25
	2.25-30	13	16	11	40
	3.30-35	6	9	8	23
	4.35-above	3	0	6	9
Gender	1.Male	21	9	21	51
	2.Female	11	23	12	46
Qualification	1. Under bachelors	9	1	3	13
	2. Bachelors	5	18	17	40
	3. Masters	16	12	11	39
	4. Above masters	2	1	2	5
Income	1. Less than 10000	6	10	5	21
	2. Less than 20000	12	6	7	25
	3. Less than 30000	4	8	7	19
Occupation	4. Above 30000	10	8	14	32
	1. Employed	10	9	11	30

2. Businessmen	5	7	9	21
3. Students	12	12	9	33
4. Unemployed	5	4	4	13

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In the first phase, we conducted three focus group interviews. The first focus group interview was conducted with students, second with general consumers and last was conducted with telecom employees. This sequence was followed during later two phases.

#### **2.1.4 Ethical Consideration(Study 1)**

Respondents were ensured the confidentiality of their responses and all other ethical considerations for research were taken into account during the process of data collection (e.g. Pope, Ziebland & Mays, 2000)

#### **2.1.5 Results and Analysis (Study 1)**

To assure the accuracy of understanding of the concepts, researchers grouped common responses and assigned relative meaningful names to the concepts. Then the participants were asked whether the concept describes their thoughts. After confirming this, we wrote all identified concepts on board and asked them to rate the concept according to their preferences. If we compare the findings of the focus group discussions sample category wise (i.e. students, general consumers and telecom employees), telecom employees were very much informed about the 3G/4G services. Most of them knew what 3G/4G is, what 3G/4G will do and how it will work. Majority of employees explained the difference between currently available 2G and upcoming 3G services. The case was opposite to general consumers and to our amazement with students. None of the general consumers knew about the 3G/4G at all. Only three students out of 33 knew that 3G stands for third generation mobile technology and it provides faster speed than 2G services. Then the researcher briefly introduced 3G concepts to the participants so that the factors that may make up their intention could be identified. Results revealed that social networking and cost are the most important aspects. Consumers prioritized the usage of 3G/4G services for the social networking purposes. At the same time, consumers are greatly concerned about the potential high prices of 3G/4G services. Results suggest that lower prices of 3G/4G services would enhance the possibility of adoption of 3G/4G for a broader range of consumers. Then they perceived high speed to be influential in developing their intention towards 3G/4G technology. They perceive a considerable difference among data speeds between 3G and 2G services.

**Table 2: Analysis of Qualitative Study**

Sr. No.	Concepts Identified	Total Weights	Phase 1 N=32			Phase 2 N=32			Phase 3 N=33			Average Weights
			FG1	FG2	FG3	FG4	FG5	FG6	FG7	FG8	FG9	
1	Entertainment	10	8	10	6	9	10	7	9	9	7	8.3
2	High Speed	10	9	10	10	10	10	9	10	9	10	8.6
3	Social networking	10	10	8	10	10	10	10	10	9	10	9.7
4	Cost	10	10	10	8	8	9	8	10	10	9	9.1
5	High quality	10	7	7	9	8	8	8	7	9	9	8
6	Status symbol	10	8	9	6	9	10	6	8	10	7	8.1
7	Fun for time pass	10	6	9	6	8	9	6	6	7	6	7
8	Informative	10	8	6	9	9	7	7	8	7	10	7.9
9	Something new	10	6	6	6	8	6	7	6	6	7	6.5

Note: average weight= total of all weights /no of focus group interviews

FG= Focus group session

Entertainment is another perceived important aspect of 3G/4G services that would enable the user to stream online listen, watch and download music, video games dramas movies and sports events. Using 3G/4G services will enhance consumer social status as evident from the results. Consumers consider using 3G to be essential if their peers family members friends or group fellows are using it. They argued that they were very much concerned about their self-image and would prioritize using 3G/4G if it enhances their social standing. Quality of 3G/4G services, information seeking medium and fun and novelty seeking were other important aspects that were associated with 3G/4G adoption intention but were not as important as previously discussed aspects.

