Adoption Of 3G/4G Technology in Pakistan: An Eastern Cultural Perspective

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This study primarily focuses on enhancing the existing understanding of Pakistani consumers' intentions regarding the adoption of 3G/4G technology through empirical investigation. Furthermore, it attempts to develop a new theoretical framework focusing on factors affecting consumers' adoption intentions. It is designed to explain the barriers consumers face while adopting 3G/4G technology in an eastern culture like Pakistan. Although previous research has already explored similar topics and conducted studies in the same field. in the Western context but, Pakistani 3G/4G market needs more investigation to understand consumers' adoption behavior. This work acts as foundation for marketing managers to have a comparative comprehension between the Western and Pakistani consumers. Literature indicates Pakistani markets under umbrella of the eastern Culture, so the Western theories may conclude in different consumer behavior due to relatively different socio-economics dynamics. A cross sectional survey was designed and convince sampling was used. The model is tested based on 7-point Likert scale self-administered questionnaire and obtained results of 566 respondents from Pakistani mobile phone users by using AMOS. The conclusion of this study showed that perceived social outcomes, general perceptions, perceived social impacts and perceived barriers contributed positively to the behavioral adoption intention of 3G/4G technology among Pakistani mobile phone users.

1. Introduction

We are living in the age of technology, and nothing is possible without the use of technology. Nowadays, it has become a trend that a person is judged mainly by their technology. Innovative and new ideas regarding business and mobile services are emerging with the fast-paced development of mobile technology. A study (Iqbal et al., 2020) reported that Pakistan has one of the largest mobile users based on biometrical verification. However, the country is quite behind in mobile internet related adoption, with only around, a half of mobile device users using a broadband connection. here is a significant untapped market segment that presents a viable opportunity.

Research (Naqvi et al., 2021) concluded that Pakistan's mobile phone penetration rate is impressive in comparison with other ICT tools. Roughly 77% of Pakistan's populace possesses a mobile phone subscription, and among them, approximately 32.34% utilize 3G and 4G technology. With the help of leveraging mobile phones, farmers can enhance their agricultural productivity and income while also reducing transportation expenses. As the development is proceeding at a speedy rate, it is essential to judge the response of consumers because, ultimately, the success of technology is judged by its acceptance and usage rate in consumers (Liébana-Cabanillas et al., 2019). The global count of internet users has experienced a swift and substantial growth. The internet users percentage in the world including developing countries, on average rose from 0% in 1990 up to 51% till 2018 in a period of 28 years (Rajagukguk, 2022).

The internet usage in one of the developing countries Pakistan, has increase from 15% in 2018 to 21% in 2021 ("The World Bank Data," 2021). According to("Telecom Indicators," 2023), there is 52.4 % mobile broadband penetration and a tele-density of 81.3%. In Pakistan, the uptake of transitioning to 3G and 4G networks exhibits a lackluster trend, with 2G networks retaining a considerable share of 59% among the overall subscriber base. Furthermore, despite the introduction of domestic manufacturing and increased production of mobile devices, the rate of smartphone adoption remains low. Consequently, Pakistan's potential to emerge as a dominant force in the realm of smartphones, akin to China, India, and Indonesia, is at risk of eluding them, as the aforementioned countries are poised to achieve their predetermined objectives by the year 2025 (Iqbal et al., 2020). However, the global average of broadband internet penetration is 64.6% which is higher than 52.4%(Statista, 2023).

According to (Measuring digital development:Facts and Figures Ê 2022), the users of 3G/4G technology has grown from 30% in 2010 to 63% in 2021. However, when comparing Pakistan to developed nations worldwide, the adoption trend of mobile and fixed broadband technologies has been increasing in Pakistan instead of 3G/4G technologies. The adoption rate of 3G/4G technology is prolonged compared to the developed countries of the world, where people are adopting 3G/4G technology at a swift rate.

Among the developing countries, Pakistan has been going ahead as one of the world's biggest mobile phone communication markets. As per Pakistan Telecommunication Authority (PTA), Pakistan is the country with the world's fourth most extensive and most significant broadband system. With the introduction of 3G/4G technology on 23 [Apr] 2014, Pakistan is now, a multifaceted technology area for competitors. Initially, Pakistan was proved to be the slowest technology adopter till year 2008 due to of the non-availability of the Internet, the expense of computers, and fewer people's awareness about the Internet and computers (Nielson, 2008). But with the induction of 3G/4G technology in Pakistani markets, the technology area is developing rapidly. The number of 3G/4G customers has be expanded by 3.74%, which is more than almost 1.07 million customers in the mid of yer 2016 (PTA, 2016).

Previous research has utilized different theories to comprehend the uptake of novel technologies. These theories encompass the Technology Acceptance Model (TAM), Theory of Planned Behavior and the Theory of Reasoned Action (Fishbein and Ajzen, 1975; Ajzen, 1985; Venkatesh,; Davis, 1989, Morris & Davis, 2003). Numerous studies have already explored in Western countries have identified factors that influence consumer adoption based on these theories (e.g., Nysveen, Pederson, & Thorbjornsen, 2005; de Marez, Vyncke, Berte, Schuurman, & de Moor, 2007; Pedersen, 2005; Revels, Tojib, & Tsarenko, 2010). However, whether these adoption determinants discovered in a Western context hold similar significance and applicability for consumers in Pakistan and other Eastern regions is worth considering.

Due to the significant disparities between Western Culture and Eastern Culture, Malhotra and McCort (2001) suggest the inclusion of additional constructs in Western models to account for the Eastern context. The primary objective of this study is to establish a novel conceptual framework that centers on the factors influencing consumers' intentions to embrace or adopt certain product or service. It is designed to explain the barriers consumers face while adopting 3G/4G technology.

