PREDICTING MOBILE PHONE USAGE WHILE DRIVING: A TWO STAGED PARTIAL LEAST SQUARES AND ANN APPROACH

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APPROVAL

This **Thesis** titled "**Predicting mobile phone usage while driving: a two staged partial least squares and ANN approach**", submitted by Umma Kulsum Mowri, **ID**: **181-35-2316** to the Department of Software Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc in Software Engineering and approved as to its style and contents.

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THESIS DECLARATION

I hereby declare that the thesis titled "**Predicting mobile phone usage while driving: a two staged partial least squares and ANN approach**" is an original record done by me under the supervision of Dr. Imran Mahmud, Associate Professor & Head, Department of Software Engineering, Daffodil International University, towards the partial fulfillment of requirement for the award of degree of Bachelor of Science in Software Engineering during the period of 2017-2021. I also state that this thesis has not been submitted anywhere in the partial fulfillment for any degree of this or any other University.

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In this present age there is a race to sustain one's existence in which those who are having will come anterior to succeed.A thesis is an theory or idea that expressed as a statement and is discussed in a logical way.It is true that I have taken exertion in this thesis.But it would never have been possible except the kind support and help of many individuals.

At the very beginning of this report, I would like to stretch my earnest & heartfelt obedience close to all the individuals who have helped me in this exertion.Without their effective guidance, support, cooperation and encouragement I would not have made headway in the thesis.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

Despite the numerous advantages of mobile phones, they are a major source of distraction for drivers, making them a global worry.When using a smartphone while driving, whether hands-free or portable, the risk of an accident increases fourfold, whilst also texting while driving increases the risk by 23 times.The current study looked at the psychological aspects that are linked to using a hand-held mobile phone while driving, specifically writing or reading a text message, among a group of Bangladeshi bike riders.In This examine was included drivers' behavioral, normative, and control attitudes about Mobile phone use while driving Is tested. As well as the extent to which utilizing a mobile phone is a part of one's daily existence_ Mobile phone Involvement ,PBC (Perceived Behavioural Control,),Social Interactive Technologies ,Navigation and road music addiction was also Included.Basis of this data sample 34.2 % people read a text and 31.1% people send a text daily while they driving.And make a phone call and answer a phone call 28.6% and 37.3 % people. A survey questionnaire was used to collect data in this study.To analyze the gathered data, we used SPSS and SmartPLS 3.Also we used ANN(Artificial Neural Network) to find out most important variable among this factors.This study incorporates theoretical as well as practical contributions.The results supported all of the hypothesized relationships except one among individual factors of mobile phone use while driving.Our proposed model is tested validated and added to a growing body of information concerning the factors impact mobile phone use while driving.

Keywords: The frequency of mobile phone use while driving,The frequency of mobile phone use generally,Beliefs,PBC,Social interactive technologies,Mobile phone involvement, Navigation / GPS,Music Addiction.

1 .Introduction:

The use of a mobile phone whilst driving is one of the most common types of driver sorrow that rise the risk of motor vehicle crashes (e.g., Sullman and Baas, 2004; Bianchi and Phillips, 2005; Caird et al., 2014).Whilst many developed countries have tried to prevent this behaviour in many ways (e.g., Walsh et al., 2008; Shi et al., 2016),because of this behaviour the highest road mortality rate in Europe.Now a days 75% people using smartphone ; this figure more than doubled between 2011 and 2014 and is expected to reach 91% by 2017 (Telstra, 2014).According to research 25% driver updating their Facebook status or tweeting while driving (NRMA, 2012).maximum drivers are involve to unnecessary task that do not relate to the primary action of driving (i.e. mobile phone distress, commercial roadside advertising, etc.) often disturb this required wariness, which increases the risk of crash and injury (Oviedo-Trespalacios et al., 2016).According to as many studies in the cognitive psychology literature ,distraction is a serious issue. They says multitasking has important and long-lasting perceptual and cognitive costs (Di Lollo et al., 2005; Monsell, 2003; Visser et al., 2004).A recent naturalistic study conveyed in the U.S. found that visual-manual mobile phone interactions, such as texting, grown the possibility of a road traffic crash by 6.1, and dialing the phone by 12.2 (Dingus et al., 2016).Australian drivers engage in a secondary task every 1.6 min (Young et al., 2019). A systematic review of roadside distraction surveys signal that mobile phone use while driving has been growing around the world (Huemer et al., 2018).For example, Oviedo-Trespalacios (2018) found that drivers can successfully hide their phones to avoid police enactment.Unfortunately, text messaging or browsing have been found to have limited popularity into younger drivers (Delgado et al., 2018).hat said,Luria (2018)found that young learners touch their smartphone 1.7 times per minute when driving a car.Authorities such as the National Highway Traffic Safety Administration (2016) have reported that the development of technologies dedicated to decrease driver workload (i.e., visual, manual, and cognitive demands) connected with performing secondary tasks is a worthwhile approach to raise safety.The TAM was at first proposed by Davis (1985).The TAM has been used in the behalf of road safety research to count Intelligent Transport Systems (Larue et al., 2015), vehicle navigation systems (Park et al., 2015), and more at present, to measure drivers' confirmation of automated vehicle technology . (e.g., Buckley et al., 2018; Rahman et al., 2017; Panagiotopoulos and Dimitrakopoulos, 2018).

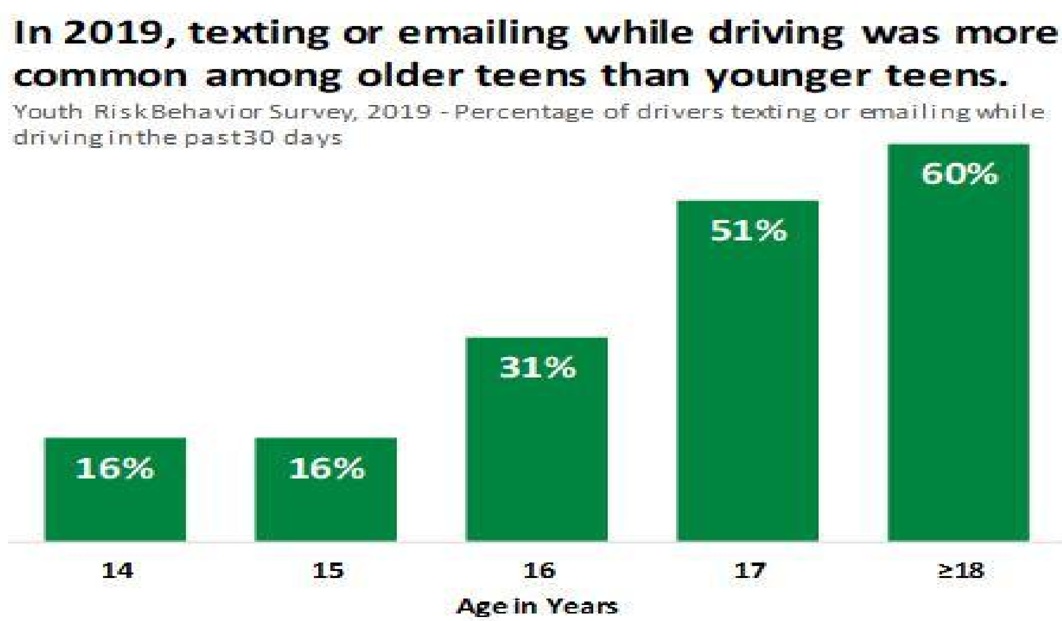

Figure 1.1: Youth Risk Behavior Survey, United States, 2019

Young drivers aged 17-25 years are show up in over 20% of road crash mortality (Department of Infrastructure and Regional Development, 2014) yet generate only 12.4% of the population (Australian Bureau of Statistics, [ABS], 2015).Australian state of Queensland current study was conducted. Young drivers aged 18-25 years, however, this age group most usages mobile phone while driving rather than other age group. (AAMI, 2012).Studies also show that young drivers are comparatively liable for more crashes than old drivers are (Jones, 2015a, 2015b).In any accident approximately 8% of drivers were distracted. the average of young driver was higher (11.7%) (Stutts and Hunter, 2003).In Another study says that, the tend of young drivers are high involvement in crashes caused by driving distraction (Klauer et al., 2006). In middle east From the year 2001 to 2011, crashes have almost increases tripled from 57,951 to 160,557 in Qatar (Shaaban and Hassan, 2014; Shaaban and Kim, 2016) .the 18 to 25 years age group formed 32.6% of the total mortality, major injuries total 29.3%, minor injuries 26.6% in 2011 (Shaaban and Hassan, 2017).While driving Young driver use more cell phone rather then old driver the rate is (20.2%) than young drivers (10.5%), and older drivers (8.0%) (Shaaban, 2013).1.25 million deaths each year because of traffic crashes(World Health Organization, 2016).In U.S for 9% of all fatal crashes are happened in the age group 15-20(National Center for Statistics and Analysis, 2016, May).While driving sending a text message had negative impact on almost all angle of driving performance (Caird, Johnston, Willness, Asbridge, & Steel, 2014).While driving 44.5% U.S school student using mobile phone for sending texted/emailed, And they also involved in other risky driving behaviors, such as drink driving (Olsen, Shults, & Eaton, 2013).According to Australia,50% of the age group 18-25 years check their mobile phone within five minute, And total average time is 56 time a day (Deloitte Research, 2015).

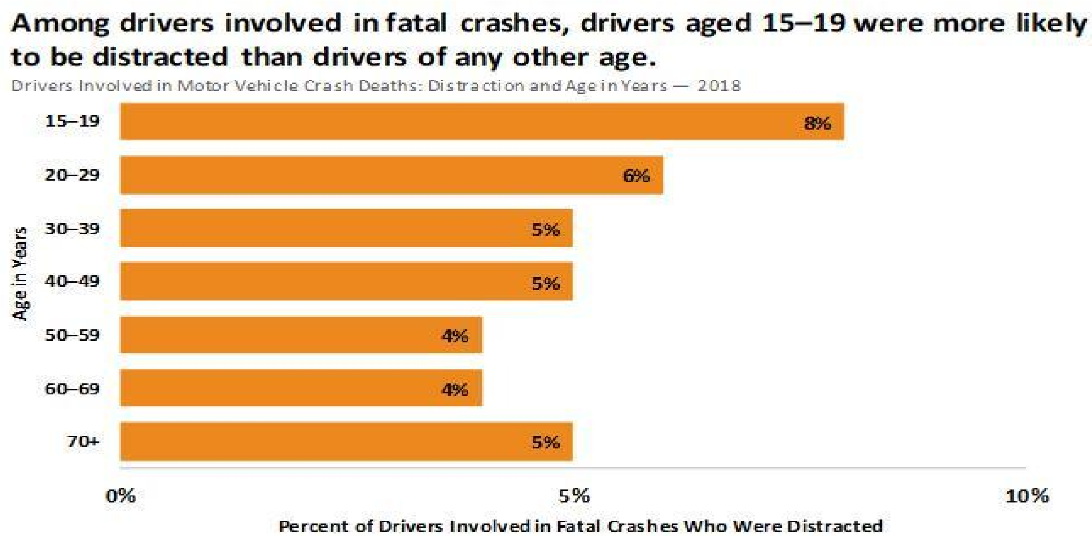

Figure 1.2: Distracted Driving 2018 (DOT HS 812 926)

Many country, including Australia banned hand-held mobile phone while driving (Parnell, Stanton, & Plant, 2017).In Queensland in 2015 survey the aged 17-24 years responsible for 16% of road mortalities themselves, and they are also involved in 22% of all road crash mortalities(Department of Transport and Main Roads, 2017).Because of using mobile phone approximately 390000 injuries happen each year from accident (Texting and Driving Accident Statistics).According to research between to drunk driver and mobile phone using while driving driver,6x more cases accident due to use of mobile phone while driving than after accident of drunk driver (Texting and Driving Accident Statistics).According to report, using cell phone while driving ,15,341 driver aged group 15-29 were engaged in mortal crashes (2017 U.S. Cell Phone and Driving Statistics).263 teens age 15-19 were die as a result of distraction while driving in 2016(2017 U.S. Cell Phone and Driving Statistics).In 2016 10% of teen motorcycle crash mortality engaged distracted driving (2016 U.S. Cell Phone and Driving Statistics).