### **3 Study 2: Quantitative Study**

This study aimed at developing ‘3G/4G technology acceptance model’ in consumer context based on previous core technology models such as ‘Technology Acceptance Model (TAM)’ and the ‘Unified Theory of Acceptance and Use of Technology (UTAUT).’

#### **3.1 Conceptual Development**

The TAM has gained much respect in the information technology and information systems study (Davis, 1989). The TAM advised that two variables perceived ease of use and perceived usefulness are two key factors in explaining the use of the system. UTAUT (Venkatesh & Davis, 2000) has refined the crucial factors and contingencies regarding forecasting of behavioral intention in the technology used mainly in organizational contexts. The behavioral intention in technology usage is influenced by performance expectancy, effort expectancy and social influence, though technology use is determined by facilitating conditions and behavioral intention. However, age, gender, experience and voluntariness moderate several relationships in the UTAUT model.

UTAUT model incorporated TAM constructs, perceived usefulness and ease of use by insertion of variables i.e. performance expectancy and effort expectancy. Though according to UTAUT model effort expectancy significantly determine acceptance of information technology by consumers, apprehensions for ease of use tend to turn non-significant over the prolonged and persistent use of technology (Marchewka, Liu, & Kostiwa, 2007). Hence, only in prior stages of new technology usage, perceived ease of use is more relevant and positively affect perceived usefulness (Davis, 1989; Davis et al., 1989). However, as compared to TAM studies alone, 70% of the variance is accounted for by the UTAUT model (Marchewka, Liu, & Kostiwa; 2007). In the current study, due to its broad application, both acceptance models (i.e. TAM and UTAUT) have been applied as a theoretical framework.

## **3.2 Hypotheses Development**

### **3.2.1 Attitude-towards-Use (ATT)**

Attitude is defined as an individual's favorable or unfavorable propensity towards a specific phenomenon (Allport, 1964). In this research, we defined attitude as a consumer's favorable or unfavorable propensity towards 3G/4G technology. Attitude has been acknowledged to be a precursor of consumer behavioral intentions (Garg & Garg, 2013; Moon et al., 2017). As far as 3G/4G technology is concerned, it is merely different from 2G technology regarding its speed and bandwidth for accessing the wireless network. The majority of the consumers of mobile services has already been exposed to the 3G/4G mobile phone due to the rapid expansion of smartphones and have formed attitudes towards the acceptance and usage of 3G/4G technology.

### **3.2.2 Social Influence (SINF) and Social Norms (SNR)**

Social influences are defined as the extent of perception that a person holds vital that others believe he or she should use new system technology or application. Social influences are usually categorized into three parts. These include subjective norms, social factors and finally the image. Subjective norms are an individual's perceptions about what people who are close to him think about a specific behavior. Social factors include the peer, group culture and the nature of relationships that an individual has with others in a particular setting. The image is defined as the individual's social image that is resultant of using new system/technology/application (Venkatesh et al., 2003). It implies that if a person acts in a way that conforms to the norms of his group and people around, and others approve this behavior around him, then the individual does not only gain acceptance from the group but also receives social reinforcement (Venkatesh & Davis, 2000). Social influences were dropped from earlier TAM studies, but numerous studies found it positively related to the behavior of a consumer in a technology context (Grag & Grag, 2013). As suggested by several of consumer behavior theories (e.g. TRA), social influences play an overwhelming role in the development of consumer behavior also in technology acceptance and usage behavior (Yang, 2017). Social influences have a positive influence on perceived usefulness and behavioral intentions.

In findings, utilizing the UTAUT2 model, Newby, Nguyen and Waring (2014) remarked habits as an important influencer of the adoption process. It was found in a study conducted on Chinese consumer of mobile social network services that social influences have unique implications in understanding the technology adoptions behavior of consumers. Various studies found that social influences have also played a significant role in the formation of intentions to adopt 3G/4G technology (Moon & Attiq, 2018).

H<sub>1</sub>: Social norms have a significant positive influence on perceived usefulness.

H<sub>2</sub>: Social norms have a significant positive influence on perceived ease of use.