2. Background

2.1. Behavioral Adoption Intention

Intentions can be defined as the probability or the probability of an individual engaging in a specific behavior, as outlined by Fishbein and Ajzen (1975). While the probability of adopting a behavior inside the consumer's mind is also known as intention (Grewal, Monroe & Krishnan, 1998). Intentions have an influence on the execution of real-life actions based on the intensity of intentions. Behavior is formed based on intentions, and antecedents of intentions are attitude (Fishbein and Ajzen, 1967). For instance, the Technology Acceptance Model (TAM) posits that intentions are influenced by variables such as perceived usefulness and perceived ease of use (Davis, 1989), while Fishbein and Ajzen (1975) propose that intentions play a role in the performance of actual behavior. While in the theory of planned behavior, perceived behavioral control and attitude shape behavioral intentions (Ajzen, 1985). Therefore, intentions have a significant impact on the adoption of future behaviors. Intentions also show the intensity of usage of behavior or actual behavior (Grewl et al., 1998).

2.2. Theoretical perspective

The previous research on innovation adoption examines and elucidates the decisions about the adoption of innovations through the utilization of cognitive and social theories that have evolved in Western Culture. The theories recognized in this context include the Theory of Planned Behavior (TPB) (Ajzen, 1985), the Technology Acceptance Model (TAM) (Davis, 1989), and the Theory of Reasoned Action (TRA) (Fishbein and Ajzen, 1967).

According to a study conducted by Siddiqi (2020), the implementation of 3G and 4G services, led to a remarkable increase in broadband connections in Pakistan. Public data up until March 2016 revealed that over 30 million broadband connections were recorded, indicating the enthusiastic adoption of this technology. A comparison between the current scenario and the past reveals a substantial change, as the number of broadband connections in Pakistan has risen from less than 4 million to over 30 million since the initiation of 3G and 4G technologies. As a result of these advancements, 3G/4G customers now make up the 90% of Pakistan's broadband access part and around 20% of the aggregated mobile phone customer base.

As these models are applied widely in technology adoption studies, it is argued that there are two primary criticisms about using these theories or models in current research. First, these models are too general and parsimonious. The primary focus of the Technology

Acceptance Model (TAM) lies in cognitive beliefs related to the adoption of technological innovations, specifically Perceived Usefulness and Perceived Ease of Use (Venkatesh & Davis, 2000; Nysveen, Pederson & Thorbjornsen, 2005). Therefore, TAM cannot be considered as a comprehensive and robust model. Secondly, due to reasons such as personal factor, universal accessibility factor and other multipurpose characteristics, there are a collection of factors that influence adoption which are very much dissimilar than traditional innovation drivers (Hong & Tam, 2006; Nysveen et al., 2005).

In addition, when applying these models in the Pakistani context, which represents an Eastern cultural context, there may be concerns regarding their applicability since all of these theories were developed within a Western context, specifically the United States. Therefore, it becomes necessary to adapt and incorporate new constructs into the model to suit the context outside of Western regions (McCort & Malhotra, 2001). While the present study does not directly utilize any of the three primary models, it aims to construct a conceptual framework for technology innovation adoption based on consumer psychology and behavior literature. This approach is expected to enhance understanding of technology adoption phenomena (Nysveen et al., 2005).

2.3 Conceptual framework and the research model development

In the present research, a different approach has been taken to construct a conceptual framework by integrating literature from various fields to complement each other. The study examines explicitly four categories of factors that drive adoption: perceived barriers, general perceptions, perceived social outcomes, and social influence.

The beliefs and individuals generally perceive for using technology innovation are known as general perceptions. The factors related to how social context influences affect adoption behavior is called social influence. Perceived barriers are the barriers perceived by Pakistani people affecting their adoption decisions. Perceived social outcomes are the social desires and need a Pakistani consumer go after using technological innovation. The proposed integrated model for the technology acceptance model suggests that the implementation of innovative and advanced technology can contribute to establishing a positive social image and fostering acceptance (Chi et al., 2022). Few innovation studies have recognized that utilizing an innovation may change the social image, resulting in adoption decisions (Venkatesh & Brown, 2001; Andrews, Kiel, Drennan, Boyle, & Weerawardena, 2007). The impact of social influences on shaping consumer behavior and technology adoption was substantial (Fisher and Price, 1992; Bearden and Etzel, 1982; Venkatesh and Brown, 2001).

Table No1: Adapted Factors Based on Theoretical Backgrounds

Categories	Constructs
"General Perceptions"	"Innovativeness, Skillfulness, Perceived Coolness, Facilitating Conditions, Perceived Enjoyment"
"Perceived Social Outcomes"	"Face gains, Face loss avoidance"
"Social Influences"	"Interpersonal Influence"
"Perceived Barriers"	"Price, ICAIL"

2.4 Innovativeness

Innovativeness is how a person tries new and unique technology (Agarwal & Prasad, 1998). Rogers (1995) suggests that innovative individuals are always ready to embrace and use

new products and technology. When they feel bored while using the same particular product, consumers switch toward the new product (Meuter et al., 2008). Higher innovativeness is the base of a higher level of positive thinking toward new technology (Lopez et al., 2008; Wang et al., 2013).

Innovativeness refers to the market leader and pioneer in the technology industry. It is among the constructs to measure technology readiness (Parasuraman, 2000). Personal innovativeness positively impacts BI and consumer attitude in online shopping (Limayem et al., 2000). Based on the above, it is possible to formulate the aforementioned hypothesis:

H$_1$: There is a significant positive relationship between innovativeness and behavioral adoption intention.

2.5 Perceived Coolness

"Wow! This is a cool response given by a person when he is provided with new technological and innovative products. A product has a greater chance of market success if it can induce positive interest (e.g., coolness) (Kim et al., 2015). Coolness is assessed using four dimensions, namely attractiveness, subcultural appeal, originality, and utility. (Sundar et al., 2014).