1.1 Problem Around The World:

Nowadays mobile phone usage while diving is a common problem all over the world. Cell phones play a risky role in today's world because of cell phones most of the people lost their attention towards driving. Our brain can't do multiple tasks at a time so you can't safely drive if you use a mobile phone while drive.According to University of Utah psychologists research those people who use mobile phones while driving their are the same as impaired as drunken drivers ("Drivers on cell phones"). Because this two type people lose their consciousness while driving. According to an article in The Atlantic Monthly, this people are more dangerous than drunk drivers (Distracted Driving and Car Accidents).In Australia survey 45 Australians the age 16-50+ years they use mobile phones. They usage mobile phone for texting, messaging or checking social media As a result most of the time they lose their control over the speed of the vehicle(Effects Of Using Mobile Phones While Driving).No doubted using mobile phone while driving increases the chance of accidents/crashes more.That's why most of the country include Australia and Africa banned hand-hold mobile phone while driving. (Parnell, Stanton, & Plant, 2017).Roff from U.S. news told that, Highway Traffic Safety Administration predicted that In 2011 there were 3000 serious accidents are happened just because of driver distraction. Phone talking is one of the reasons for these distractions.Roff from U.S. news told that, Highway Traffic Safety Administration predicted that In 2011 there were 3000 serious accidents are happened just because of driver distraction. Phone talking is one of the reasons for these distractions.

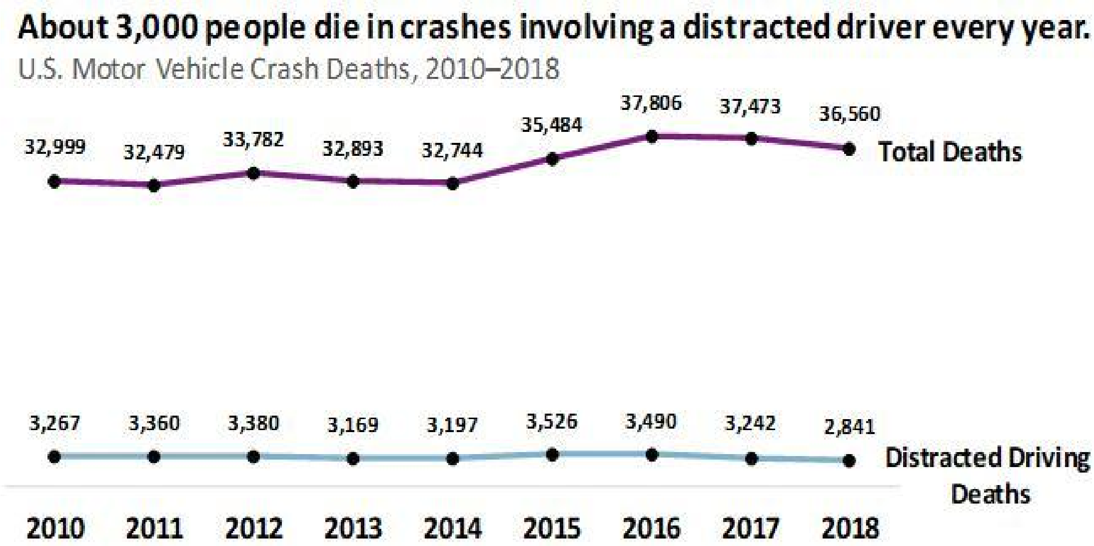

Figure 1.3: U.S. Motor Vehicle Crash Deaths, 2010-2018

According to the information, In 2012 because of using mobile phone while driving 3,328 people were killed in crashes and about 421000 people were injured in crashes. This incident happened because of driver distraction(Edgarsnder.com).According to Ian Mulgrew, he is a Canada journalist, He said that many accident happen because of driver distraction and most of the distractions are involving by cell phone usage(Mulgrew).So using mobile phone while driving is not only danger for yourself but also the people of surrounding you.According to DWI, text messaging makes a crash up to 23 times more probability (DWI).According to "Harvard Center for Risk Analysis as a result of using mobile phone while driving nearly 2600 people die each year because of accident.In 2011 ,statistics displayed that all most 1.6 million car accidents happened just because of drivers using cell phones while driving (National Safety Council). So we can surely say that lots of people lost their loves one because of using mobile phone while driving.A research project by the Virginia Tech Transportation Institute (*2) In this project they are using cameras on the road side for monitoring drivers to observe how much they distraction during the crashes. They said that of the 905 serious injurious and property damages, 68.3% crashes were due to distraction. So through this project we get clear proof that most of the accidents are happening only by using the driver's mobile phone. And it is happening more or less in all countries now.34,247 accidents are occur in 2017 because of distracted driving (2017 U.S. Cell Phone and Driving Statistics).In united states 1 out of every 4 car accident are occur because of texting and driving (Texting and Driving Accident Statistics).It is reported that In the united states 28% o crashes are involved of driver distraction. (NCSA,2018).the NHTSA calculates that, every day almost 660,000 drivers use electronic devices while behind the wheel (2016 U.S. Cell Phone and Driving Statistics). So we can surely say that is the main reason for most of the accidents in the world.In 2015, Because of distracted drivers 3,477 people were killed and 391,000 people were injured in motorcycle crashes(2015 U.S. Cell Phone and Driving Statistics). I think this amount is huge.Many people lost his/her loved ones because of this one accident.The European Transport Safety Council (ETSC) informed that the French Association Prévention Routière says that 4 out of 10 drivers use their mobile phones while driving. A current survey of bikers by AA Ireland said that half of bikers see drivers using their phones at the wheel on a daily basis driving. France's Sécurité Routière, part of the Interior Ministry, balm that about 10% of the country's road serious accidents happen at least in part by PUDs(Phone using drivers, 2018).

1.2 Problem In Bangladesh:

Using police record as reference ARI indicate that in every year on average 3,000 road accidents are happen in Bangladesh, around 2,700 people are died in this road accidents and injured about 2,400.Because of this road accident's annually the estimated economic loss almost touch TK 40,000 crore ,which is 2% to 3% of Bangladesh's GDP.

According to their calculation In 2017, 7,397 people lost their lives in a total of 4,979 accidents throughout Bangladesh,while another 16,193 were injured (Accident Reaches Institute (ARI) and Bangladesh Passengers Welfare Association (BPWA)). In 2011, a Full loaded students truck at Mirsarai of Chittagong drove into a ditch because the driver was talking over the phone. In this accident at least 42 student and 2 others died.(the daily star ,2011).Mohammed Fahim share his own experience in a paper, he was driving his motorcycle in hatirjheel and try to cross the road, in that moment a car also try to cross the road also but the driver was talking on phone while driving so driver failed to notice pedestrian and driver hit him. People on the road hold the driver and scold him. luckily pedestrian was not hurt seriously (fahim,2017 ,The Financial Express).Road accidents assert 5 lives in Habiganj, Jamalpur after a bus crash with a CNG-run auto rickshaw in Madhabpur upazila (Dhaka tribune, Sep 28, 2021).Road accident leaves 2 truck drivers dead on the Dhaka-Sylhet highway (Dhaka tribune, Sep 28, 2021).a pickup van crashed into a stationary truck on the Netoakona-Mymensingh Highway in Netrokona's Sadar upazila in the early hours of Saturday. In this accident Three people were killed and two others injured(Dhaka tribune, Sep 28, 2021).Road crashes leave 7 dead in Tangail, Khulna (Dhaka tribune, Sep 28, 2021).At least three people were killed and four others injured in a friction between a bus and a CNG-run auto rickshaw at Manoharganj Upazila in Comilla (Dhaka tribune, Sep 28, 2021).3 teens die as bus hits bike in Barisal (Dhaka tribune, Sep 28, 2021).In Bagerhat, a previous Bagerhat district cricket captain passed away on Saturday when a truck and motorcycle were engaged in a head-on friction in Jatrapur’s Kulia Dair area(Dhaka tribune, Sep 28, 2021).3 bikers killed in Gaibandha road crash because bus driver lost control of his vehicle and hit the bike (Dhaka tribune, Sep 28, 2021).Two army personnel have been killed following a head-on Crash between an army pickup truck and a cement truck, in Kamarkhand upazila of Sirajganj district(Dhaka tribune, Sep 28, 2021) . At least six people have been killed and another injured in a crash between a covered van and a CNG-run auto rickshaw in Habiganj (Dhaka tribune, Sep 28, 2021).5 people die and almost 20 others are injured in bus and a parked truck crash in Dhaka-Mymensingh highway at Trishal upazila (Dhaka tribune, Sep 28, 2021).

1.3 Research Questions:

The research question is following to test the impact of individual factors on The frequency of mobile phone use while driving as well as examine the impact and consequences of behavioral beliefs,control beliefs,Normative beliefs.In absence of clear evidence for a directional hypothesis, the following research question is posed:

RQ1: What factors (Fmpu,MPI) influence mobile phone use while driving ?

RQ2: Does Beliefs lead to actual mobile phone usage behaviour while driving?

RQ3:Does Checking Navigation and Music Addiction influence phone usage behaviour while driving?

1.4 Research Objective

As a result, our objectives are

Q:To find out the factors that impact mobile phone use while driving.

Q:To investigate the relationship between mobile phone use while driving and other factors.

Q:To find out The most Important variable among this factors.