H<sub>3</sub>: Social influence has a significant positive influence on perceived usefulness.

H<sub>4</sub>: Social influence has a significant positive influence on perceived ease of use.

### 3.2.3 Innovativeness (INN)

The willingness to adopt a new innovative technology is known as innovativeness. It is also known as the level of interest of an individual related to trying out a new product, service, thing or concept (Rogers, 1995; Frimpong et al., 2017). Innovation Diffusion theory posits that the adoption or acceptance of new technology is closely tied to the willingness of trying and accepting new things (Rogers, 1995). Innovativeness is a trait that signifies the tendency of consumers of trying out new products (Pagani, 2004) that implies that consumers with high innovativeness will exhibit more positive technology acceptance behavior (Bartels & Reinders, 2011; Jang & Lee, 2018). In findings of their study, utilizing the Unified Theory of Acceptance and Use of Technology (UTAUT2), Moon et al., (2018) classified innovativeness as an essential influencer of the technology adoption process.

H<sub>5</sub>: Innovation has a significant positive influence on perceived usefulness.

H<sub>6</sub>: innovation has a significant positive influence on perceived ease of use.

### 3.2.4 Image (IMG)

Image is defined as when an individual considers a group's belief to be significant regarding execution of specific behavior and its execution can augment the worth of internal mechanism of organization persistently (Pfeffer, 1982). In technology acceptance context image refers to the extent of belief of potential adopters to be conferred with additional prestige in the relevant community by adoption of technology (Moore & Benbasat, 1991). The definition shows social benefit related to the technology. In prior studies, Image impacts positively perceived usefulness as concluded by Venkatesh and Davis (2000). Similarly, TAM2 illustrate the positive and significant impact of subjective norm on the image since individuals consider executing specific behavior will lean to uplift their status in the social system (Venkatesh & Davis, 2000). Research conducted by Lu et al. (2005) concluded that social networks and sense of image considerably influence the perception of usefulness and ease of use towards the adoption of wireless Internet services via mobile technology WIMT.

H<sub>7</sub>: Image has a significant positive influence on perceived usefulness.

H<sub>8</sub>: Image has a significant positive influence on perceived ease of use.

### 3.2.5 Price (PVL)

Price is considered an essential factor while making technology adoption decisions (Yang, 2017). We operationalized price as the monetary value that a consumer has to bear for availing 3G/4G services. Several studies (Yang, 2017) have been conducted to authenticate price contributions towards 3G/4G usage behavior. Research suggests that low prices of 3G/4G services are likely to attract more consumers to adopt 3G/4G (Lin & Chiu, 2014). In a research conducted on 3G/4G services, high perception of prices is negatively related to 3G/4G adoption intention and discourages consumers to adopt 3G/4G technology (Yang, 2017). Price is considered as an



essential determinant of adoption intention specifically in developing countries (Grag & Grag, 2013). Majority of consumers in America and China (Lin & Chiu, 2014) rated price to be a prime factor in studies analyzing attitudes and intentions towards 3G/4G adoption.

H<sub>9</sub>: Price has a significant positive influence on Perceived Usefulness.

H<sub>10</sub>: Price has a significant positive influence on Perceived Ease of Use.