2.6 Originality

Originality can be defined as the degree to which a product distinguishes itself from other similar products in terms of substantial, functional, and aesthetic aspects. It is also known as uniqueness (Sundar et al., 2014). Products with uncommon features as compared to products of the exact nature are usually as unique. For example, new names, exciting features, accessible functions, and fashionable modern or ultra-modern designs are some of the distinct characteristics on which product uniqueness is predicted (Ki, et al., 2015). Products possessing such features make people feel different from others in society (Snyder, 1992). Early adopters and potential users are attracted to the originality and innovativeness of the product (Sundar & Marathe, 2010). Products that show unique and individual styles are purchased in western Culture based on novelty (Kron, 1983). Ki et al. (2015) suggest that the product's originality creates a positive attitude toward users of smartphones.

2.7 Subcultural Appeal

People are usually distinguished by outstanding characteristics, unique values, and significant interests (Tian et al., 2001; Southgate & Coolhunting, 2003; Horton et al., 2012). Using unique products is the source of distinctiveness in society (McAlister & Pessemier, 1982). Sundar et al. (2014) suggest that a product's subcultural appeal is critical to coolness, making a person feel different from and unique from others. Subcultural attraction promotes a positive attitude toward the device (Kim & Shin, 2015). Perceived coolness leads to technology adoption (Kim et al., 2015). So, the following hypothesis is proposed:

H$_2$: There is positive relationship between perceived coolness and behavioral adoption intention.

2.8 Facilitating Conditions

The term facilitating conditions means the perception of unique resources to aid the usage behavior (Venkatesh et al., 2003). The utilization of the "Unified Theory of Acceptance and Use of Technology (UTAUT)" is incorporated in this context. The adoption of technology tends to be higher when users perceive that the technological features facilitate the usage of a system (Wong et al., 2015). Facilitating Condition positively impacts Behavioral Intention for Adoption (Jose et al., 2015). This is why, it is hypothesized that:

H$_3$: There is positive relationship between facilitating conditions and behavioral adoption intention.

2.9 Skillfulness

Implementing a task effectively from mobile phone devices by an individual is known as skillfulness (Lu & Su, 2009). It is referred to as the accomplishment of the task by users by mobile devices. If the technology users complete their tasks within the specified time and within system limitations via m-devices, it is considered a higher level of mobile skillfulness (Lu & Su, 2009). Skillfulness is positively associated to "perceived ease of use", usefulness, and service is positively associated with behavioral adoption intention (Wong et al., 2015). Consequently, the aforementioned hypotheses can be suggested:

H₄: There is positive relationship between skillfulness and behavioral adoption intention.

H₅: There is positive relationship between skillfulness on Perceived enjoyment.

2.10 Perceived Enjoyment

Perceived enjoyment can be defined as the perception that using the system or engaging in activities on the system is enjoyable, regardless of the system's actual performance (Davis, et al., 1992). Perceived enjoyment is an intrinsic dimension of motivation related to activity satisfaction and pleasure (Sung & Yun, 2010). Perceived enjoyment is the primary and essential predictor of technology (Moon & Kim, 2001). The higher the person enjoys the system, the higher the BI rate the system uses (Van der Heijden, 2004). The higher the individual perceives the enjoyment and pleasure condition, the higher the rate of Behavioral adoption intention. There is a positive correlation between perceived enjoyment and consumers' Behavioral Intention (Wong et al., 2015). Therefore, perceived enjoyment is hypothesized to be related to behavioral adoption intention.

H₆: There is positive relationship between perceived enjoyment and behavioral adoption intention.

2.11 Face Gain

It is defined as the degree to which the adoption of mobile innovation improves users' social image or reputation within their society (Yau, 1988). By successful social performance, face gain is achieved (Hwang, 1987). Technology adoption increases and enhances their social status (Moore & Benbasat, 1991; Rogers, 1995; Andrews, Kiel, Drennan, Boyle & Weerwardena, 2007; Revels, Tojib & Tsarenko 2010; Venkatesh & Bala, 2008). Face gain is the motivation for technology adoption in the mobile phone sector. Face gain positively influences adoption intention (Song, 2014). This argument leads to the following hypothesis:

H₇: There is positive relationship between Face gain and behavioral adoption

2.12 Face Loss Avoidance

Face Loss avoidance is usually perceived as the anti-concept to face gain, but it is not anti to it. Face loss avoidance is the ability to avoid status or face loss by using mobile phone innovation (Ho, 1976; Hwang, 1987). Sometimes the, outdated technology becomes the source of face loss avoidance. Consumers are often very conservative, but they update their mobile technological innovation to maintain their face loss avoidance. Face loss avoidance has a positive influence on "adoption intention". Interpersonal influence has a direct positive effect on face loss avoidance. Based on the preceding discourse, we put forward the subsequent hypothesis:

H₈: There is positive relationship between Face loss avoidance and behavioral adoption intention.

2.13 Interpersonal Influence

Interpersonal influence refers to the impact of others on an individual's mobile innovation adoption because the person influences his social network (Song, 2014). Social influence is the performance of behavior under perceived pressure to perceive product value (Cousineau & Burnkrant, 1975; Ajzen & Fishbein, 1975). Social influence is analyzed by Normative and Informative factors (Burnkrant & Cousineau, 1975). Rogers (1995) states that

interpersonal and external sources can distinguish it. Bass (1969) suggests that social influences are analyzed by interpersonal and mass media influence. Interpersonal influence has a positive impact on adoption behavior (Ajzen, 1991; Fishbein & Ajzen, 1975) as well as mobile adoption (Hong & Tam, 2006; Nysveen et al., 2005). Individuals often influence interpersonal influence to form a positive social image within society. Based on the above arguments, the aforementioned hypotheses are formulated:

H_9: *"There is a significant positive relationship between interpersonal influence and behavioral adoption intention."*

H_{10}: *"Interpersonal influence and face gain have a significant positive relationship."*

H_{11}: *"Interpersonal influence and face loss avoidance have a significant positive relationship."*

