Customer's adoption of 5G services on social media: The mediating role of customer-based brand equity and technology adoption

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Abstract

Rapid evaluation of mobile network technology has a significant impact on the telecommunication industry's traditional system. A deep understanding of consumer's adoption behaviour of the innovative mobile service is required. The Fifth generation of mobile communication technology has recently been introduced to the market for individual and commercial use. We specifically focused on how social media is used by telecommunication companies to influence consumer's 5G mobile service bundle purchase intention. Since this research targets the Chinese market, we choose WeChat as a representative platform to analyse the companies' social media marketing activities. In this research, we collected 765 valid online responses through an online survey administered to the survey of their intention to purchase 5G mobile service bundle. Structural equation modelling technique was used to test the direct and mediation hypotheses. The result shows that SMM activities has a positive and direct influence on adoption readiness, CBBE and self-efficacy. Moreover, SMM activities have a positive influence on purchase intention through the mediation of adoption readiness and CBBE. However, the result reposted that SMM activities have a direct and negative relationship with purchase intention. The result also showed self-efficacy has no influence on purchase intention and does not mediate the relationship between SMM activities and purchase intention of 5G mobile service bundles. On the contrary, Self-efficacy has an influence on purchase intention through the mediation effect of adoption readiness. This research is this is the first study to examine the interrelationships between SMM activities technology adoption and brand equity. Furthermore, this is one of the first studies on consumer's intention to purchase 5G mobile services bundles. The thesis also provides a new perspective for analysing other technology product and service adoption which also help the telecommunication industry better understand customer's behaviour and develop an effective marketing strategy.

Declaration

This statement and the accompanying publications have not previously been submitted by the candidate for a degree in this or any other university.

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List of Publications

The working paper is related to this thesis:

Wenjin, H., Raffaele, R., Bhattacharya, S. 'Social media marketing activities of 5G adoption: A branding and technology adoption approach',

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I specially dedicate this thesis to my mother, you are the most wonderful mom in the world!

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Chapter1. Introduction

In the following sections, I will discuss the research background of 5G technology and then present the aim of this study as well as the considered theoretical models.

1.1. The Research Background

In the last few decades, telecommunication networks and communication technology have improved noticeably. More specifically, the mobile wireless generation (G) technology has been upgraded from 1G to 4G, which will be replaced by the 5G technology (Srivastava and Chourasia, 2019). This continuous upgrade of mobile wireless communication technology, which makes the customers already have certain level of knowledge about the telecommunication products and services. Therefore, the knowledge that customers acquired from their previous experience helped accelerating the speed of the adoption of 5G mobile service for both personal and business use compared to previous generations (Boccardi *et al.*, 2013; Chin *et al.*, 2014).

The mobile wireless generation (G) refers to the technology used in different mobile communication networks (Vora, 2015). Each of the mobile wireless generations has its own characteristic regrading to the technical standards and capacities (Campbell et al., 2017). In other words, each generation has different data processing and transmission ability (Alliance, 2014). Compare with the previous generation, the fifth generation (5G) enables consumers to download and upload at a higher speed. Furthermore, 5G has wider coverage and provide a more stable connection (Srivastava and Chourasia, 2019). Most importantly, 5G technology will allow consumers to connect more devices online at the same time. Such successive benefits of 5G will improve and enhance the users' mobile experience (Wall, 2018). 5G technology emphasizes human-centric roles as access to the user content of multi-media, service, and data. Based on 5G technology, the technology company will also develop new usage scenarios, for instants, AR (augmented reality), VR (virtual reality), autonomous vehicles, self-driving lorries. (Srivastava and Chourasia, 2019). Moreover, the 5G technology will be embedded and lead to a substantial structural change in the industry. 5G network is more like a pervasive platform, which will foster the foundation of new business models and new industries. The 5G mobile service network will benefit a new economic system as well as new demands around the whole world (Soldani and Manzalini, 2015). In the near future, the wide diffusion of 5G technology will enable the digital mobile network to have a profound and sustainable effect across multiple sectors in society (Wall, 2018)