### **3.2.6 Perceived Usefulness (PUF)**

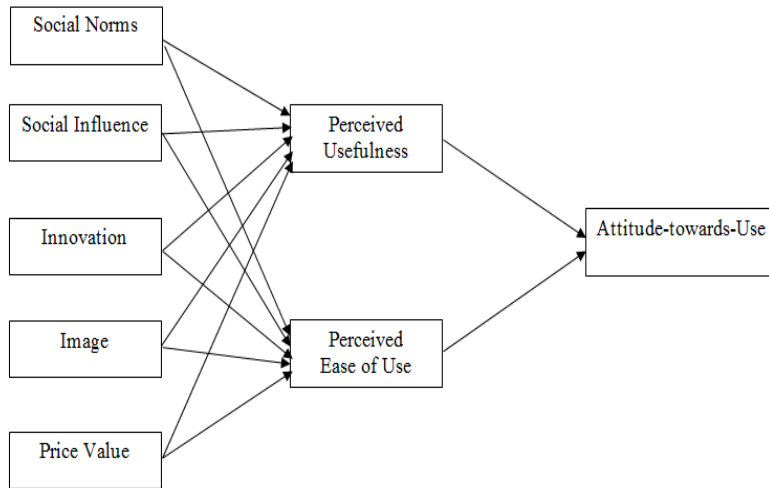
Perceived usefulness is defined as “the degree to which a person believes that using a particular system would enhance his or her job performance” (Davis, 1989). We define perceived usefulness as the perception of a consumer that using 3G/4G technology will enhance his/her communication performance. Perceived usefulness is found to be a powerful predictor of technology/ system/ application usage intention and ultimately behavior (Venkatesh & Davis, 2000). Perceived usefulness was found to be a strong influencer of attitude and intentions to adopt 3G/4G technology in different studies (Pagani, 2004; Ntsafack, Kamdjoug & Wamba, 2018).

H<sub>11</sub>: Attitude-towards-Use has a significant positive influence on perceived usefulness

### **3.2.7 Perceived ease of use (PES)**

Perceived ease of use is defined as “the degree to which a person believes that using a particular system would be free from effort” (Davis, 1989). In this research, we defined perceived ease of use as the degree or extent to which consumers perceive the use of 3G/4 Gtechnology as easy. It is found that if the system/technology/application is perceived easy to use, the consumers tend to accept or adopt it easily (Al-Ajam & Nor, 2013). In studies conducted using Technology acceptance model, perceived ease of use was found to have a positive relationship with attitude and intentions to use the technology (Joseph et al., 2018) whereas it was also found that perceived ease of use has no direct influence over behavioral intentions to use a technology. Adoption of 3G/4 Gtechnology is found to be influenced by perceived ease of use in different researches (Yang, 2017).

H<sub>12</sub>: Attitude-towards-use has a significant positive influence on perceived EU.



**Figure 1: Theoretical Framework (Study 2)**

### 3.3. Research Methodology

#### Study 2: Quantitative Study

##### 3.3.1 Sample (Study 2)

The target population was residents of Islamabad. Questionnaires were floated to the residents of Islamabad for data collection. We received 610 complete questionnaires from the respondents after screening. Out of these 610 respondents, 422 respondents are males (69.2%) and the remaining 188 respondents are females (30.8%). The mode and standard deviation of respondents' gender were 2 and 0.46 respectively. For analyzing the normality of data, the study found skewness and kurtosis is -.83 and -1.31 which are in the range of -2 to +2 (Tabachnick & Fidell, 2007).

Out of 610 respondents 29 (4.8%) were below 20 years, 245 (40.2%) were lies between 20-25 years category, 164 (26.9%) respondents were from 25-30 years, 94 (15.4%) respondents were 30-35 years, 41 (6.7%) respondents were 35-40 years, 22 (3.6%) respondents were 40-45 years, 13 (2.1%) respondents were 45-50 years, and remaining 2 (0.3%) were above 50 years. The average score or mean and standard deviation of respondent's age is 3.00 and 1.33 respectively. (42.6%) respondents were students, 119 (19.5%) respondents were part-time students, and the remaining 231 (37.9%) respondents were working people.

### **3.3.2 Measures (Study 2)**

To measure the perceived ease of use, perceived usefulness and attitude-towards-use we adapted Davis et al. (1989) scale where three items represented each of the constructs. To measure social norms, three items scale were used (Taylor & Todd, 1995). To measure Image, Moore and Benbasat (1991) scale was used and it has four questions. To measure innovations, four items scale was used. To measure price value, Dodds et al. (1991) scale was used and it has three items. We used five-point Likert scale anchored at 1=strongly disagree and 5= strongly agree.

### **3.3.3 Procedure (Study 2)**

We collected data from residents of Islamabad during November and December 2014. Respondents were approached on their workplaces and asked for their consent to participate in the study. Initially, we contacted 1034 respondents out of whom 390 refused to participate. Out of the 644 respondents who showed their consent, 34 did not return the questionnaire. Therefore, 610 respondents constituted the final pool of respondents for study 2.