2.14 Price

The consumer perception of the monetary cost consumed while using the product and its perceived benefits is known as Price value (Venkatesh, Thong & Xu, 2012). Price is essential when adopting technology (Zhenyu et al. 2011). We defined price as the monetary value that consumers associate with 3G services. Previous studies conducted by Agarwal et al. (2007) and Zhenyu et al. (2011) have examined the impact of price upon 3G usage behavior, confirming its significance. Studies suggest that reducing the prices of 3G services is likely to entice a larger number of consumers to embrace 3G technology (Lin & Chiu, 2014). In a study specifically focusing on 3G related services, Zhenyu et al. (2011) assessed that a perception of high prices is negatively associated with adopting 3G, discouraging consumers from adopting this technology. Price is considered an essential determinant of adoption intention (Akematsu, Shinohara & Tsuji, 2012), categorically in developing countries (Grag & Grag, 2013). Most consumers in USA and China (Lin, 2013) rated price as a major factor in studies analyzing attitudes and intentions toward 3G adoption. Price is negatively related to behavioral adoption intention. Therefore, the hypothesis is proposed that:

H_{12}: *"There is a significant negative relationship between price and behavioral adoption intention."*

2.15 ICAIL

Individualism is referred to as the achievement of individual goals, while on the other hand, collectivism is the achievement of collective goals (Kulkarni et al., 2011).

IC's influence on social behavior is due to its prominence in the Hofstede cultural theory (Tri Andis, 1995). Hofstede (1991) suggests that IC, out of the five fundamental dimensions of Culture, is deeply connected with the innovation adoption intention studies. Most studies have examined IC's role being incorporated in the TAM relationship and intention to use subjects. Srite and Karahanna (2006) have assessed the positive effect of the IC relationship with usefulness and the perceived ease of use while assessing the impact of moderation of IC on the acceptance of information technology with TAM as an extension.

Among cultural values, IC is one of the negative factors affecting innovation adoption, that's why a considerable number of researches are conducted on IC's impact on purchase intention and behavior (Flight et al., 2011). Hung et al. (2010) use the Hofstede theory is employed to examine the correlation between cultural values and adoption intention. He explained that IC moderated between perceived ease of use and perceived usefulness. Zhang et al. (2012) confirmed that technology innovation adoption is specifically moderated under IC. Individualism-collectivism at the individual level plays a positive moderating role in the connection between behavioral intention and the actual usage of m-commerce. The moderating impact is more pronounced among individuals who demonstrate collectivist inclinations in contrast to those with individualistic tendencies. Based upon the aforementioned discussion, this assessment presents the following hypothesis:

H₁₃: *"A significant positive relationship exists between ICAIL and behavioral adoption intention."*

Figure No1: Proposed Research Framework
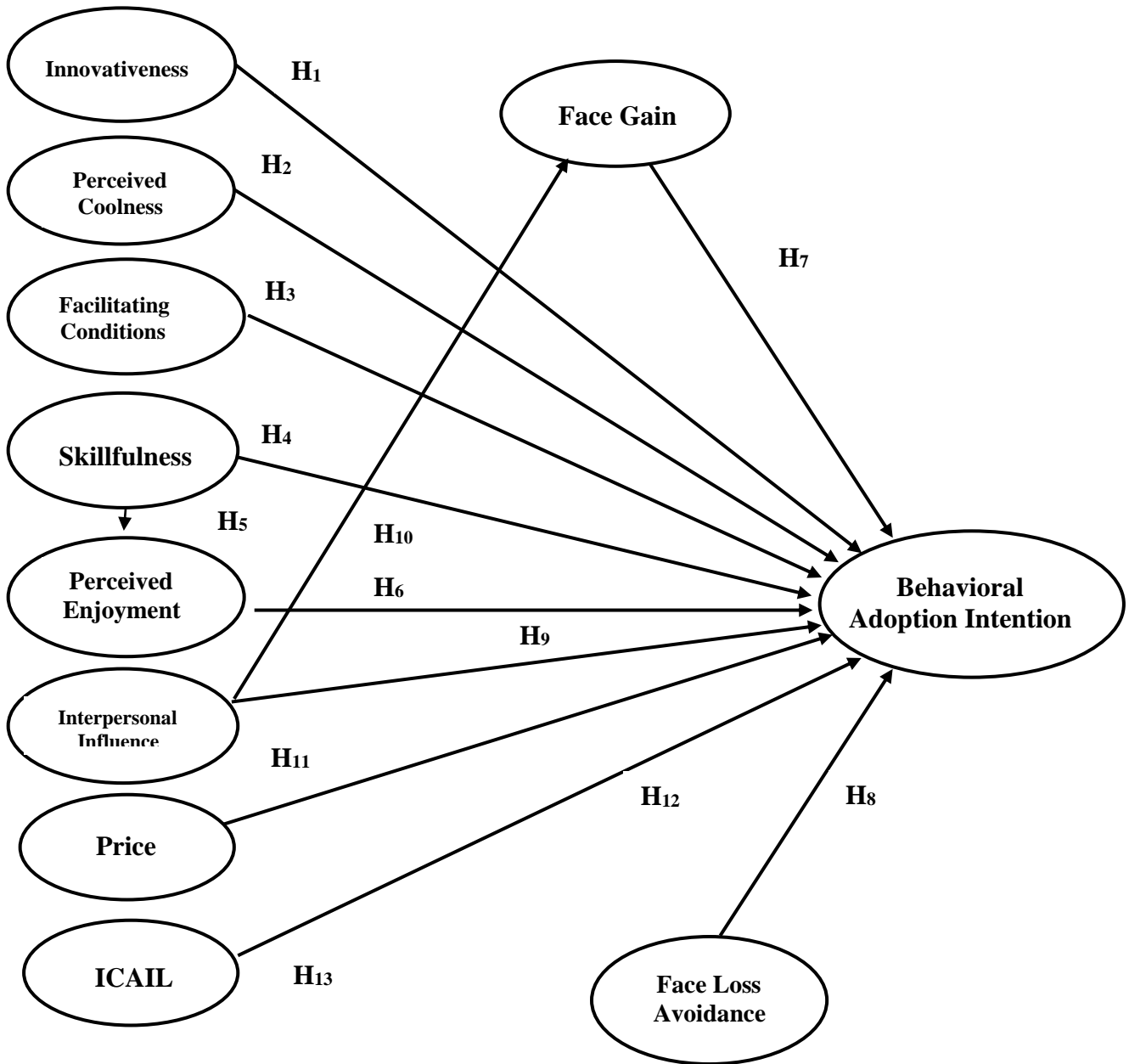
3. Methodology