The commercialisation of 5G mobile network-based products and services is now approaching a critical stage. Since mobile technology has developed significantly, more 5G mobile network-based products and services will soon be available in the market (Vora, 2015). However, at the early stage, the new technology product and services it is not easy to be accepted by the customers (Lee *et al.*, 2011). 5G has become a necessary support for many innovative products and services, which enable society and enterprises to realise the benefits of the 5G technology (PWC, 2021). This situation accelerates the maturity of 5G mobile technology. Yet, the functionality of 5G cannot be fully discovered without the adoption rate reach certain level (Velrajan, 2020). The 5G market strategy will focus on creating more value for the customer, competitive advantages and focus on accelerate the speed of adoption (PWC, 2021).

Consumer's adoption behaviour is crucial for the diffusion speed of the new technology, especially at early stage (Rogers, 2010). Since the success of the technology ultimately depend on the level of consumers' acceptance which makes it essential to understand the consumers' response to technology innovation (Hauser *et al.*, 2006). If the mobile network adoption rate is low, is not only represent the failure of the new technology, the investment need longer time to recover, but also implied reduce the speed of economic growth and decrease the sustainable development of the whole society (Ericsson, 2022). Moreover, massive research related to consumers' adoption of 3G, 4G mobile service are mostly conduct in western countries (Kim, 2010; Revels *et al.*, 2010; Al-Debei and Al-Lozi, 2014; Kim *et al.*, 2018). As China is one of the largest mobile market in the world (Statista, 2021), a study of its success in 5G implementation will give other counties an example how to drive the telecommunication industry at the early stage of 5G. Furthermore, research in a growing 5G market will also provide bias for other countries to formulate the strategies for developing 5G market.

Besides technology, the communication channel where consumers obtain information about the product changed as well (Venkatesh *et al.*, 2012b). Traditionally, consumers obtained product information through word-of-mouth (WOM), TV advertising, and directly from shop assistance from the shops. In the age of the internet and social media, there are multiple ways for the consumer to get information and advice about new technology (Rauschnabel *et al.*, 2012). Accordingly, this research attempts to build a theoretical framework that can explain consumer adoption behaviour of new technology products and services under the influence of social media marketing. This study chooses 5G products and services as a research target to test our model.

Hence, this study investigates the influence of social media marketing on consumer technology adoption behaviour of 5G. This research identifies new constructs that can influence customers' intention to purchase 5G mobile service. The result of this research will help marketing managers and companies to understand consumer adoption behaviour and build their marketing strategy. In this study, we only focus on the drivers of the behavioural intention to adopt the 5G network service bundles in the Chinese telecom market.

1.2. Current Status Of 5G Mobile Network and Service Bundle

The first commercial 5G network was launched in South Korea in April 2019. Till the end of 2020, there are 73 telecommunication companies launched 5G service in 41 counties (Ericsson, 2022). China launched the 5G network after South Korea in November 2019 (Ministry of Industry and Information Technology, 2021a), and China has the most 5G subscribers in the world by the end of 2021 (Statista, 2022). Therefore, the focus of this research is on the Chinese 5G market. There are three telecommunication companies (carriers) in China, which are China telecom, China Unicom and China Mobile which have total number of 1.7 billion mobile users in February 2021. From the total mobile users, 263 million are 5G users which accounts for 18% of the whole mobile users (Ministry of Industry and Information Technology, 2021b).

In order to persuade consumers, switch to 5G network, there is a highly interconnected chain throughout the procedure. The chain including the steps of 5G network to 5G mobile service bundle, 5G mobile service bundle to 5G devices, and 5G devices to the real user. Inside this relationship chain, the purchase of 5G mobile service bundle is the vital point, which pushes the customer to become a 5G network user. However, the data showed that the subscription number of the 5G mobile service bundle at the end of 2020 experienced a reduction compared to the first few months of open to the public (Ministry of Industry and Information Technology, 2021b). There are unavoidable problems leading to this situation, such as the limited choice of 5G mobile devices and the high price of 5G bundles. Moreover, the Chinese telecommunication regulation department suggested that, while the carriers are eager to pursue the economics benefits, the companies neglect the consumer perception and experience with 5G mobile service, for instance they did not match consumers' needs and their intention to purchase. Therefore, understanding the consumers' purchase intention has become the key issue for increasing 5G mobile service bundles' purchase rate.