### **3.3.4 Ethical Consideration (Study 2)**

Respondents were ensured of the confidentiality of their responses and all other ethical considerations for research were taken into account during the process of data collection (see Pope, Ziebland & Mays, 2000)

### **3.3.5 Results and Analysis (Study 2)**

Correlation results showed that all variables are positively correlated with each other. The value of Cronbach's alpha of image and social influence variable is 0.60 and 0.65 respectively and all other remaining variables have correlation above 0.74.

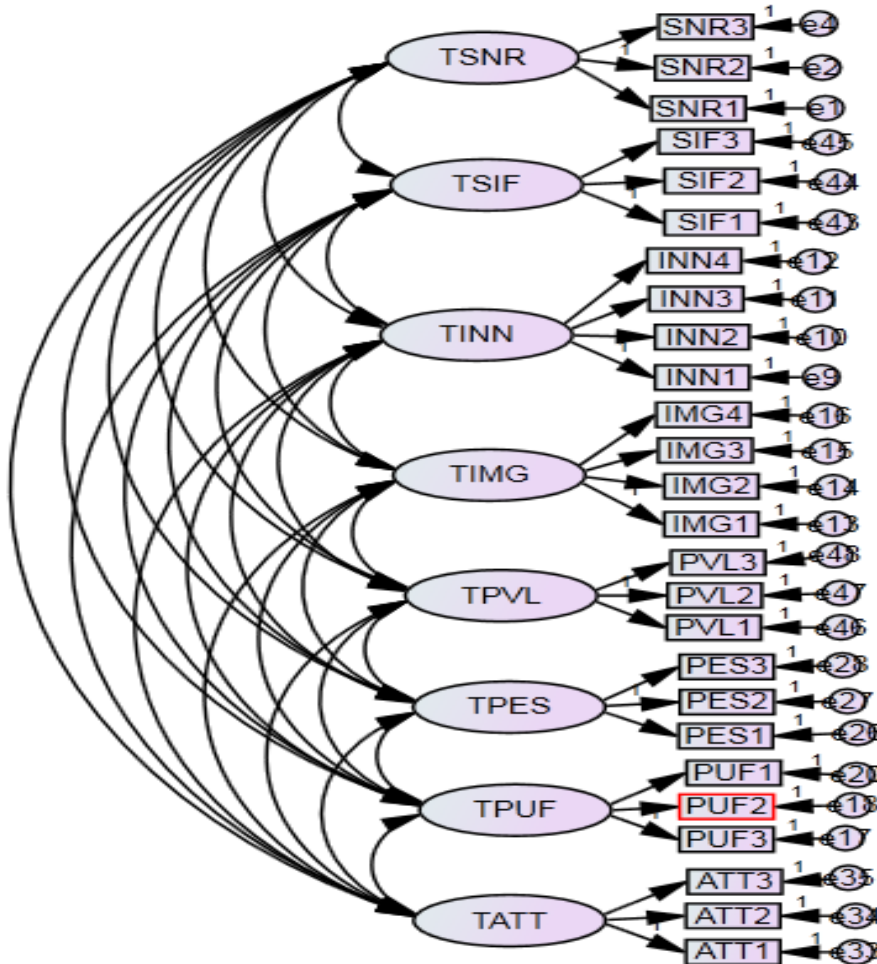
#### **3.3.5.1 Structural Equation Modeling (Measurement & Structural Models)**

In confirmatory factor analysis, factor loading (FL) and squared multiple correlations (SMC) was employed to find out the reliability of every item and also find problematical errors (Fornell & Larcker, 1981).

If FL value below 0.50 and SMC value below 0.20 of any item then this item is dropped. Latent variables used in CFA are Social Norms (TSNR). Social influence (TSIF), Image (TIMG), Innovation (TINN), Price value (TPVL), Perceived usefulness (TPUF), Perceived ease of use (TPES) and Attitude-towards-use (TATT).