3.1 Data Collection

A self-administered survey was conducted among university students. Because of cost-effectiveness and coverage of a big sample size, many researchers recommend the survey data collection for primary data collection (Bloch, Ridgway & Dawson, 1994). Most researchers in the field of 3G/4G service technology have used the survey method for primary data collection because of its benefits of easiness and cheapness (Song, 2015). The data was gathered from university students residing in major cities of Pakistan. The major cities from which data was collected were Multan, Lahore, Quetta, Peshawar, Karachi, Mirpur, and Faislabad. University students in these seven cities were contacted through personal contacts and by contacting their faculty members and the directorate of student affairs of specific universities. Eight hundred students were initially contacted, and the response rate was 89.5%.

3.2 Participants

Youngsters are innovative and more inclined towards using the new mobile technology, especially university enrolled students, who have a higher level of exposure to mobile technology adoption process than the general public (Choi, Hwang & McMillan, 2008; Jurisic and Azevedo, 2011). Because of this reason, the data has been gathered from university students of seven major cities of Pakistan. 716 responses were collected from 15 universities in Pakistan. 150 responses from the total collected responses were eliminated due to missing information and incorrect and improper filling of the response. 566 properly filled responses were left, which was 69.5 % of the responses floated.

3.3 Measurement Instruments

A Likert scale with seven points, ranging from one (1) (representing Strongly Disagree) to seven (7) (representing Strongly Agree), was utilized. The questionnaire comprised a total of 66 items. Rankings from the previous literature and published studies of the variables mentioned in the model have been used.

Table No 2: Variables and Scale References

No.	Variable	Scales Reference
1	Subcultural Appeal	(Sundar et al., 2014)
2	Originality	(Kim et al., 2015)
3	Facilitating Condition	(Pederson, 2005)
4	Innovativeness	(Parasuraman, 2000)
5	Skillfulness	(Lu and Su, 2009)
6	Perceived Enjoyment	(Nysveen and Pederson, 2005)
7	Face Gain	(J. Song, 2014)
8	Face Loss Avoidance	(J. Song, 2014)
9	Interpersonal Influence	(Hong & Tam, 2006)
10	Price	(Venkatesh, Thong & Xu, 2012)
11	Individualism Collectivism at	(Hofstede, 1993)
12	Behavioral Adoption Intention	(Hong & Tam, 2006)

4 Results
4.1 Instrument Validity and Reliability

To evaluate the accuracy of the measurement model, a confirmatory factor analysis was conducted using AMOS software (Version 23). Multiple fit indices, including the Comparative Fit Index (CFI), Normal Fit Index (NFI), Tucker-Lewis Index (TLI), Goodness of Fit Index (GFI), Root Mean Square Error of Approximation (RMSEA), and Relative Chi-square (CMIN/DF), were utilized to assess the overall fitness of the model. These fit indices are widely recognized and useful in evaluating the tested model's overall fit quality (Kline, 2023) (Hair et al., 1998). The descriptive statistics for the sample are summarized in Table 2.

Table 3: Demographics Information

Demographic Variable	Properties	Frequency	Percentage
Gender	Male	334	59%
	Female	232	41%
Age	18-23	378	66.80%
	24-29	165	29.20%
	30-35	23	4%
Income or Pocket Money	Less than 10000	292	51.60%
	Less than 20000	121	21.40%
	Less than 30000	63	11.10%
	Less than 40000	37	6.50%
	More than 40000	53	9.40%
Education	Undergraduate	231	40.80%
	Graduate	192	33.90%
	Postgraduate	143	25.30%
	Never	49	8.70%
Experience of using 3G/4G	Up to 6 months	150	26.50%
	Up to 1 year	127	22.40%
	Up to 1.5 year	75	13.30%
	Up to 2 year	164	29%

After evaluating the overall fit of the model, an examination was conducted to assess the reliability and validity of the constructs in the model. Table 5 presents the values for Cronbach's coefficient (α), composite reliability (CR), average variance extracted (AVE), and factor loadings (k). The results indicate that all constructs have Cronbach's α values greater than 0.70, indicating satisfactory construct reliability (Nunnally, 1978). The constructs exhibit strong convergent validity, with indicator factor loadings exceeding 0.70 (Nunnally & Bernstein, 1994). The values for composite reliability (CR) range from 0.74 to 0.85, surpassing the threshold of 0.60 (Fornell & Larcker, 1981). Average variance extracted (AVE) values range from 0.43 to 0.60, above the recommended level of 0.50 (Fornell & Larcker, 1981). Overall, the findings support good convergent validity.

Table 4 presents a summary of the model fit indices, indicating that the relevant indicators fall within their prescribed threshold values. These findings imply a satisfactory level of goodness of fit.