Moreover, bunding products and services is a sophisticated marketing tool (Kotler *et al.*, 2019). Guiltinan (1987) provide the definition of bundling as in the marketing practice, products and services been put together as single package at a specific price. Company uses

bundling strategy to achieve price discrimination and stimulate the sales numbers. Especially help the company lock-in customer and increase the entry barrier for the market (Klein and Jakopin, 2014). In telecommunication industry, the mobile service bundle have been used for a long time and proved to be an effective marketing strategy (Klein and Jakopin, 2014). The products and services bundles are expected to play a crucial role in promoting the mobile service specifically for the latest generation. In telecommunication industry the bundling is also the form by certain numbered chosen products and services are offered as a package at a single price (Shapiro *et al.*, 1998; Klein and Jakopin, 2014).Traditional telecommunication bundle usually limited to voice and SMS, and triple or quadruple play APP offerings. However, with the development of mobile technology, the mobile service bundle now combines new technologies and service from telecommunication industry domain. Some of the bundles even cover information technology and consumer electronics. The latest mobile serive bundle usually include mobile network service subscription, WIFI, internet service and handheld device. Recently TV service is one of the options for the service bundle and becoming the most favoured options (Levashova and Pashkin, 2020). Mobile service bundles are expected to take the leading part in the marketing strategy for the new generation of mobile services. Thus, in this research we focus on the consumer purchase behaviour of mobile serive bundle.

1.3. Objectives of the research

Although there are theories for analysing consumer behaviour with regards to technology adoption, consumer's adoption behaviour may differ depending on the degree of the product's technological innovation. The consumer's adoption behaviour also depends on the development and innovation speed of the industry (Rogers, 2010). Anckar and D'incau (2002) research implied that technology development influences mobile service adoption. Knutsen (2005) study illustrates that the infrastructure of the industry, inter-firm collaboration, the business model may affect the adoption phenomenon. Also, the value of the service for the customer is another influential factor (Hsin Chang and Wang, 2011).

A growing number of studies have discussed the value of mobile services (Clarke, 2001; Anckar & D'Incau, 2002). However, the primary reasons why a customer decides to use new mobile products and services are still not clear (Pedersen et al., 2002; Lu et al., 2003; Meso et al., 2005). There is no unified framework that can successfully explain all technology adoption behaviours, which implies that in the field of consumer technology adoption behaviour, the primary focus is to follow the upgrade of technology and the changing of usage scenarios (Alter, 2018). With the development of technology, researchers need to find new

angles to analyse the newly added technology features and how these will affect consumers' adoption behaviour.

Moreover, in the past the carriers relied heavily on the monopoly marketing position and the fixed period contract bundle to secure the customer. However, after the release of 5G mobile service bundles by a heated competition and the unforeseen changes in the industry. The most fundamental change is the influence of the companies' marketing activities in social media (PWC, 2021). Before, the carriers communicate with customers mainly through traditional ways, such as their retail shops. In the era of 5G and social media, the telecommunication companies realise the need to form a new relationship with the customer, which results in turning their focus on social media. Accordingly, all carriers have their own social media account on WeChat, which build a new way to interact with the consumer and to capture their intention (Gallaugher and Ransbotham, 2010; Kim and Ko, 2012). Social media also changes the way how consumers obtain information before they make a purchase decision. For instance, consumers could check other people's comments on the product before their purchase, and they can even provide their own suggestions via social media. Many companies also use social media to support brand building, which can help engaging customers and delivering product information in a more effective way (Kim and Ko, 2012).