Model fit showed satisfactory results and measurement model fit demonstrated accepted fitness in following values of indices. CMIN/DF = 2.07; GFI = 0.93; AGFI = 0.91; CFI = 0.97; RMSEA = 0.04. As a result, fit of measurement model was found to be excellent.

**Figure 2: Measurement Model or CFA (Study 2)**



**Table 3: Results of Mean, Standard Deviation, Correlation Analysis**

	M (S.D)	1.	2.	3.	4.	5.	6.	7.	8.
<b>1. TSNR</b>	2.17 (.81)	<b>0.50</b>							
<b>2. TSIF</b>	2.44 (.76)	.52**	<b>0.68</b>						
<b>3. TINN</b>	1.83 (.74)	.48**	.47**	<b>0.79</b>					
<b>4. TIMG</b>	2.70 (.75)	.35**	.29**	.42**	<b>0.51</b>				
<b>5. TPVL</b>	1.95 (.77)	.50**	.48**	.64**	.40**	<b>0.87</b>			
<b>6. TPUF</b>	2.10 (.79)	.58**	.56**	.63**	.39**	.58**	<b>0.82</b>		
<b>7. TPES</b>	1.99 (.71)	.50**	.47**	.69**	.42**	.76**	.61**	<b>0.75</b>	
<b>8. TATT</b>	2.08 (.75)	.55**	.49**	.64**	.40**	.72**	.59**	.68**	<b>0.84</b>

\*\* Correlation is significant at the 0.01 level (2-tailed)

Bold values show 'Square root of AVE' of all constructs (Average Variance Extracted- AVE)

Convergent validity is attained when there are factor loadings more than 0.50 among items and construct. To establish convergent validity, the current study also identified other core fit indices such as ‘Coefficient of determination ( $R^2$ ),’ ‘Composite Reliability (CR),’ and ‘Average Variance Extracted (AVE)’. The AVE values of all variables exceeded the threshold limit of 0.40 except image as recommended by Fornell and Larcker (1981). Composite reliability of all variables lies between the ranges of 0.70 to 0.91 except image (i.e. 0.57). Similarly, for measurement of reliability estimates of all variables were also calculated considered such as factor loading of all variables lies between the ranges of 0.51 to 0.91. The squared multiple correlations (SMCs) of all items ranged between 0.21 and 0.83.

According to Hair et al. (2013), discriminant validity is measured as the degree to what extent two related constructs are actually different. With the presence of discriminant validity, this condition assumes that construct variables exert the greater power of explanation for that construct than others in the model. For that reason, correlation of a construct with others construct should be less than the square root of the AVE of that construct (except TSNR).

In the structural model analysis, the value of standardized regression ( $H_1$ :  $\gamma = 0.26$ ,  $p < 0.01$ ) indicated a significant and positive relationship between social norms (TSNR) and perceived usefulness (TPUF). Significant and positive relationships were found between social influence (SINF) and perceived usefulness (TPUF) ( $H_2$ :  $\gamma = 0.31$ ,  $p < 0.01$ ), social norms (TSNR) and perceived ease of use (TPES) ( $H_3$ :  $\gamma = 0.11$ ,  $p < 0.01$ ), among innovation (TINN) and perceived usefulness (TPUF) ( $H_5$ :  $\gamma = 0.35$ ,  $p < 0.01$ ), innovation (TINN) and perceived ease of use (TPES) ( $H_6$ :  $\gamma = 0.29$ ,  $p < 0.01$ ), image (TIMG) and perceived ease of use (TPES) ( $H_8$ :  $\gamma = 0.12$ ,  $p < 0.01$ ), price value (TPVL) and perceived usefulness (TPUF) ( $H_9$ :  $\gamma = 0.13$ ,  $p < 0.01$ ), price value (TPVL) and perceived ease of use (TPES) ( $H_{10}$ :  $\gamma = 0.66$ ,  $p < 0.01$ ), perceived usefulness (TPUF) and attitude-towards-use (TATT) ( $H_{11}$ :  $\gamma = 0.20$ ,  $p < 0.01$ ) and perceived ease of use (TPES) and attitude-towards-use (TATT) ( $H_{12}$ :  $\gamma = 0.66$ ,  $p < 0.01$ ). Result indicated insignificant relationship between social influence (SINF) and perceived ease of use (TPES). ( $H_4$ :  $\gamma = 0.20$ ,  $p > 0.05$ ) and, image (TIMG) and perceived usefulness (TPUF) ( $H_7$ :  $\gamma = 0.28$ ,  $p > 0.05$ ).