Table No 4: Final Measurement Model for Fit Indices
Table No 5: Reliability and Validity

SN	Name of Measures	Abbreviations	Thresholds	Initial Measurement Model	Final Measurement Model
1	Relative Chi-Square	CMIN/DF	Poor fit: >5	2.262	1.936
			Reasonable fit 3-5	Best Fit	Best Fit
			Best fit 1-3		
2	Goodness of Fit Index	GFI	Poor fit <0.90	0.838	0.856
			Reasonable fit ≥0.90	Poor Fit	Poor Fit
			Best fit ≥0.95		
3	Adjusted GFI	AGFI	Poor fit <0.80	0.817	0.833
			Reasonable fit ≥0.80	Poor Fit	Reasonable fit
			Best fit ≥0.90		
4	Comparative Fit Index	CFI	Poor fit <0.90	0.891	0.918
			Reasonable fit ≥0.90	Poor Fit	Reasonable fit
			Best fit ≥0.95		

SN	Variable	Codes	Factor Loadings	SMC	CR	α	AVE
1	Subcultural Appeal	SA1	0.612	0.375	0.754	0.830	0.435
		SA3	0.650	0.423			
		SA5	0.667	0.445			
		SA6	0.706	0.498			
2	Originality	O1	0.724	0.523	0.749	0.783	0.500
		O2	0.756	0.571			
		O3	0.635	0.403			

#	Construct	Item	Loading		CR	α	AVE
3	Facilitating Conditions	FC1	0.687	0.472	0.835	0.840	0.503
		FC2	0.706	0.499			
		FC3	0.739	0.546			
		FC4	0.692	0.478			
		FC5	0.722	0.521			
4	Innovativeness	IN2	0.786	0.678	0.774	0.763	0.535
		IN3	0.643	0.413			
		IN4	0.757	0.573			
5	Skillfulness	S1	0.774	0.599	0.790	0.790	0.556
		S2	0.754	0.568			
		S3	0.708	0.502			
6	Perceived Enjoyment	PEJ1	0.796	0.663	0.846	0.831	0.579
		PEJ2	0.784	0.615			
		PEJ3	0.758	0.574			
		PEJ4	0.703	0.494			
7	Face Gain	FG1	0.760	0.578	0.852	0.838	0.591
		FG2	0.739	0.546			
		FG3	0.779	0.606			
		FG4	0.796	0.634			
8	Face Loss Avoidance	FLA1	0.716	0.513	0.845	0.837	0.578
		FLA2	0.759	0.577			
		FLA3	0.774	0.600			
		FLA4	0.790	0.624			
9	Interpersonal Influence	II1	0.765	0.585	0.837	0.828	0.563
		II2	0.754	0.569			
		II3	0.711	0.505			
		II4	0769	0.592			
10	Price	P1	0.758	0.575	0.809	0.808	0.586
		P2	0.824	0.679			
		P3	0.710	0.504			
11	Individualism Collectivism at Individual Level	IC1	0.634	0.402	0.852	0.838	0.536
		IC2	0.764	0.583			
		IC3	0.739	0.546			
		IC4	0.740	0.547			
		IC5	0.776	0.602			
12	Behavioral Adoption Intention	BAI1	0.763	0.582	0.823	0.822	0.608
		BAI2	0.803	0.645			
		BAI3	0.773	0.597			

The findings mentioned in Table 6 suggest satisfactory discriminant validity as the associations among the constructs were compared to the square roots of the Average Variance Extracted (AVE) values, following Fornell and Larcker's (1981) approach.

Table No 6: Discriminant/Divergent Validity

	α	CR	AVE	SA	P	PEJ	IC	II	S	IN	FC	FG	BAI	FLA	O
SA	0.754	0.754	0.435	**0.660**											
P	0.808	0.809	0.586	0.402	**0.765**										
PEJ	0.831	0.846	0.579	0.498	0.481	**0.761**									
IC	0.838	0.852	0.536	0.380	0.571	0.464	**0.732**								
II	0.828	0.837	0.563	0.481	0.714	0.660	0.661	**0.750**							
S	0.790	0.790	0.556	0.505	0.516	**0.794**	0.470	0.662	**0.746**						
IN	0.773	0.774	0.535	0.453	0.516	0.703	0.525	0.600	**0.923**	**0.731**					
FC	0.830	0.835	0.503	0.519	0.486	0.590	0.457	0.590	0.574	0.588	**0.709**				
FG	0.838	0.852	0.591	0.504	0.647	0.607	0.449	0.622	0.539	0.441	0.492	**0.769**			
BAI	0.822	0.823	0.608	0.436	0.425	0.475	0.642	0.536	0.452	0.430	0.420	0.425	**0.780**		
FLA	0.837	0.845	0.578	0.375	0.571	0.468	0.415	0.573	0.435	0.427	0.340	**0.832**	0.371	**0.760**	
O	0.761	0.749	0.500	**0.837**	0.438	0.523	0.318	0.444	0.513	0.445	0.530	0.442	0.360	0.341	**0.707**

Standard method of variance was analysed with "Harman's single factor test", as Podsakoff, MacKenzie, Lee, and Podsakoff (2003) recommended. Herman's single factor showed 32% of the total variance, which is quite less than fifty percent, indicating that the common method bias is not affecting our data set.

4.2 Outcomes of SEM and hypothesis testing

The research model was tested using full structural equation modeling in AMOS (Ver. 23), and a comprehensive analysis was conducted. Similar fit indices were used to assess the goodness of fit of the structural model. The summarized results can be found in Table 5 also, indicating a favorable fit based on all the indices. Table 7 presents the outcomes of the confirmatory structural model testing, providing information on the degree of support for the proposed hypotheses.

As per the result outcomes presented in Table 7, several hypotheses were supported. Hypothesis 1 received support, indicating a significant relationship between innovativeness and behavioral adoption intention ($\gamma= 0.16$, P<0.001). Hypothesis 2 was also supported, revealing a "significant positive relationship" between perceived coolness and behavioral adoption intention ($\gamma= 0.49$, P<0.001). Similarly, Hypothesis 3 found support, indicating a "significant positive relationship" between supported or facilitating or supporting conditions and behavioral adoption intention ($\gamma= 10$, P<0.05). Proposed Hypothesis 4 received support, showing a significant relationship between skillfulness and behavioral adoption intention ($\gamma= 0.57$, P<0.001). Hypothesis 5 was supported, demonstrating a significant relationship between skillfulness and perceived enjoyment ($\gamma= 0.67$, P<0.001). Hypothesis 6 received support, indicating a "significant relationship" between perceived enjoyment and behavioral adoption intention ($\gamma= 0.24$, P<0.001).