1.5 Research Scope:

We discovered a research gap. Based on this gap, we selected a few factors that were used significantly in various literature reviews. Then we developed a research propose model where included individual factors impacting on mobile phone use while driving. Following that, we collected data from selected respondents via a survey and analyzed the data using SPSS and SmartPLS3. In addition, we used ANN to validate the model and identify relevant variables among all of the variables. Above all, we obtained the intended outcomes, which supported all of our research model's hypotheses.

1.6 Organization Of The Chapter:

We layout our paper in different sections or different parts. So, we organized our chapter as follows: chapter 1 describes introduction; chapter 2 narrates the literature review; chapter 3 hypothesis and development, chapter 4 Methodology; chapter 5 Result and discussion 6. limitations And future work ; and lastly chapter 7 describes the conclusion.

2 LITERATURE REVIEW:

2.1 Theoretical foundation

People tend to involve in dangerous behaviours when they believe that the advantage outweigh the expectation costs, which in the driving context may be the perceived possibility of having a motor vehicle clash (e.g.,Walsh and White, 2006; White et al., 2012; Nelson et al., 2009).A number of researchers used the theory of planned behaviour in their research (TPB;Ajzen, 1991)to fathom the fixation and decision making processes that underpin risky driving practices.primarily, to explore the reason that why drivers use their mobile phones while driving ,many researchers have used an intention-based TPB approach(e.g., Nemme and White, 2010; Sullman et al., 2018).However, some of the researchers explore on their studies different road infringement , such as speeding,have assumed a beliefs-based approach to inquire the

right away determinants of intentions to engage in these risky behaviours(e.g., Forward, 2009; Warner and Åberg,2008).Many researcher explores that the Theory of Planned Behaviour (TPB; Ajzen, 1991) can be used to interpret texting and calling behaviour while driving(e.g., Nemme & White, 2010; Przepiorka, Błachnio, & Sullman, 2018; Sullman, Przepiorka, Prat, & Blachnio,2018;Waddell &Wiener, 2014; Walsh,White, Hyde, & Watson, 2008; White, Hyde, Walsh, & Watson, 2010). An underlying presumption of the TPB model is that intentions forecast behaviour and that intentions result from an individual's attitude towards subjective norms,the behaviour,and perceived behavioural control (PBC) above the behaviour.Attitude is the positive or negative appraisal of the behaviour, Subjective norm prescribe to the perception of whether others would agree or disagree of the behaviour, while PBC is the perceived level of control that one has over involved in or refraining from involving in this behaviour (M.J.M. Sullman,2018).

Table 2.1 : Literature review table

SI	Author	Year	Source	Theory	Title	Sector	Technology	Method	Model
1	T. Hilla,et al.,	2019	Elsevier	Theory of Planned Behaviour, Theory of addiction	Mobile phone involvement, beliefs, and texti	driving in Ukraine (19-70) years	SPSS for Windows and STATA 14	Online survey questionnaire(4)	A binary logistic regression, initial multivariate model, model evaluati

					ng while driving in Ukraine				on
2	O. Oviedo - Trespalacios, et al.,	2020	Elsevier	Theory of Planned Behaviour , Theory of Acceptance	Assessing driver acceptance of technology that reduces mobile phone use while driving: The case of mobile phone applications	licensed drivers	IBM SPSS statistics (version 23),	Survey through a media release from the Queensland University of Technology, through social media methods , and through an email sent through insurance clubs.	hierarchical multiple regressions, A two-step hierarchical multiple regression
3	C.S. Gauld et al.	2017	Elsevier	Theory of planned behaviour	Smartphone use while driving:	Young driver (17-25) Years	(SPSS version 18.0)	online survey,	Hierarchical multiple regression analyses,

					What factors predict young drivers' intentions to initiate, read, and respond to social interactive technology?				regression analysis
4	M.J.M. Sullman a , et al.,	2018	Elsevier	Theory of planned behaviour	Predicting intentions to text and call while driving using the theory of plan	licensed drivers from Ukraine	SPSS v.22	via an online questionnaire	hierarchical linear regressions

					ned behaviour				
5	A.M. George et al	2018	Elsevier	Theory of planned behaviour	‘‘I need to skip a song because it sucks”: Exploring mobile phone use while driving among young adults	young adult drivers aged 17–24 years	a thematic analysis	Online survey	
6	Khaled Shaabana et al.,	2018	Elsevier	Theory of planned behaviour	Characteristics and mitigation strategies for cell phone use whil	young drivers in Qatar	SAS software (version 9.4) procedure CALIS	face-to-face interview	Structural Equation Model (SEM), confirmatory factor analysis (CFA) and path model

					e driving among young drivers in Qatar				analysis, a causal model. Eqs. hypothesized underlying model"
7	C.S. Gauld et al.,	2016	Elsevier	Social Learning Theory, theory of planned behavior	Young drivers' engagement with social interactive technology on their smartphone: Critical beliefs to target in public education messages	young drivers aged 17–25 years	SatMDT	TPB self-report format	stepwise regression, the Extended Parallel Process Model, The Elaboration Likelihood Model, and

2.3 Variable identification:

2.3.1 The Frequency of mobile phone use while driving:

Because of the rising accident rate around the world, numerous researchers have recently been working on MPUWD.Kita and Luria(2018) explored the influence of personality on smartphone use among drivers in Israel.Gauld et al.(2017) investigated the effect of mobile phone participation using the Theory of Planned Behaviour (TPB) and moral norms.Sullman et al.(2018) investigated the frequency of phone use by drivers by testing TPB with crash risk.

2.3.2 Frequency of mobile phone use:

Adults' best friend is their smartphone. And smartphones are used for the majority of the tasks.Mobile phones are used to collect the information and data. In 1998 Peter D Hart researched that most of the people use mobile phones for business purposes in 1990/1991 and In 1993/1994 most phones were purchased for personal use and this personal use increased 1998 (hart,1998). So many researchers have tried to find out if the general use of mobile phones is related to the use of mobile phones while driving.

2.3.3 Beliefs:

People are more likely to engage in dangerous behaviors when they believe the advantages outweigh the potential costs, which in the case of driving could be the perceived risk of being involved in a car accident (e.g.,Walsh and White, 2006; White et al., 2012; Nelson et al., 2009).The Theory of Planned Behaviour (TPB; Ajzen, 1991) has been employed in a variety of research to better understand the factors and decision-making processes that underpin unsafe driving habits. To investigate why drivers use their cellphones while driving, the majority of studies have used an intention-based TPB approach(e.g., Nemme and White,2010; Sullman et al., 2018).

2.3.4 PBC :

According to the Theory of Planned Behavior ([TPB], Ajzen, 1985], attitude, subjective norm, and perceived behavioural control (PBC) all work together to predict intention. PBC is the perceived ease or difficulty of performing the behavior and can reflect past experience as well as consideration of obstacles. Attitude is defined as how positively (or negatively) the behavior is evaluated, subjective norm is the extent to which important others approve or disapprove of the behavior, and attitude is defined as how positively (or negatively) the behavior is evaluated. (According to Ajzen, 1991).

2.3.5 Social Interactive Technologies :

Smartphones have a larger potential to distract a driver due to their expanded capability as compared to traditional mobile phones.According to a sample of 415 drivers in the Australian state of New South Wales, 68 percent had checked emails while driving and 25% had changed their Facebook status or tweeted (National Roads and Motorists' Association [NRMA], 2012).The fact that drivers may be using social interaction technology in hand-held mode (Rudin-Brown et al.,2013) is a source of particular worry.Social interactive technology, such as social networking sites (e.g., Facebook, Twitter), emails, messaging, and calling, is available on smartphones and allows users to engage with others.The concept of people communicating with others through a variety of media (e.g., Skype, Facebook, and phone conversations) is known as 'media multiplexity,' and it is becoming more common in modern interactions (Baym, 2015).

2.3.6 Mobile Phone Involvement:

According to Walsh et al.(2012), mobile phone engagement refers to the extra ways that people interact with their phones when they aren't using them to engage with others, such as checking email or chat, checking for missed calls, and so on.According to a study conducted by the same group of experts, the more people are involved with their phones, the more likely they are to participate in potentially harmful behaviors, such as texting while driving (Walsh et. al., 2010; White et. al., 2012).Young people's intents to use a mobile phone for calls and texts while driving have been found to be significantly influenced by their mobile phone usage (Gauld et. al., 2014; Walsh et. al., 2010; White et. al., 2012).

2.3.7 Navigation/GPS:

Using GPS or Checking is a common thing nowadays for every one.people are now much more dependent on navigation/GPS when they go to a new place according to A.M. George et al. 2018 survey out of 312 people 60.8 % are checking navigation while driving.

2.3.8 Music Addiction:

At this time, studies on the impact of music on driving behavior have produced conflicting results.According to Navarro et al.(2018), music influenced drivers' performance in a car-following task by boosting coherence and gain adjustments relative to the pursued vehicle while also reducing intervehicular time.Music is one of the most common auditory stimuli that drivers are exposed to while driving.According to A.M. George et al. 2018 research survey Playing music was the most popular mobile phone activity, followed by reading text messages, GPS navigation, and sending text messages.

3. HYPOTHESES DEVELOPMENT:

We develop hypotheses and research questions for our study. We make different hypothesis for all of these factors,the frequency of mobile phone use,Beliefs,Intention,PBC,Social interactive technologies,mobile phone involvement,Navigation/GPS,Music addiction,the frequency of mobile phone use while driving All of these factors has relationship with other factors .All hypothesis is given below:

Table 3.1 : Hypothesis

3.1	**Beliefs:** People lead to intertwine in risky behaviours when they believe that the benefits outweigh the expectation costs, which in the driving motto may be the perceived possibility of having a motor vehicle clash.(e.g.,Walsh and White, 2006; White et al., 2012; Nelson et al., 2009).However, some of the current studies on several road infringement, such as speeding, have adopted a beliefs-based approach to inquire into the direct determinants of intentions to engage in these risky behaviours(e.g., Forward, 2009; Warner and Åberg, 2008). H1: Belief has negative impact on mobile phone usage while driving
3.2	**General Frequency of mobile phone use:** In 1998 peter D hart research that most of the people use mobile phone for business purpose in 1990/1991 and In 1993/1994 most phone were purchased for personal use and this personal use more increased 1998 (hart,1998).Undoubtedly the level of this use has now increased even more.And people are also using this while driving.Because of increasing of mobile phone use which can be influence Mobile phone usage while driving. H2:General Frequency of Mobile Phone Use has positive impact on mobile phone usage while driving

3.3	**Mobile phone involvement:** As per to Gauld et. al. (2017) mobile phone involvement firstly developed by White, Walsh, Hyde, & Watson, 2012) argued about initiating, reading, monitoring and responding through mobile phone.The thought of MPI encircle additional ways of people to associate with the phone when not engaged with genuine communication with others. H3: Mobile Phone Involvement has a negative impact on mobile phone usage while driving.
3.4	**Music Addiction:** Most of the people love to listen to music when they driving.This is the top reason for most of them that touching and fiddling the phone while driving. H4: Music has negative impact on mobile phone usage while driving
3.5	**Navigation:** Nowadays most of the people depend on navigation so that they reach the right way.This is one of the major reasons that many people use mobile phones while driving to see or follow the GPS.This is another reason for distraction. H5:Navigation has a positive impact on mobile phone usage while driving.
3.6	**PBC:** PBC is the perceived facile or inconvenience of causation the behaviour and can reflect past experience as well as consideration of barriers(Ajzen,1991). H6:PBC has negative impact on mobile phone usage while driving
3.7	**Social Interactive technologies:** Many researchers found that Young drivers had big intentions to interact in social technologies while driving.And they are distracted from driving for this reason. H7: SIT has positive impact on mobile phone usage while driving

Our final proposed model is presented in figure 3.1.