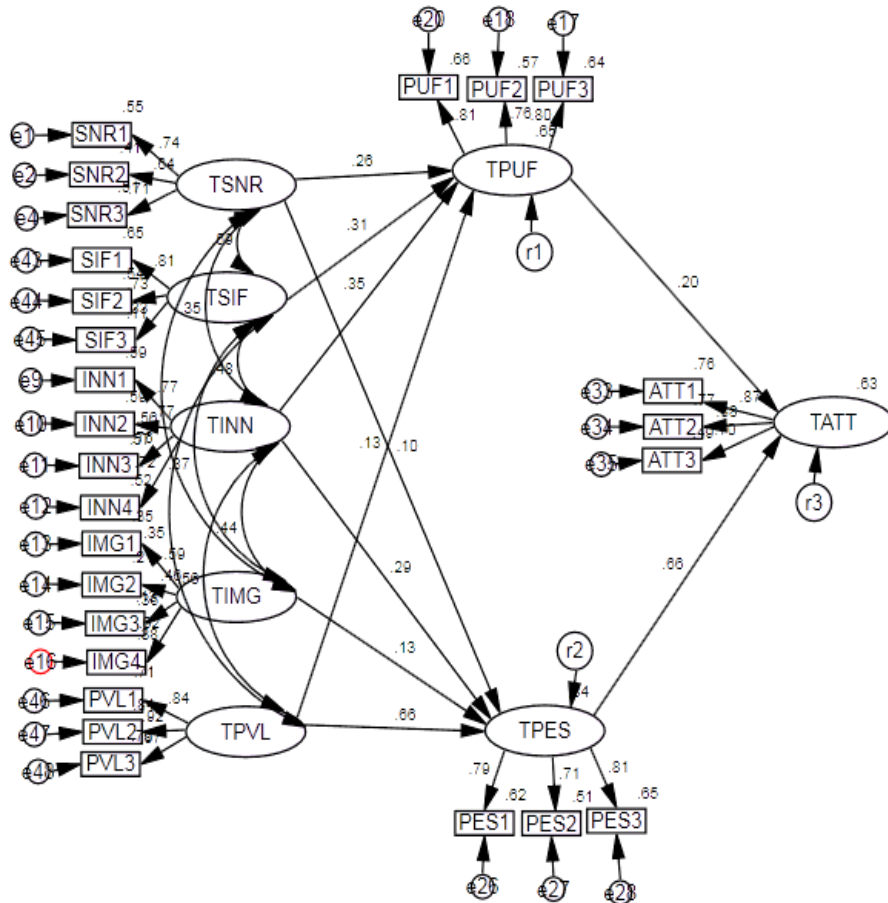


Figure 2: Structural Model (Study 2)

In the structural model analysis, the value of standardized regression ( $H_1: \gamma = 0.26, p < 0.01$ ) indicated a significant and positive relationship between social norms (TSNR) and perceived usefulness (TPUF). Significant and positive relationships were found between social influence (SINF) and perceived usefulness (TPUF) ( $H_2: \gamma = 0.31, p < 0.01$ ), social norms (TSNR) and perceived ease of use (TPES) ( $H_3: \gamma = 0.11, p < 0.01$ ), among innovation (TINN) and perceived usefulness (TPUF) ( $H_5: \gamma = 0.35, p < 0.01$ ), innovation (TINN) and perceived ease of use (TPES) ( $H_6: \gamma = 0.29, p < 0.01$ ), image (TIMG) and perceived ease of use (TPES) ( $H_8: \gamma = 0.12, p < 0.01$ ), price value (TPVL) and perceived usefulness (TPUF) ( $H_9: \gamma = 0.13, p < 0.01$ ), price value (TPVL) and perceived ease of use (TPES) ( $H_{10}: \gamma = 0.66, p < 0.01$ ), perceived usefulness (TPUF) and attitude-