The objective of this study is focuses on identifying the constructs that will affect the 5G mobile service purchase intention, exploring psychological, technology-related, social influence and brand-related factors. In addition, the objective of this research is to examine how the social media marketing activates (SMM) from WeChat enterprise Office Account (WOA) affect 5G mobile service purchase behaviour in China.

1.4. Research contribution

Theoretical Contribution

Previous studies emphasised that the Social Media Marketing (SMM) activities can influence Customer-Based Brand Equity (CBBE) as well as purchase intention of luxury goods sector and Fast-Moving Consumer Goods (FMCG) (Bergst(Kim and Ko, 2012)röm and Bäckman, 2013; Liu et al., 2019b; Wang et al., 2020; Zollo et al., 2020). To date, in the studies related to new technology product and service adoption, CBBE has received limited attention (Kim and Ko, 2012).

Ovčjak et al. (2015) noted that more factors should be considered and analysed in order to encourage customers to purchase of 5G mobile service. Self-efficacy has been proved that play an important role in studies of individuals' behavioural intention in mobile service adoption (Fu et al., 2010; Ovčjak et al., 2015; Sanakulov and Karjaluoto, 2015). Furthermore,

the social cognitive theory demonstrates that in behavioural modelling, human has the capacity for observational learning, in which self-efficacy is a key factor (Peng et al., 2019). However, the effect of self-efficacy has never be tested in 5G adoption research before. The novelty of this research is we try to understand whether the individuals' self-efficacy has an impact on adopting 5G mobile service bundles.

Among the many IT theories trying to assess new technology product and service adoption and usage, the Unified Theory of Acceptance and Use of Technology (UTAUT) proposed by Venkatesh et al. (2003b) is one of the most popular frameworks. It has been proved by many studies that UTAUT has high explanation power, close to 70% of the total variance of user behavioural intention, and 50% usage of new technology products and services (Venkatesh *et al.*, 2003b). The results achieved by this framework are more reliable compared with results obtained from other technology acceptance models, which can only explain 17%-53% of user intention (Taylor and Todd, 1995; Venkatesh et al., 2012a). Therefore, this study is the first time adopts UTAUT as the main research framework for analysing consumers' behavioural intention for 5G mobile service adoption. Furthermore, the behaviour of purchasing 5G services bundles is the key action that represent the adoption of 5G mobile service. In this research, the adoption of 5G mobile service implies purchase 5G service bundles. Moreover, with more studies using UTAUT, the UTAUT model has been revisited and expanded to include various constructs. For instance, scholars have analysed UTAUT as a multi-dimensional construct, labelling it Adoption Readiness (AR) (Thakur and Srivastava, 2014a; Donmez-Turan, 2019).

Adopting the same approach, this study also has sought to extend the UTAUT, through incorporating different constructs from the marketing literature, specifically first time combine CBBE and SMM activities. Drawing from the previous researches theoretical models, this study developed a conceptual framework and contribute a new insights of measuring how the role of SMM activities in adopting 5G service bundles. Moreover, this research is aims to analyse whether AR, CBBE, self-efficacy mediate the relationship between customer perceived SMM activities and purchase intention of 5G mobile service bundle, which never be done in other research before.

Managerial Contribution

The managerial contribution will be the identification of the factor which will contribute to 5G mobile service bundle purchase intention in Chinese market. The study will form and test a framework for management practice. The result of the research will help the Chinese telecommunication company make more effective social media marketing strategy for

promoting 5G mobile services and provides insights for marketers to increase consumers' purchase intention towards 5G mobile service. It will also help the other counties developing the marketing strategy of increasing the numbers of subscription of 5G services bundle.

1.5. Research questions

The research questions the researchers attempted to address in this research are as follows:

1. What factors will influence consumers' purchase intention of 5G service bundles?
2. Does social media marketing activities from the WeChat carriers' official account influence consumers' purchase intention towards 5G mobile service bundles?
3. Does adoption readiness, CBBE and self-efficacy mediate the relationship between SMM activities and consumers' purchase intention of 5G mobile service bundles?