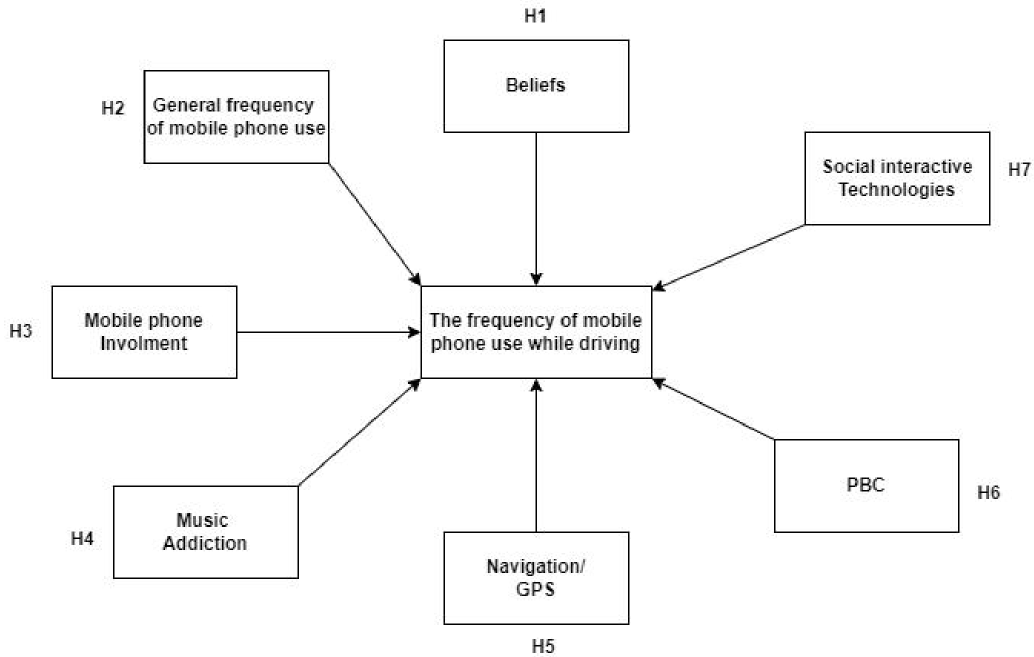

Figure 3.1: Final proposed model

4. Methodology :

4.1 Data collection procedure:

For collect our data we used google from survey and make hard copy by physical survey. A purposive sample of BD young drivers was surveyed to test the hypotheses.Young drivers aged 18-25 years, however, this age group most uses mobile phone while driving rather than other age group. (AAMI, 2012).In any accident approximately 8% of drivers were distracted. The average of young drivers was higher (11.7%) (Stutts and Hunter, 2003).for this study using Google Form and broadcasted through social media (such as Facebook, Twitter, Instagram) and for face to face survey you given this paper hard copy to the participants. This two way you used to collect data our data among Bangladeshi young motorcycle drivers. All Respondents were

Bangladeshi young drivers and they were in different kinds of university and other sectors.Data were collected in 2021 over a 2-month period from October to November.
The specimen frame for inclusion in the study was that the participants who drive a bike, have a smartphone, have access to internet connection and access to social media.G*Power calculation was guided, and the minimum number of participants was 160 persons.We distributed 200 questionnaires to selected individuals and attempted to reach them via online and offline questionnaires, but only 162 people responded, aged (17-33) years(mostly young motorcycle drivers) in October 2021 by questionnaire set. The survey took participants approximately 10 minutes to complete.There were two sections to the questionnaire.The first component was focused with demographic information, while the second segment was concentrated on questions that were designed to evaluate the structures of our research model.After the short demographic questionnaire, participants completed the survey. All respondents were informed about the aims of the study and to confirm their consent before starting the survey. was not collected any personal information, which can allow the identification of participants, was collected to guarantee anonymity.By The Department of Software Engineering (Daffodil International University; Bangladesh) approved the All procedure.

4.1.1 Demographic Information:

This research makes a number of significant contributions.It experimentally studied the impact of chosen demographic parameters on targeted persons (bike riders), such as age, gender, occupation, educational level, and per-day internet use, per-day social media use, and other questions that have a major impact on mobile phone use while driving.Here, almost all the peoples use smart phone(100%).And 18.6% people use per day smart phone and 16.1% people use Internet 12 hours per-day.15.5% people use social media 5 hours per a day. 59.6 % of them student.62.1 % undergraduate.68.3% of people have more than 400 Facebook friends.And among these participants,83.9% have their own bike,77.6 % have licenses and 94.4% have biking experience.

So far I have discussed the highest percentage of all questions in our survey's demographic question.Now I will show through my demographic analysis table which I was doing by SPSS ,what percentage of the answer to each question.

Table 4.1 Demographic profile of survey respondents

	Age	Gender	Education	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13
Valid	161	161	161	161	161	161	161	161	161	161	161	161
Missing	0	0	0	0	0	0	0	0	0	0	0	0

So from this table we can see there is no missing value in this data set.

Table 4.2 Frequency table of Gender

Gender					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	161	100	100	100
	Female	0	0	0	0

Here we can see our all participants are male because in our country female bikers are not so much found.So it's a little difficult to find female bikers.So unfortunately we got all male participants in our survey.

Table 4.3 Frequency table of Age

AGE					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	17	1	0.6	0.6	0.6
	18	9	5.6	5.6	6.2

19	10	6.2	6.2	12.4
20	9	5.6	5.6	18
21	5	3.1	3.1	21.1
22	6	3.7	3.7	24.8
23	33	20.5	20.5	45.3
24	33	20.5	20.5	65.8
25	16	9.9	9.9	75.8
26	4	2.5	2.5	78.3
27	8	5	5	83.2
28	12	7.5	7.5	90.7
29	1	0.6	0.6	91.3
30	6	3.7	3.7	95
31	1	0.6	0.6	95.7
32	5	3.1	3.1	98.8
33	2	1.2	1.2	100
Total	161	100	100	

In this table Most of the participants' ages are 23 and 24 (20.5%).

Table 4.4: Minimum and maximum Age

	N	Minimum	Maximum	Mean	Std. Deviation
AGE	161	17	33	23.97	3.479
Valid N (listwise)	161				

So in this table we can see in our survey participants minimum age 17 and the maximum age is 33.

Table 4.5: Frequency table of Highest Education.

Education					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Secondary	33	20.5	20.5	20.5
	Undergraduate	100	62.1	62.1	82.6
	Master	22	13.7	13.7	96.3
	Other	6	3.7	3.7	100
	Total	161	100	100	

Most of the participants are undergraduate (62.1%).An 2^{nd} is secondary student (20.5%). So we can say most of the participants are young in our survey.It's also our main target to find young bike rides.

Table 4.6: Frequency table of Smartphone user

Q5					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	161	100	100	100
	No	0	0	0	

In this frequency table we can see every participant using a smartphone.

Table 4.7: Frequency table of use smart phone per day

Q6					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	3	9	5.6	5.6	5.6
	4	26	16.1	16.1	21.7
	5	9	5.6	5.6	27.3
	6	31	19.3	19.3	46.6
	7	15	9.3	9.3	55.9
	8	18	11.2	11.2	67.1
	9	1	0.6	0.6	67.7
	10	10	6.2	6.2	73.9
	12	30	18.6	18.6	92.5
	13	3	1.9	1.9	94.4
	14	7	4.3	4.3	98.8
	15	1	0.6	0.6	99.4
	23	1	0.6	0.6	100
Total		161	100	100	

Most of the participants use a smart phone 12 hours (18.6%) per-day.

Table 4.8: minimum and maximum use smart phone per-day

	N	Minimum	Maximum	Mean	Std. Deviation
Q6	161	3	23	7.8	3.514
Valid N (listwise)	161				

So minimum smartphone use 3 hours per-day and maximum use 23 hours per-day.

Table 4.9: Frequency table of driving license

License					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	125	77.6	77.6	77.6
	2	36	22.4	22.4	100

Total	161	100	100	

For this question 1 is yes and 2 is no so 77.6% people ans is yes.77.6% people have their own license.

Table 4.10: Frequency table of use internet per-day

Q8					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	13	8.1	8.1	8.1
	3	8	5	5	13
	4	16	9.9	9.9	23
	5	22	13.7	13.7	36.6
	6	22	13.7	13.7	50.3
	7	4	2.5	2.5	52.8
	8	20	12.4	12.4	65.2
	9	5	3.1	3.1	68.3
	10	12	7.5	7.5	75.8
	12	26	16.1	16.1	91.9
	14	10	6.2	6.2	98.1
	16	2	1.2	1.2	99.4
	20	1	0.6	0.6	100
Total		161	100	100	

The highest percentage is 12 hours which is 16.1%.

Table 4.11: minimum and maximum use internet per-day

	N	Minimum	Maximum	Mean	Std. Deviation
Q8	161	2	20	7.53	3.775
Valid N (listwise)	161				

Minimum use of the internet 2 hours and maximum use of the internet 20 hours.

Table 4.12: Frequency table of use social media per-day

Q9					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	16	9.9	9.9	9.9
	2	26	16.1	16.1	26.1
	3	16	9.9	9.9	36
	4	17	10.6	10.6	46.6
	5	25	15.5	15.5	62.1

	6	23	14.3	14.3	76.4
	7	2	1.2	1.2	77.6
	8	14	8.7	8.7	86.3
	10	10	6.2	6.2	92.5
	11	1	0.6	0.6	93.2
	12	6	3.7	3.7	96.9
	16	4	2.5	2.5	99.4
	18	1	0.6	0.6	100
	Total	161	100	100	

So 16.1% of people use social media 2 hours per day.

Table 4.13: minimum and maximum use social media per-day

	N	Minimum	Maximum	Mean	Std. Deviation
Q9	161	1	18	5.2	3.495
Valid N (listwise)	161				

Maximum use 18 hours and minimum use 1 hours social media per-day.