Hypothesis 7 found support, revealing a significant positive relationship between face gain and behavioral adoption intention ($\gamma= 0.33$, P<0.001). Proposed Hypothesis 8 received support, indicating a significant positive relationship between face loss avoidance and behavioral adoption intention ($\gamma= 0.12$, P<0.05). Hypothesis 9 was supported, showing a significant relationship between interpersonal influence and behavioral adoption intention ($\gamma= 0.11$, P<0.10). Hypothesis 10 found support, revealing a significant positive relationship between interpersonal influence and face gain ($\gamma= 0.16$, P<0.001). Proposed Hypothesis 11 received support, indicating a significant positive relationship between interpersonal influence and face loss avoidance ($\gamma= 0.11$, P<0.001). Hypothesis 12 was not supported, as an insignificant relationship was found between price and behavioral adoption intention ($\gamma= 0.04$, P>0.10). Hypothesis 13 was supported, indicating a "significant positive relationship" between individualism-collectivism and "behavioral adoption intention" ($\gamma= 0.57$, P<0.001).

Table No 7: Hypothesis Outcomes

Hyp.	Structural Path			γ	SE	t-values	P-values	Decision
H1	IN	→	BAI	0.16	.105	5.689	<0.001	Supported
H2	PC	→	BAI	0.49	.065	6.888	<0.001	Supported
H3	FC	→	BAI	10	.040	2.284	<0.05	Supported
H4	S	→	BAI	0.57	.113	4.334	<0.001	Supported
H5	S	→	PEJ	0.67	.028	23.708	<0.001	Supported
H6	PEJ	→	BAI	0.24	.048	3.830	<0.001	Supported
H7	FG	→	BAI	0.33	.056	4.826	<0.001	Supported
H8	FLA	→	BAI	0.12	.052	1.874	<.05	Supported
H9	II	→	BAI	0.11	.055	1.788	<.10	Supported
H10	II	→	FG	0.16	.049	3.593	<0.001	Supported
H11	II	→	FLA	0.11	.028	4.063	<0.001	Supported
H12	P	→	BAI	0.04	.042	.869	.385	Not Supported
H13	ICAIL	→	BAI	0.57	.041	11.989	<0.001	Supported

Table No 8: New Relationships from the Results

New Relationships			Γ	SE	t-values	P-values	Decision
SA	→	FG	0.18	.039	5.117	<0.001	Unable to Reject
FC	→	PEJ	0.12	.029	4.426	<0.001	Unable to Reject
FC	→	FLA	0.22	.026	9.333	<0.001	Unable to Reject
P	→	FG	0.41	.048	9.174	<0.001	Unable to Reject
FG	→	FLA	0.84	.025	34.174	<0.001	Unable to Reject

5. Discussion and Conclusion

The research results supported the proposed research model of this research work and its hypotheses. Several insightful findings are summarized and presented respectively.

General perceptions of consumers include variables of perceived coolness measured by the two fundamental dimensions of sub-cultural appeal and originality, facilitating conditions, perceived enjoyment, skillfulness, and innovativeness. The "perceived social outcomes" include face gain and face loss avoidance. Price and individualism-collectivism at the individual level were included in perceived barriers. Interpersonal influence is included in social influences. The conclusion of this study outcomes expressed that general perceptions, perceived social results, perceived social impacts, and perceived barriers contributed positively to the behavioral adoption intention of 3G/4G technology.

General perceptions include five constructs formed by using or getting knowledge of 3G/4G technology. Behavioral adoption intentions in Pakistani consumers were significantly influenced by the general perceptions, which is in a similar lane to Western adoption of technology studies (Nysveen et al., 2005; Venkatesh & Brown, 2001; Sullivan Mort & Drennan, 2007), suggested that these five constructs are universally affecting behavioral

adoption intention process across worldwide nations. It was hypothesized that innovativeness and behavioral adoption intention had a significant positive relationship. Results supported that a significant positive relationship existed between innovativeness and behavioral adoption intention, similar to the findings in previous studies on innovativeness and behavioral adoption intention (Limayem et al., 2000). A "significant positive relationship" was proposed between perceived coolness and behavioral adoption intention. Current study results supported a significant positive relationship between perceived coolness and behavioral adoption intention.

As perceived coolness was measured on the basis of two dimensions in this study which were sub-cultural appeal and originality so, the result explained that originality is the uniqueness of the 3G/4G technology, which leads to the cool feelings. At the same time, sub-cultural appeal plays a major role in the formation of perceived coolness. Prior studies also showed a positive relationship between perceived coolness and the technology adoption process (Kim et al., 2015).

A "significant positive relationship" between "facilitating conditions" and "behavioral adoption intention" was hypothesized in the proposed framework. The findings of this study supported this hypothesis. Jose et al. (2015) also argued that the facilitating conditions are positively related to the technology adoption process.

A significant positive relationship existed between skillfulness and behavioral adoption intention. From the results of this study, this relationship was proved, similar to the findings of previous research (Wong et al., 2015). It was suggested that a positively significant relationship exists between skillfulness and perceived enjoyment. The results of this study proved the positive relationship between skillfulness and perceived enjoyment. A significant positive relationship exists between perceived enjoyment and behavioral adoption intention hypothesized in the proposed framework. The results supported the hypothesis. Previously Wong et al. (2015) also found this relation.