The sub-questions were adopted from the main research questions, which are what key factors could affect the purchase behaviour of 5G mobile service bundles:

- Does the adoption readiness affect consumers' purchase intention of 5G mobile service bundles?
- Does self-efficacy affect purchase intention of 5G mobile service bundles?
- Does the customer-based brand equity affect the purchase intention of 5G mobile service bundles?
- Does SMM activities will impact adoption readiness self-efficacy and customer-based brand equity mobile service bundles?

The factors which affect 5G mobile service bundles purchase intention will be demonstrated in detail in the research model which will be present later. These factors will be procced as drivers of intention to purchase 5G mobile bundle in China. The literatures in the later chapter will also explain the relationships between SMM activities, adoption readiness, CBBE and purchase intention (Kim and Ko, 2012; Venkatesh *et al.*, 2012a; Thakur and Srivastava, 2014a; Godey *et al.*, 2016).

1.6. Research method and data collection

This research uses a quantitative method. The objective of the research is to analysis whether social media marketing activities influence 5G mobile service purchase intention in China. Quantitative research through hypothesis testing is effective in validating the hypotheses of the factors affecting consumer intention to purchase 5G in China. The research hypothesis was made based on the constructs from the well-established behaviour intention model, which is the unified theory of acceptance and use of technology (UTAUT). According to our research context, we add new constructs in the research model, which are social media marketing (SMM) activities, customer-based brand equity (CBBE) and self-efficacy. As our

research is focused on social media activities in the Chinese market, WeChat, as the dominant social media platform in China, is our target. The factors related to WeChat characteristics also be considered.

This study developed the survey using Qualtrics. and was send to the real customers of China telecom through the help of the customer service department. The questionnaire was shared in the China telecom customer WeChat group, which used for client maintenance to ensure it goes to actual 5G users. This sampling approach ensured focused and reliable data.

1.7. Thesis structure

According to the Phillips and Pugh (2000) suggestions, the main structure of the thesis should be combined into four parts which are contributions, data theory, theory, and background theory. Chapter 2 reviewed the literature related to technology adoption and the background theory as well as identify the research gap. Chapter 3 will demonstrate the research hypothesis and conceptual model. Research philosophy and approaches will be discussed thoroughly in Chapter 4, which is based on related theory. Chapter 5 will present the research strategy and data collection method, which are based on data method theory. Chapters 6 and 7 will demonstrate the discussion of the research result and finding by comparing the research objective and research questions. The details of each chapter will be explained below.

- **Chapter 2: Literature Review** Chapter 2 will evaluate the determinants of consumers' purchase intention of 5G mobile service. This chapter will review the Stimulus-Organism-Response (S-O-R) theory and try to use S-O-R theory to explain how social media influence the adoption of 5G mobile service. The chapter will also discuss the UTAUT model and the latest research contributions. Moreover, other drivers of 5G purchase intention will also be discussed in detail, including adoption readiness, self-efficacy, and customer-based brand equity. In this chapter, the researcher examines how social media marketing activities could influence AR, self-efficacy and CBBE; how the AR, self-efficacy and CBBE impact 5G purchase intention. Specifically, how the AR, self-efficacy and CBBE work as mediator links the relationship between SMM activities and purchase intention will also be discussed.
- **Chapter 3: Research Model and Hypothesis Development** Chapter 3 presents the research paradigm and theoretical background to ensure that the research framework has a stable foundation through testing the constructs. The research framework of UTAUT (adoption readiness) may not be sufficient to thoroughly explain purchase intention of 5G mobile service, so in this research, we also evaluate other factors from

other research filed such as social environment, psychology, and branding which are supposed to have an influence on 5G service purchase intention. The theoretical model relies on the UTAUT model and S-O-R theory. These theories are deemed more suitable for evaluating the impact of SMM on WeChat. The research hypotheses will be developed.