Table 4.14: Frequency table of Driving Experience

Q10					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	152	94.4	94.4	94.4
	2	9	5.6	5.6	100
	Total	161	100	100	

Here 1 is yes and 2 is no so most of the participants ans is yes (94.4%)

Table 4.15: Frequency table of total Facebook Friend.

Q11					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	1	0.6	0.6	0.6
	4	5	3.1	3.1	3.7
	5	1	0.6	0.6	4.3
	6	11	6.8	6.8	11.2
	7	6	3.7	3.7	14.9
	8	27	16.8	16.8	31.7
	9	110	68.3	68.3	100
	Total	161	100	100	

For this question 0 = 10 or less, 1 = 11–50, 2 = 51–100, 3 =101–150, 4 = 151–200, 5 = 201–250, 6 =251–300, 7 = 301–400, 8 = more than 400. So we can see most of the participant answers are 9 (68.3%) which is more than 400.

Table 4.16: Frequency table of occupation

Occupation					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	96	59.6	59.6	59.6
	2	36	22.4	22.4	82
	3	19	11.8	11.8	93.8
	4	10	6.2	6.2	100
Total		161	100	100	

For this question 1.Student 2. Job 3. Business 4. nothing. So here highest percentage is 1 (59.6%) that means Student.

Table 4.17: Frequency table of own bike.

Bike					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	135	83.9	83.9	83.9
	2	26	16.1	16.1	100
Total		161	100	100	

Here 1 is yes and 2 is no so most of the participants ans is yes 83.9%. So 83.9% participants have their own bike.

4.2 Measurement items:

The questionnaire survey measured a set of demographic variables (name,gender, age, education, occupation), variables related to driving (type of driving licence, driving experience, have a own bike or not), and variables related smartphone and social media (use smartphone or not,the hours of par day use smart phone,the hours of par day use social media,the hours of par day use internet ,the number of Facebook friends).

Table 4.18: Demographic questionnaire

Fields	Unite
Name	
Age	________________ years
Gender	Male/Female
Highest degree in education	1. Primary 2. Secondary 3. Undergraduate 4. Master 5. PhD 6. Others __________________
Do you use smart phone?	1.yes 2.No
Do you own a driving license?	1.yes 2.No
How long you use smart phone per day?	________________ hours
How long you use internet per day?	________________ hours
How long you use social media per day?	________________ hours
How many total Facebook friends do you have?	0 = 10 or less, 1 = 11–50, 2 = 51–100, 3 = 101–150, 4 = 151–200, 5 = 201–250, 6 = 251–300, 7 = 301–400, 8 = more than 400
Driving experience	1.yes 2.No
What's your occupation	1.Student 2. Job 3. Business 4. nothing
Do you have your own bike	1.yes 2.No

4.2.1 The frequency of mobile phone use while driving:

For measurement frequency of mobile phone while driving we were using five question , which was "how often do you" : "use your phone in general while driving";.Participants response were made on a 7-point Likert scale (1=More than once a day , 2=Daily , 3= 1-2 times per week , 4= 1-2 times per month , 5= 1-2 times per six month ,6= once a year ,7=.never).

Table 4.19 : Item of The Mobile phone use while driving (MPUWD)

Item	Questionnaire	Source
MPUWD1	How often do you": "Use your phone in general while driving" For Make a mobile phone call"	T. Hilla,∗ , et al., 2019
MPUWD2	How often do you": "Use your phone in general while driving"For Answer a mobile phone call"	
MPUWD3	How often do you": "Use your phone in general while driving"For" Send a text"	
MPUWD4	How often do you": "Use your phone in general while driving"For "Read a text"	
MPUWD5	How often do you": "Use your phone in general while driving"For Overall use.	

4.2.2 The frequency of mobile phone use:

For measuring the frequency of mobile phones in general we were using four questions .Responses were made on a 5-point likert scale (1=All business, All personal , 3= Most business , most personal , 5=Some business , most personal).

Table 4.20:Item of The frequency of mobile phone use (FMPU)

Item	Questionnaire	Source
FMPU1	How many calls would you make [receive] on your mobile phone each week?	T. Hilla,∗, et al., 2019
FMPU2	How many texts would you make [receive] on your mobile phone each week?	
FMPU3	The ratio for mobile phone use personal or business	

4.2.3 Beliefs

Four question were measured on beliefs about," I am able to drive safely and read a text at the same time "; " I am able able to drive safely and send a text at a same time".for this question responses were made on a 7-point likert scale (1=strongly disagree , 4= neither , 7= strongly agree).

Table 4.21 : Item of Beliefs

Item	Questionnaire	Source
B1	I am able to drive safely and read a text at the same time	T. Hilla,∗,
B2	I am able to drive safely and Send a text at the same time.	et al., 2019
B3	I am able to drive safely and Talk on a hand hold mobile phone.	
B4	I am able to drive safely and Talk on a hands-free kit.	

Using a mobile phone (behavioral beliefs) while driving were measured using six items: How likely is it that using a mobile phone while driving in the next week would result in": " using time effectively "; "Being involved in a crash "; "Being caught and fined by the police" etc. And this responses were made on a 7-point likert scale (1= Extremely unlikely, 4= Neither , 7= extremely likely).

Table 4.22 : Item of behavioral beliefs

How likely is it that using your mobile phone while driving in the next week would :

Item	Questionnaire	Source
B5a.	Using time effectively	T. Hilla,∗,
B5b.	Receive information	et al.,2019

Normative beliefs was measured using the five item "How likely is it that the following people or groups of people would approve of you using a mobile phone while driving in the next week", "friends ", "partner", "police" etc .Responses were made on a 7-point likert scale (1= Extremely unlikely, 4= Neither , 7= extremely likely).

Table 4.23 : Item of Normative beliefs

How likely is it that using your mobile phone while driving in the next week would result in the following:

Item	Questionnaire	Source
B6a.	Friends	T. Hilla,∗,
B6b.	Partner/Spouse	et al., 2019

4.2.4 PBC :

Perceived behavioral control (PBC) was measured using two questions,the two item responses were made on a 7-point likert scale (1=strongly disagree , 4= neither , 7= strongly agree) and (1=very easy , 4= neither , 7= very difficult).

Table 4.24 : Perceived behavioral control (PBC)

Item	Questionnaire	Source
PBC1.	"I am confident that I could initiate/monitor/read/ respond social interactive technology on my smartphone while driving in the next week	C.S.Gauld et al.,2017

4.2.5 Social Interactive technologies:

Social interactive technologies was measured using 12 items"Social interactive technologies participants have ever Accessed while driving".("talking", "Instagram", "Facebook" etc). This responses were made on (never to always).

Table 4.25 : Item of Social interactive technologies (SIT)

Social interactive technologies participants have ever accessed while driving		
Item	**Questionnaire**	**Source**
SITa.	Talking	C.S.Gauld et al.,2016
SITb.	Texting	
SITc.	Facebook	
SITd.	Snapchat	
SITe.	Email	
SITf.	Instagram	
SITg.	Twitter	
SITh.	WhatsApp	
SITi.	Viber	
SITj.	Skype	
SITk.	Tinder	
SITl.	Others	

4.2.6 Mobile phone involvement:

For measurement Mobile phone involvement we were using eight questionnaires. This eight question based on the behavioural addiction components presented by Brown (1993, 1997).this questions describe the degree to which interacting with a mobile phone is realized as unabated to everyday life.For example"I often think about my mobile phone when I am not using it". Responses were made on a 7-point likert scale (1=strongly disagree , 4= neither , 7= strongly agree).

Table 4.26 : Item of Mobile phone involvement questionnaire

Item	questionnaire	source
MPIQ1	I often think about my mobile phone when I am not using it (cognitive salience)	Guald 2017
MPIQ2	I often use my mobile phone for no particular reason (behavioural salience)	
MPIQ3	Arguments have arisen with others because of my mobile phone use (interpersonal conflict)	
MPIQ4	I interrupt whatever else I am doing when I am contacted on my mobile phone (conflict with other activities)	
MPIQ5	I feel connected to others when I use my mobile phone (euphoria)	
MPIQ6	I lose track of how much I am using my mobile phone (loss of control)	
MPIQ7	The thought of being without my mobile phone makes me feel distressed (withdrawal)	
MPIQ8	I have been unable to reduce my mobile phone use (relapse and reinstatement)	

4.2.7 Navigation/GPS:

Nowadays most of the people depend on navigation so that they reach the right way.For measurement navigation we were using two question.Responses were made on a 7-point likert scale (1=strongly disagree , 4= neither , 7= strongly agree).

Table 4.27: Item of Navigation/GPS (Nav)

Item	Questionnaire	Source
Nav1.	Something, of the area so I can quickly look navigation /GPS if I need, if I'm getting lost or something	A.M. George et al,2018
Nav2.	'I just check intermittently at the navigation/GPS lights, like,'OH, I think I'm going the right way'"	

4.2.8 Music addiction:

Music addiction was measured using four questions. This four question based on the music addiction while driving.which asked 'music is definitely the top reason that I would be touching or fiddling with my phone while driving.Responses were made on a 7-point likert scale (1=strongly disagree , 4= neither , 7= strongly agree).

Table 4.28 : Item Of Music addiction (MA)

Item	Questionnaire	Source
MA1	Music is definitely the top reason that I would be touching or fiddling with my phone while driving	A.M. George et al,2018
MA2	Used it to ''change the song" while driving.	
MA3	You have a playlist going, you'd start it before driving	
MA4	Most of the time you will change the song when you get sick [of it]	

4.3 Data Analysis Technique :

To test all these collected data I used ANN(Artificial Neural Network to find out the most important variable).And We also used smart PLS to test the relationship.

4.3.1: ANN

Unsupervised ANN has been effectively exploited for data mining and classification intend (Chen & Du, 2009). The ANN is sturdy against noise,outliers, and small sample sizes.It can also conciliation non-compensatory models where a reducing in one factor needs not to be expiate by an increase in another factor.The ANN algorithm can binding linear and nonlinear relationships and does not need usual distribution (Teo, Tan, Ooi, Hew, & Yew, 2015).There are several reasons to use ANN.

A) Non linearity:

From the computational neuron can be linear or nonlinear output.The ANN is wrought by interconnection of non-linear neurons those by itself is non linear.

B) Adaptive learning:

ANN is capable of marking off the relationship between the various examples being presented to it without needing an anterior model.

C) Self-organization:

ANN is able to distribute knowledge in the whole network formation.

D) Fault tolerance:

ANN is capable of managing noise or mutability and even if any of the elements of the network fails, it does not influence its functionality.