Perceived social outcomes include two constructs: face gain and face loss avoidance. Face gain and face loss avoidance have a major role in Pakistani Culture. Behavioral adoption intentions are positively as well as significantly related to perceived social outcomes. A "significant positive relationship" was proposed in the framework between face gain and behavioral adoption intention. The findings of this study supported this proposed relation. The 3G/4G technology improves people's status and image. It helped the Pakistani people in adopting technology. Song (2015) also found that a positive image exists between face gain and adoption intention.

Moreover, it was also proposed that face loss avoidance has a significant positive relationship with behavioral adoption intention. The results of this study supported the significant positive relation between face loss avoidance and behavioral adoption intention. Another study supported this finding, which found a positive relationship between face loss avoidance and technology adoption (Song, 2015).

Perceived influences were measured in this study based on one construct, interpersonal influence. A "significant positive relationship" between interpersonal influence and behavioral adoption intention was proposed in the current study. According to the hypothesis testing results, a significant positive relationship between face gain and interpersonal influence behavior and between face loss avoidance and interpersonal influence were supported.

The present study categorized price and individualism-collectivism at the individual level as perceived barriers. The findings provided support for a significant positive association between "individualism-collectivism" on the individual level and behavioral adoption intention. However, the relationship between price and behavioral adoption intention was not resulted in to be significant. This suggests that individualism-collectivism

at the individual level plays a prominent role in influencing adoption intention. On the contrary, price did not have a significant impact on the adoption intention of Pakistani consumers in the context of 3G/4G technology. This finding may indicate that Pakistani consumers are not easily swayed by price when it comes to adopting 3G/4G technology. This observation aligns with the principles of the Price-Demand theory, which primarily apply to basic commodities. Since 3G/4G technology is not considered a basic commodity, its adoption may not be greatly influenced by price considerations. It is demonstrated as a want, more precisely, a luxurious item. (Alfred Marshall, 1890). Table 8 shows the new relationships suggested by the results of the study.

5.1 Theoretical implications

This research presents an attempt to understand Pakistani consumers' technology adoption intentions. There are several implications. Firstly, it examines factors influencing the 3G/4G technology adoption, contributing to the existing literature. The area of Pakistani consumers' adoption of 3G/4G technology has been acknowledged as lacking sufficient research. The outcomes of the this research work aim to accommodate research gap by offering valuable insights into the under-explored domain of 3G/4G technology adoption in Pakistan. These findings are expected to provide valuable contributions to the existing literature and serve as a valuable resource for research scholars interested in investigating the dynamics of 3G/4G technology adoption in the Pakistani context.

Secondly, this study extends the findings of Western innovation adoption studies. Unlike other studies, Western theories were applied without considering whether these theories were appropriate for eastern Culture. The current study developed a research framework based on the psychology and behavior of the consumer. This model of adoption incorporates four adoption drivers named perceived social outcomes, general perceptions, perceived influences, and perceived barriers. Western studies suggest that they are equally important all across the world. But, this study identified one inconsistency with Western studies.

The findings of the study indicated that the price factor had an insignificant impact on the adoption of 3G/4G technology among Pakistani consumers. Furthermore, face gain and face loss avoidance, which are not typically considered critical determinants in Western cultures, were identified as influential factors influencing the adoption of the 3G/4G technology among Pakistani consumers. As a result, this study expands upon the existing body of Western research on 3G/4G technology adoption by uncovering the significance of these cultural factors in the Pakistani context.

5.2 Practical Implications

This study contributes practically by providing important factors for corporate decision makers and technology giants regarding Pakistani consumers' intention to adopt 3G/4G technology. This study's contribution can assist managers and policymakers in making effective strategies that will encourage 3G/4G technology to be significantly adopted by Pakistani consumers. Firstly, a managerial recommendation, is to organize training and promotional sessions aimed at familiarizing individuals with the practical benefits of 3G/4G technology in their everyday lives. This approach can help raise awareness and educate potential users about the advantages and applications of 3G/4G technology. Additionally, managers should consider incorporating innovative strategies to enhance the adoption of 3G/4G technology. By introducing novel features, services, or approaches, managers can make

the technology more appealing and attractive to potential users, increasing their willingness to adopt it.

As "face gain" and "face loss avoidance" have a positive impact on technology adoption, so, the managers can devise the strategies in such a manner that these lead to the image and status building of the consumer, pointing out that it can be a status symbol as 3G/4G technology sector is a fastly growing sector of the economy globally. In contrast, its growth rate is much slower in Pakistan than in other developed countries. So, policymakers can design advertisements and launch campaigns in universities to create awareness among students about the benefits of 3G/4G technology because university students are early adopters. They should educate them about 3G/.4G technology and its direct effects on their academic life. Policymakers and managers should understand the psychology of Pakistani consumers to enhance the adoption rate of 3G/4G technology.

5.3 Limitations and Future Recommendations

The findings of this study should be interpreted with caution due to several limitations. One such limitation is the deployment of a cross-sectional research design, which restricts the ability to establish causal relationships and capture changes over time. Therefore, future researchers may consider employing a longitudinal design to give a more comprehensive and in-depth comprehension of the phenomenon. This would allow for the examination of changes and developments over an extended period, offering a more robust perspective.

The potential limitation of the current research work is that it has focused on users' intentions rather than their actual behaviors. This research assessment tries to understand the subject of "3G/4G adoption". However, it did not incorporate more advanced technology like LTE, an extension of 4G and 5G. Therefore, future researchers on the adoption process can consider developed technology areas in their studies.

The overall generalizability of the study outcomes in this research work is restricted to the four major cities in South Punjab, Pakistan, which restricts the applicability of the results to a specific geographical area. Furthermore, the use of undergraduate students as the sample population introduces a potential limitation, as their characteristics and experiences may differ from those of the general population. To improve the generalizability of future studies, it is advisable to incorporate a more diverse sample frame that encompasses individuals from various demographics and backgrounds. By including a diverse sample, researchers can enhance the study's external validity and gain a comprehensive understanding of the topic.

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