towards-use (TATT) ( $H_{11}$ :  $\gamma = 0.20$ ,  $p < 0.01$ ) and perceived ease of use (TPES) and attitude-towards-use (TATT) ( $H_{12}$ :  $\gamma = 0.66$ ,  $p < 0.01$ ). Result indicated insignificant relationship between social influence (SINF) and perceived ease of use (TPES). ( $H_4$ :  $\gamma = 0.20$ ,  $p > 0.05$ ) and, image (TIMG) and perceived usefulness (TPUF) ( $H_7$ :  $\gamma = 0.28$ ,  $p > 0.05$ ).

#### 4. Discussion

This study was conducted to test and validate the integrated 3G/4G model based on TAM, TAM 2 and UTAUT. Data was collected from 610 mobile phone users of Islamabad and Rawalpindi Pakistan. Majority of the respondents were male youngsters. Results indicated that perceived usefulness has a significant impact on social norms. This implies that more the social norms the more is the perceived usefulness of the 3G/4G technology (Yang, 2017). Study result also showed that social influences positively influence perceived usefulness that signified that a consumer would perceive 3G/4G technology useful if he/she is influenced by peers, friends or family etc. Innovation has a positive and significant influence on perceived usefulness. This finding indicated that the more a consumer is innovative the more he/she would perceive 3G/4G technology useful. This finding is line with the previous studies (Bartels & Reinders, 2011; Newby, Nguyen & Waring, 2014). The image had no significant impact on perceived usefulness that implied that a consumer's social image had nothing to do with the usefulness of the 3G/4G technology. A significant positive influence between price value and perceived usefulness was found in this study. Findings lead us to believe that if 3G/4G technology services are more sensibly priced then the consumer would find them useful (Yang, 2017).

Results of the study illustrated a positive and significant impact of social norms on perceived ease of use. Which means that consumers would find 3G/4G technology easy to use if it is widely used and accepted by the person who are close to them which is quite interesting finding. Another interesting finding of this study is that there is no significant impact of social influences on perceived ease of use. Findings of this study also suggested that the innovative consumers would find it easy to use 3G/4G technology services because they are always looking to try out new technologies (Moon, Rasool & Attiq, 2015; Yang, 2017). A positive and significant impact of image and price value was also found on perceived ease of use in this study. This finding implies that consumers who are concerned with their social image and observe price and value very keenly are likely to develop a favorable attitude towards 3G/4G technology adoption (Yang, 2017).

The study results suggest that perceived usefulness and ease of use of 3G/4G technology services significantly and positively affect the attitude towards 3G/4G technology adoption (Venkatesh & Davis, 2000). The perceptions of ease of use proved to be more influential than perceptions of usefulness. This finding indicated that the consumers are more concerned with the easiness of operating and using 3G/4G technology (Yang, 2017) than its functional utility.



## 5. Limitations and Recommendations

The first limitation of this study is related to the generalizability of results because data were collected from two cities of Islamabad and Rawalpindi. Findings may not be generalized to the whole country or in other technologically less developed countries. Second, we only employ the technology acceptance model (TAM), future studies can be conducted by applying other advance models of technology i.e. UTAUT1 and UTAUT2. Third, in this study, we only studied one technology i.e., 3G/4G mobile technology. Further researches can be conducted on other technologies i.e. e-learning. Fourth, this type of research can also be conducted in other technologically less developed countries. Fifth, in this study some predictors, i.e., social norms, social influence, innovativeness, image, price value and habit are studied to understand the acceptance and adoption of 3G/4G technology. Future research can use other predictors to enhance the understanding of the acceptance and adoption of 3G/4G technology. In future studies, researcher may also compare the responses consumers across demographic and personal characteristics of individual consumers to gain deeper insights into the adoption behavior.

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