4.3.2 SmartPls:

Our research model was tested using SmartPLS. In1980, LVPLS1.8, a DOS-based software, was released as the initial version of PLS-SEM.PLS-graph and VisualPLS later incorporated GUI (graphical user interface), however work has stalled since the project began.PLS-SEM can be performed with another statistical software, R, although it requires a certain amount of programming knowledge that is appropriate for those with a computer science background.The key reason to utilize SmartPLS is that it has a large community, and various researchers have used it to estimate their research models(Wong, 2013).

4.3.3 SPSS :

The demographic questionnaire and initial data screening analyzed using SPSS version 21. To calculate missing data from our data collection, we utilized the Expectation-Maximization function.

4.4 Outer Model Evaluation:

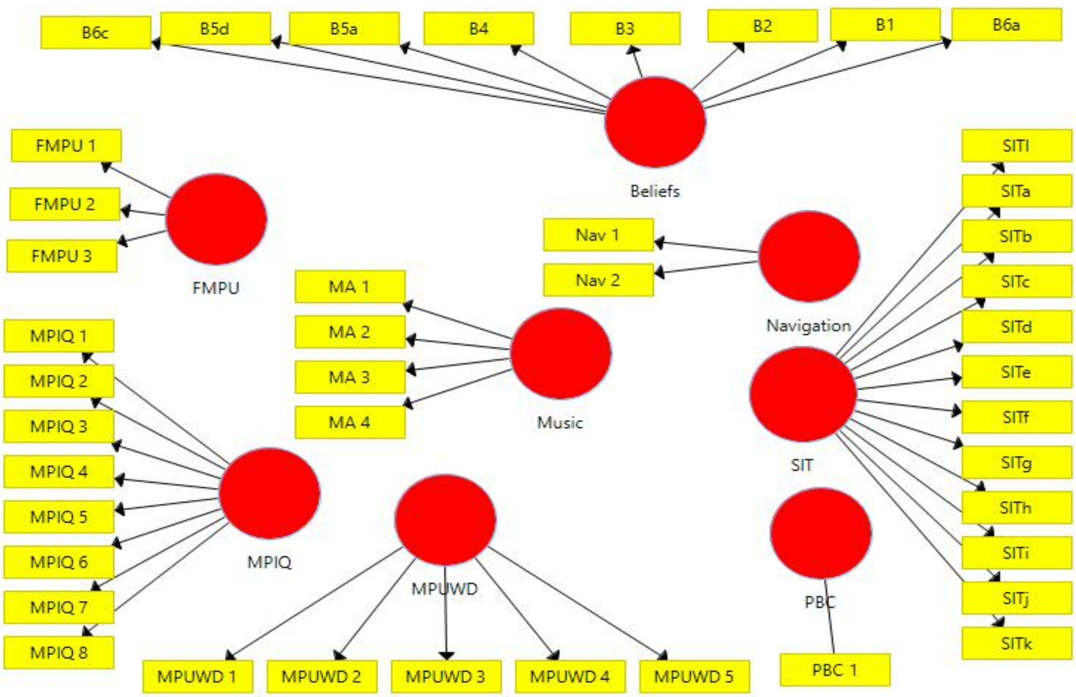

Figure 4.1 :Outer model of our research

Hair et al.(2019) state that after the model is constructed, the following step is to analyze the outer model.The outer model (Fig4.1) demonstrates that all of the indicators are reflecting.Reflective relationships produce a Characteristic set of all the construct's possible items.(Diamantopoulos & Winklhofer, 2001).Through loading's, reflective indicators are linked to the construct.A researcher must examine both the validity (convergent and discriminant) and the dependability of the outer model in order to evaluate it.

4.4.1 Composite Reliability (CR):

CR specifies internal consistency (different loadings) between items within variables. PLS-SEM informs researchers of internal consistency (different loadings), which Cronbach's alpha does not (Hair et. al. 2019).

4.4.2 Average Variance Extracted (AVE):

The next step is to assess the average variance retrieved from the reflective indicators to determine their validity(Hair et. al. 2019).Convergent validity is defined as AVE and item loadings, where each item loading should be greater than 0.7 and AVE greater than0.5, and at least 50% of items explain the construct.

4.4.3 Discriminant Validity (Fornell and Lacker):

Discriminant validity demonstrates the contrast between one construct and others (Hair et. al. 2019).According to Fornell and Larcker(1981), to evaluate discriminant validity, the AVE of each construct must be greater than the squared correlation of the other constructs, or the square root of AVE must be more than the squared correlation of the other constructs.

4.5 Summary

The need for research that focuses on both individual and organizational issues, particularly factors connected to mobile phone use while driving, drove our research. We attempted to prove our study model hypothesis. We hypothesized the positive and negative effects of these individual factors on driving while using a mobile phone.And find out the most important variable.

5 RESULTS AND DISCUSSION:

5.1 Measurement Model :

Following the establishment of the research model, the outer model must be examined (Hair et. al. 2019).This study examined AVE, CR, and discriminant validity to examine the model (outer).

Table 5.1: Convergent Reliability (CR) and Average Variance Extracted (AVE)

	Composite Reliability	Average Variance Extracted (AVE)
Beliefs	0.895	0.525
FMPU	0.660	0.402
MPIQ	0.918	0.584
MPUWD	0.945	0.775
Music	0.957	0.849
Navigation	0.961	0.925
PBC	1.000	1.000
SIT	0.931	0.536

The minimum standards for AVE is more than 0.5 and for CR is more than 0.7 (Hair et. al. 2019). In our case, the data satisfied both criteria except one (Table 5.1).We Know our standard value AVE more than 0.5 and CR is more than 0.7 but according to Fornell & Larcke AVE is higher than 0.5 but we can accept 0.4 if our composite reliability is higher than 0.6, the convergent validity of still adequate (Fornell & Larcker,1981). So in our table (5.1) we can see our FMPU average variance extracted value is 0.402 which is less than 0.5 but our Composite Reliability is 0.660.So we can say our data set is also valid.

Here, we try to show our Convergent Reliability and Average Variance Extracted (AVE) graph

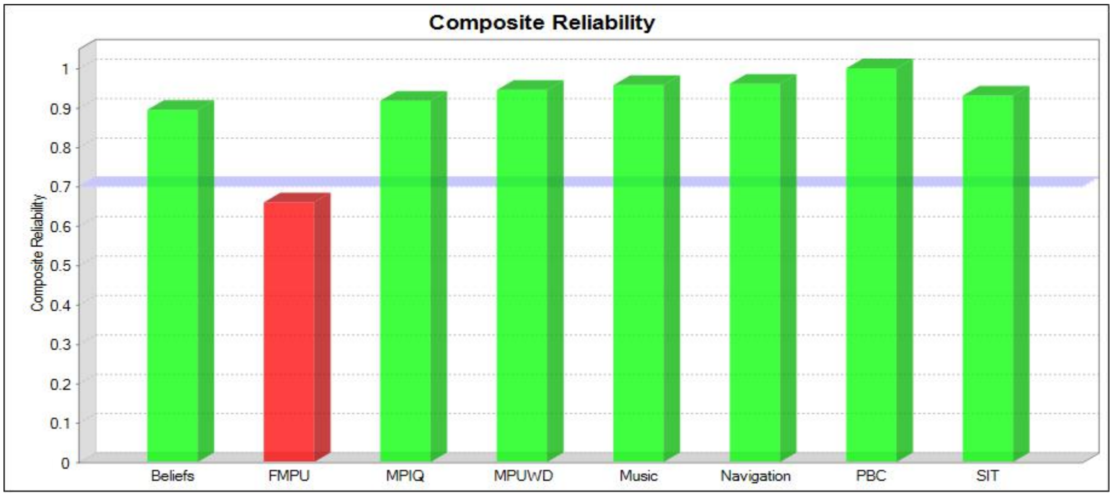

Figure 5.1 Composite Reliability graph

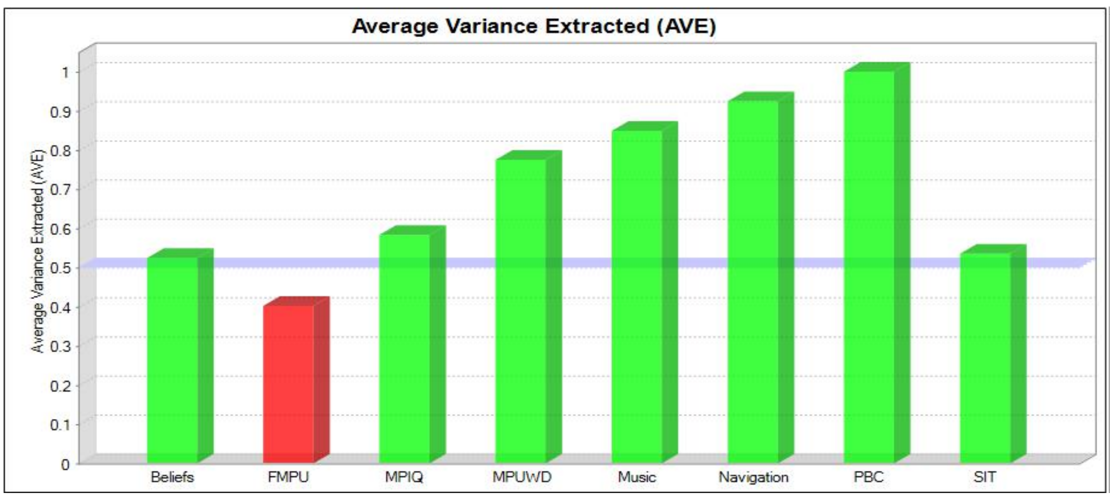

Figure 5.2 Average Variance Extracted (AVE) graph

5.2 Discriminant Validity

The basic quality criterion for discriminant validity is that the diagonal values in the matrix be greater than the square root of the extracted average variance(Hair et. al.2019).

Table 5.2 Fornell-Larcker Criterion: Discriminant Validity

	Beliefs	FMPU	MPIQ	MPUWD	Music	Navigation	PBC	SIT
Beliefs	**0.724**							
FMPU	-0.175	**0.634**						
MPIQ	0.558	-0.270	**0.764**					
MPUWD	-0.618	0.347	-0.558	**0.880**				
Music	0.287	0.017	0.402	-0.266	**0.921**			
Navigation	0.386	-0.053	0.624	-0.254	0.494	**0.962**		
PBC	0.665	-0.146	0.522	-0.611	0.217	0.333	**1.000**	
SIT	0.475	0.002	0.467	-0.367	0.163	0.164	0.445	**0.732**

Table 5.2 demonstrates that all of the diagonal values were bigger than the corresponding row and column values, showing that the measures were discriminant. As a result, our findings demonstrate that factors differ from one another.

5.3 Structure model

We identified the basic measures to report the Mean, STDEV, T-Values, P-Values (see table 10)

Table 5.3 Mean, STDEV, T-Values, P-Values

Hypotheses		Beta Value (O)	T Statistics (|O/STDEV|)	P Values	Remark
H1	**Beliefs -> MPUWD**	-0.281	2.911	**0.004**	**Supported**
H2	**FMPU -> MPUWD**	0.192	2.086	**0.037**	**Supported**
H3	**MPIQ -> MPUWD**	-0.272	2.743	**0.006**	**Supported**
H4	**Music -> MPUWD**	-0.108	1.990	**0.047**	**Supported**
H5	**Navigation -> MPUWD**	0.184	2.136	**0.033**	**Supported**
H6	**PBC -> MPUWD**	-0.298	3.771	**0.000**	**Supported**
H7	**SIT -> MPUWD**	0.013	0.191	**0.848**	**Not Supported**

Except for H7, all of the path coefficient hypotheses (H1 to H6) were supported.(table 5.3).

Regarding H1, we can verify that there is a significant relationship between Beliefs and MPUW D (H1 supported , O = -0.281, T= 2.911 and P < 0.05).

H2, We can verify that there is a significant relationship between FMPU and MPUD (H2 Supported O=0.192,T=2.086 and p<0.05).

H3, We can verify that there is a significant relationship between MPIQ and MPUW (H3 Supported, O-0.272,T=2.743 and P<0.05).

H4, We can verify that there is a significant relationship between Music and MPUWD (H4 Supported , O-0.108 , T=1.990, P< 0.05).

H5, We can verify that there is a significant relationship between Navigation and MPUWD (H5 Supported , O=0.184,T=2.136 P< 0.05).

H6, We can verify that there is a significant relationship between PBC and MPUWD (H6 Supported (O=-0.298,T=3.771, P<0.05).

But H7 is not supported because in this table (5.3) we can see that all relation's P value is less than 0.05 and t value is greater than 1.96 But only H7 P value is higher than 0.05 and t value less than 1.96. So for a significant relationship P value must be less than 0.05 and t value greater than 1.96 otherwise relation can't be supported. So that's the reason our all Hypothesis relation is supported except H7.

5.3.1 Effect Size

The effect sizes (f2) were also calculated in this study. Hair et al. (2019) state that effect size, as well as correlations of determination (R2) and path coefficient, should be reported.

Table 5.4 Effect size calculation result

Hypothesis	Relationship	value	effect size
H1	B->MPUWD	0.082	Small
H2	FMPU->MPUWD	0.070	Small
H3	MPIQ->MPUWD	0.062	Small
H4	MA->MPUWD	0.019	No effect
H5	Nav->MPUWD	0.038	Small
H6	PBC->MPUWD	0.102	Small
H7	SIT->MPUWD	0.000	No effect

We estimated f 2 values to determine effect strength.In table 5.4 we see that Beliefs has a small effect on Mobile phone use while driving (0.082). Frequency of mobile phone use has a small effect on Mobile phone use while driving (0.070). Mobile Phone Involvement has small effect on mobile phone use while driving(0.062).Music addiction has no effect on mobile phone use while driving(0.019).Navigation has small effect on Mobile phone use while driving (0.038).PBC has small effect on Mobile phone use while driving (0.102).Social Interactive Technologies has no effect on Mobile phone use while driving(0.000).

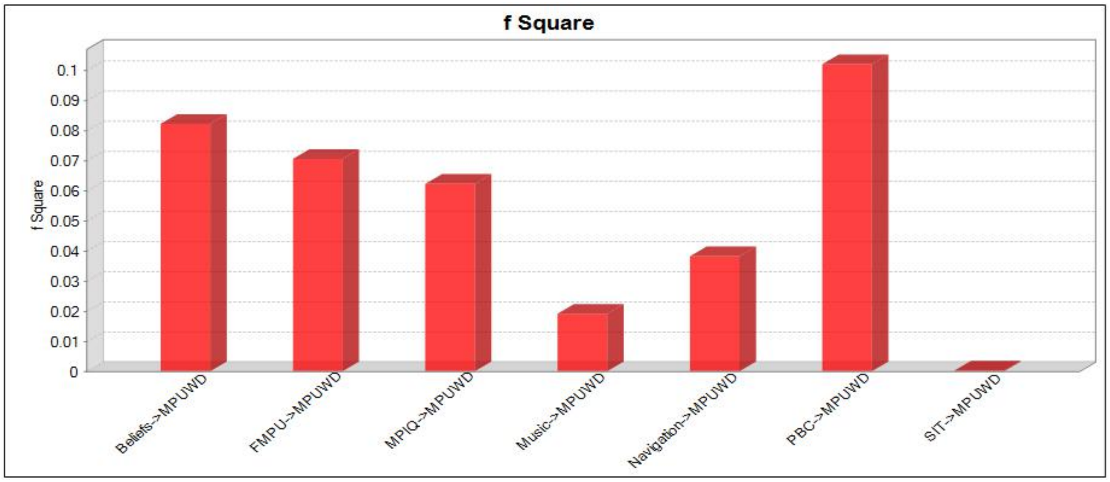

Figure 5.3 f Square graph

5.4 Final model with result:

Our final research model validation using data from the survey is given in Figure 5.4

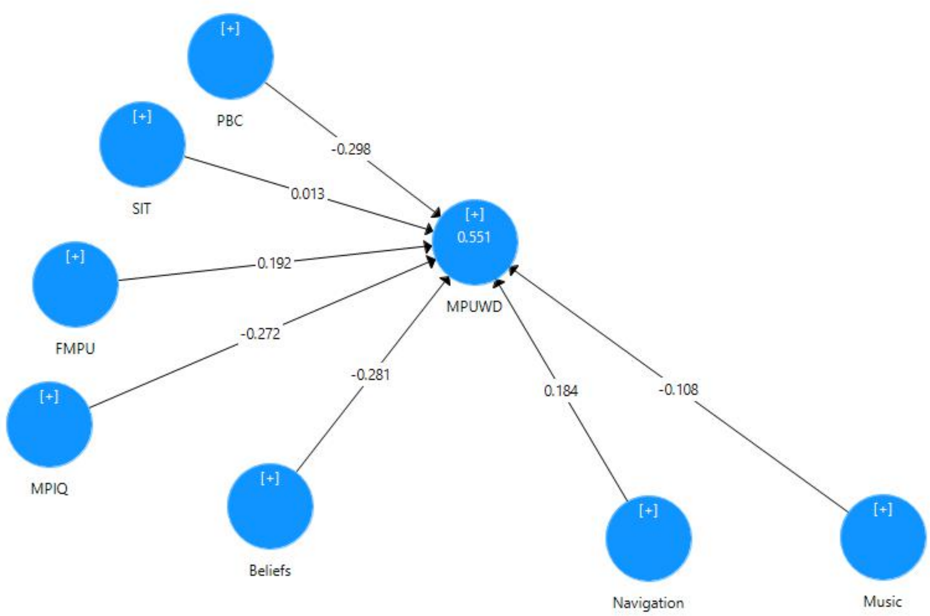

Figure 5.4 Our final research model validating using data from the survey

5.5 ANN ANALYSIS:

The relevant predictors from the PLS-SEM results are considered in the ANN analysis.This study solely looks at the dependent variable because of multiple endogenous factors i.e. Mobile phone use while driving (MPUWE) As a result, there will only be one deep ANN model (see figure 5.4).The ANN model consists of one output neuron, which is the dependent variable, and numerous input neurons.(significant indicators to Mobile phone use while driving), Such as Beliefs (B),Mobile phone involvement (MPIQ),Navigation/GPS (NAV,Music Addiction(MA),Frequency of mobile Phone use (FMPU) and Perceived behavioral control (PBC).

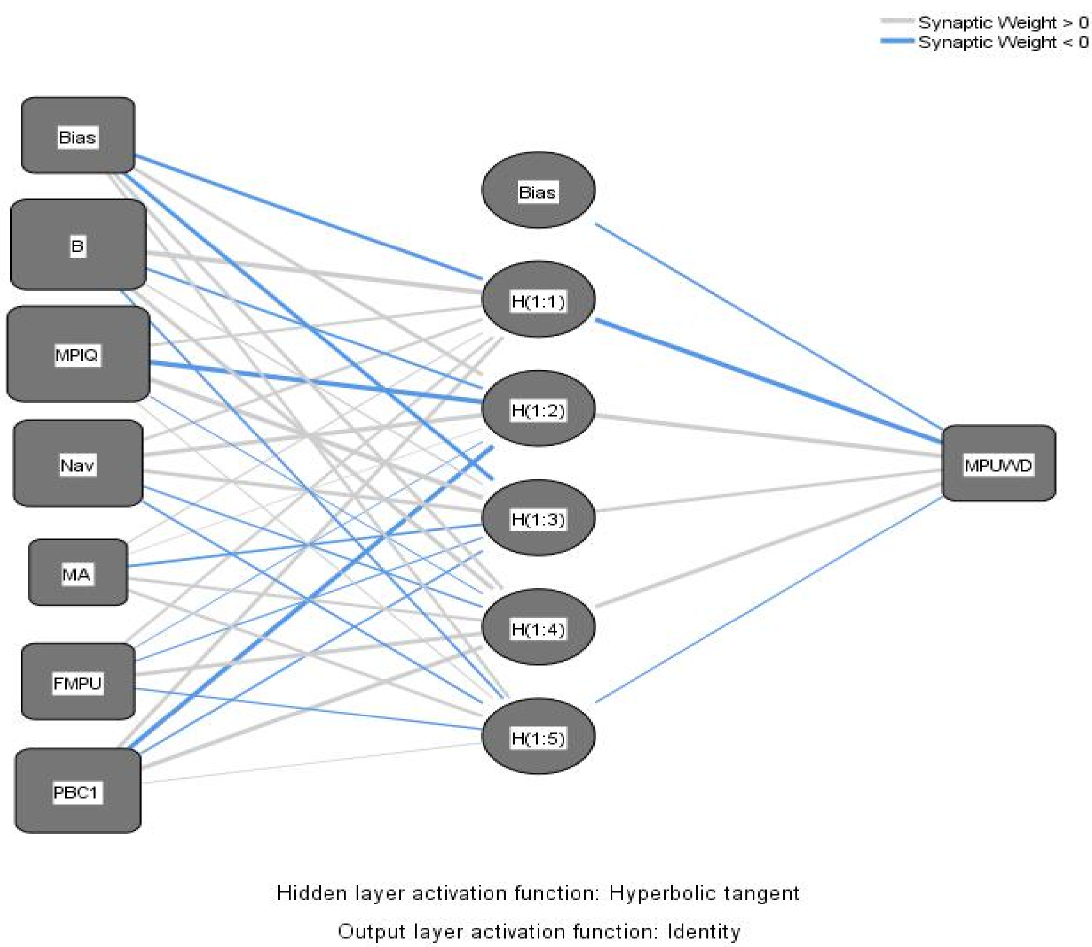

Figure 5.5 : Deep ANN model for mobile phone use while driving

Instead of using a single hidden layer model, which is referred to as a shallow ANN approach, a two-hidden layer deep ANN architecture was used to allow deeper learning to take place for each output neuron node (Lee VH et.al,2020).The sigmoid function is used as the activation function in this study for both output and hidden neurons. In addition, the range of both input and output neurons is normalized between [0,1] to improve the current model's performance (Lie´ ,2018).

Table 5.5 : Network Information (of figure 5.5)

Network Information

Input Layer	Covariates	1	B
		2	MPIQ
		3	Nav
		4	MA
		5	FMPU
		6	PBC 1
	Number of Units[a]		6
	Rescaling Method for Covariates		Standardized
Hidden Layer(s)	Number of Hidden Layers		1
	Number of Units in Hidden Layer 1[a]		5
	Activation Function		Hyperbolic tangent
Output Layer	Dependent Variables	1	MPUWD
	Number of Units		1
	Rescaling Method for Scale Dependents		Standardized
	Activation Function		Identity
	Error Function		Sum of Squares

a. Excluding the bias unit

5.5.1 Validation of neural network :

Furthermore, to avoid over fitting in ANN models, a ten-fold cross-validation approach was used with a 10:90 ratio for both testing and training data respectively.The root mean square of errors (RMSE) is recommended for neural network model accuracy per-training.For both training and testing data, the RMSE values of the ANN model used in this study (see table 5.6).

Table 5.6 : RMSE Value

Network		RMSE (Training) (MPUWD)	RMSE (Testing) (MPUWD)	
ANN1		0.406	0.376	
ANN2		0.421	0.335	
ANN3		0.425	0.257	
ANN4		0.473	0.429	
ANN5		0.467	0.211	
ANN6		0.318	0.303	
ANN7		0.460	0.392	
ANN8		0.474	0.292	
ANN9		0.516	0.453	
ANN10		0.355	0.340	
	Sum	4.315	3.387	
	Average	0.431	0.339	0.093
	SD	0.060	0.076	

From this table we see the RMSE value of training and testing data.After doing 10 time training and testing we calculate sum ,average and SD for this data.then we subtracted (training average - Testing average) and we got 0.093 value.If the value difference of training and testing is very small then we can say that our model is valid.since the value difference between our testing and training is very small then we can say that our ANN model is valid.

5.5.2 Sensitivity analysis :

Furthermore, the average of each predictor is compared to the greatest average value, expressed in percentage, to calculate the relative normalized importance (see table 5.6).

Table 5.7 : Sensitivity analysis.

	B	MPIQ	Nav	MA	FMPU	PBC 1
NN1	1.00	0.90	0.71	0.69	0.91	0.74
NN2	0.87	1.00	0.77	0.25	0.51	0.71
NN3	1.00	0.62	0.75	0.30	0.62	0.67
NN4	1.00	0.64	0.40	0.17	0.20	0.86
NN5	0.75	1.00	0.43	0.10	0.57	0.76
NN6	0.82	0.73	0.77	0.69	1.00	0.66
NN7	1.00	0.95	0.64	0.64	0.84	0.98
NN8	1.00	0.62	0.58	0.46	0.56	0.56
NN9	0.66	0.70	0.30	0.05	0.39	1.00
NN10	1.00	0.93	0.49	0.43	0.88	0.61
Average	0.911	0.808	0.585	0.377	0.647	0.755
Normalization importance	99.95%	88.70%	64.16%	41.39%	71.05%	82.89%

According to Table 5.6, the sensitivity analysis revealed that beliefs (B) are the most important predictor of mobile phone use while driving.Moreover, Music addiction (MA) was found to be the least predictor to develop Mobile phone use while driving.

Here we try to show our all percentages through the graph.

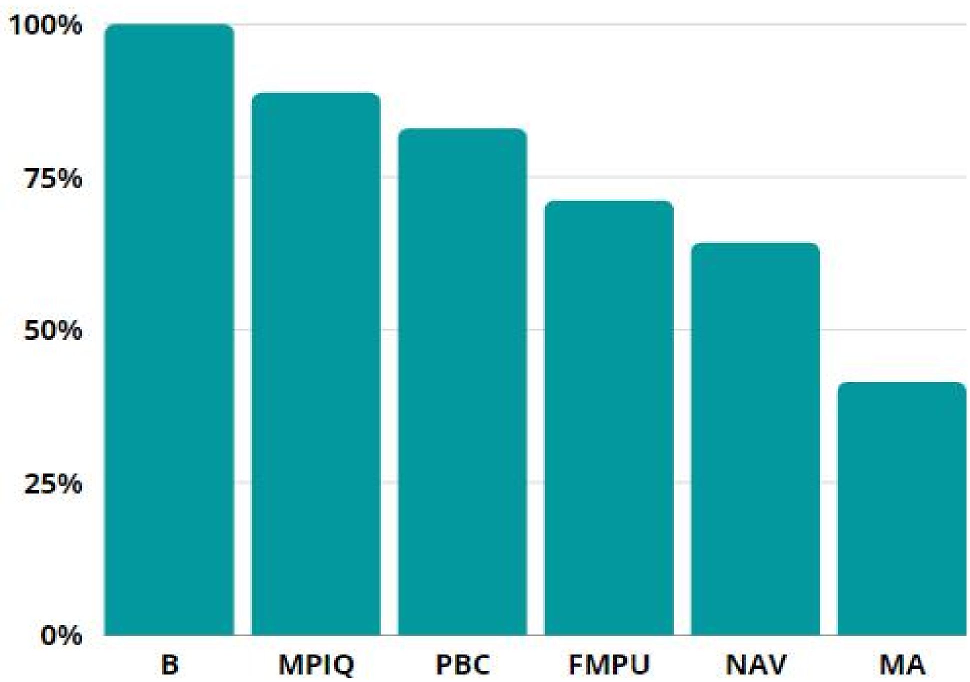

Figure 5.6 :Sensitivity analysis percentage graph.

Here is Beliefs (B), Mobile phone involvement(MPIQ),Perceived behaviour Control (PBC), Frequency of mobile phone use (FMPU), Navigation (NAV),Music addiction (MA).

5.6 DISCUSSION:

The goal of this study was to look into the important factors that could impact on mobile phone use while driving among a sample of Bangladesh young bike riders.Because the data was gathered through self-report, the frequency of mobile phone use may have been under-reported due to social desirability bias, as this behavior may be seen as undesirable by Bangladeshi bike riders.Drivers are more likely to use their smartphones for business than for personal reasons, according to research (e.g., Eost and Flyte, 1998; Walsh et al., 2008).Writing text messages was the least common behavior among all self-reported phone contacts while driving, followed by reading text messages(e.g., Drews et al., 2009; Gras et al., 2007; Nemme and White,2010).Writing a text message causes more cognitive, bodily, and visual distraction than making or receiving a phone call.Furthermore, the expanded capability of mobile phones makes texting more difficult for drivers.This has resulted in an increase in the number of programs for exchanging text messages, ranging in complexity, as well as an increase in the quantity and variety of characters available for writing messages(e.g., emojis).

In our study we are try Developed hypothesis Model to find out between relationship particular factors and mobile phone use while driving.For tested to this proposed model we used SPLS.We tested our proposed model and saw our all hypothesis relations are supported except one(See table 5.3) which was relation between Social interactive Technologies and mobile phone use while driving.Only this factor not any impacting on mobile phone use while driving moreover others factors have negative or positive impact of mobile phone use while driving like we finding that H1: Beliefs has negative impact on mobile phone usage while driving,H2: General Frequency of Mobile Phone Use has positive impact on mobile phone usage while driving,H3: Mobile Phone Involvement has negative impact on mobile phone usage while driving,H4: Music has negative impact on mobile phone usage while driving,H5:Navigation has positive impact on mobile phone usage while driving,H6:PBC has negative impact on mobile phone usage while driving.

And we developed our final model (figure5.4). We also build ANN model (figure 5.5) for deep learning testing.And test our model validation.We test our model validation and our ANN model is also valid. And finally we tested Sensitivity analysis to predict most important Factor among this all(table 5.7).According to this analysis table we found our most important factor is beliefs.And our low important factor is Music addiction.So in the end of this discussion we can tell this our all model is valid.And their have a relation(negative or positive) between mobile phone use while driving and other factors.

6. LIMITATIONS AND FUTURE RESEARCH/WORK:

6.1 LIMITATIONS:

This thesis, like every other research, has limitations that must be addressed.To begin, this study mainly included bike riders.It does not represent drivers of trucks, buses, or cars.Furthermore, it is possible that the findings will vary with time.Second, this study relied on self-report measurements of illegal driving behavior, which could be influenced by social desirability bias.According to Sullman and Taylor(2010), the impact of social desirability bias is unlikely to be large when participants are assured of anonymity and confidentiality.As objective measurements of B, MPI, MPUWD were not conducted,The absence of such measures could be viewed as a limitation.Then, this research focused on MPUWD in the context of Bangladesh.Only Bangladeshi young bike riders were recognized as participants, and they had to indicate their age range between 17 and 33 years old.In addition, consumer or participant behavior or habits may change by place or region.Due to the lack of female bike riders in Bangladesh, it was not possible to included female bike rider sample in this study.Furthermore, gender differences in consumers or participant behavior or habit may differ.For this study, we only have a small amount of data. However, for this type of large research, we require more and accurate data in order to arrive at the best possible outcome. As a result, it may be a limitation for this paper.In addition, the majority of those who took part in this survey were university students. University students may be better educated than the general public, particularly when it comes to the dangers of using a smartphone while driving, which could limit the findings' generalizability.

6.2 FUTURE RESEARCH/WORK:

This research brings up a number of possibilities ideas for future work. Future research should focus on determining the impact of the target and message purpose on texting behavior, as well as examining the impact of social approval on mobile phone usage.Future research should look into specific sorts of mobile phone interactions as well as the perceived risk associated with them.As we mentioned in our limitation, more and accurate data is required for this type of large research, therefore we may need to include more data in the future work. Female bike riders should be included as a sample in future research.Although this was important because the study focused on the behavior of young cell phone users, future research should explore a comprehensive analysis of all drivers.The acceptance of increasingly advanced technologies will require additional research in the future.

7 CONCLUSION:

This research is a study of mobile phone usage while driving among the young bike riders in Bangladesh. It attempted to explain the factors mobile phone use while driving and what are the main reasons behind this behaviour impact. Moving beyond previous research studies, this study developed a research model based .This study conducts a data analysis study by developing a hybrid model utilizing PLS and ANN to better understand the primary factors for using mobile phone while driving while driving. This study successfully verified the impact of other factors on mobile phone use while driving using a two-staged SPLS-ANN approach with a nonlinear non-compensatory neural network model.And by doing normalized importance we successfully predict our most important and strong factor.

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