- **Chapter4: Research Design** The goal of this chapter is to explore how the research question will be answered by means of a systematic plan and research design. The relationship of research and theory will also be investigated in this chapter and explore the most suitable approaches for this study topic. In order to select the most important research approach for this study, in this chapter, predictive, analytical, descriptive, and exploratory approaches will be discussed. This chapter will also investigate the research philosophy based on previous research methodology literature. The methodology for this research will be determined based on how the research questions will be answered, consistently with the research philosophy. The chapter also discusses the decisions related to the sampling method and why the questionnaire was chosen as a research instrument for this research. The chapter concludes by analysing the reliability and validity of the research, pilot study, questionnaire design, back translation, and potential ethical issues.
- **Chapter 5: Data analysis and results** in this chapter, the author will adopt structural equation modelling to test the hypotheses of this study. This chapter will also provide information about the reliability and validity assessments of the data.
- **Chapter 6: Conclusion and Managerial Implications** Chapter 6 discussed the research result and used the proposed research hypotheses and previous literature to interpret the outcomes. This chapter will evaluate the validity of the theoretical framework to explain the phenomenon investigated in this study. This chapter will also propose the managerial implications and further recommendations for the telecommunication industry. The limitations of this research and suggestion for future research are also discussed in this chapter.

Chapter 2. Literature Review

2.1. Introduction

In this chapter, we review the literature related to consumer adoption of technology products and services. This chapter will introduce the theory and concept that will be used research framework for this study, including Stimulus-Organism-Response model, the Unified theory of acceptance and use of technology (UTAUT), self-efficacy, and customer-based brand equity (CBBE). In the following section, we will also discuss research gaps and the contribution of this research.

2.2. Stimulus-Organism-Response model

Regardless of different research disciplinary and orientation, the previous literature indicated that without doubt consumer behaviour represent the format of Input-Output model (Jacoby, 2002). From traditional marketing consumer behaviour research, the early model mainly considers economic and financial factors as input, and the behaviour of spending or purchase consider as output. The early models include numerous assumptions which for today's situation is untenable. From these assumptions, the consumers are expected to act rationally. Accordingly, they treat the consumers' mental stated, process and differences as not relevant to their behaviour of purchase. Essentially, in the early theory, customers were conceptualized as their behaviour is a reaction to external stimuli. When the research of wealth related findings and psychology added to behaviour study, the second-generation of consumer behaviour model started to become popular in the 1960s. However, these models did not consider the consumers' mental state, cognitive process and their differences with regards to purchase behaviour. Essentially, at the early stage of customers behaviour research, customers decision procedure is considered as a reaction to external stimuli. Later, when the research of wealth-related findings and psychology was added to behavioural studies consumer's individual factors started to become popular in behaviour model (Mehrabian and Russell, 1974) .

With the researchers no longer deny the Stimulus-Organism-Response (SOR) model. Unlike the Input-Output model, the S-O-R model devotes more attention to inter factors compared to other models that mainly focus on external stimulus and consumer response factors (Mehrabian and Russell, 1974). The fundamental stimulation might be just a single stimulus, or a combination of stressors, for instance, a set of contexts, which may affect the objective of the response. According to Mehrabian and Russell (1974), S-O-R model

describes the mediation function of organism between stimulus and responses and demonstrate how the organisms respond to certain stimuli. The S-O-R model is often used to analyse consumers' behaviour in social media (Smith *et al.*, 2016). Based on this model, the stimuli refer to various factors of the external situation and emotional perspective. The stimuli factor in the model represent an affordance in the environment (Bigne *et al.*, 2020). Stimuli are composed by dynamic properties, for instance, different forces, in different fields. These stimuli are received, perceived, and sensed based on the complexity of the organism, which is all included in a wider situation. Then the organism transforms the properties of the stimulus into a receptive single (Quiroga, 2012).

The S-O-R is relevant to understand the influence of stimuli external to the individual when he, for example, search for information to evaluate different product alternatives available to them. In this case, under the content of the digital world, the external stimuli are the information from online websites and digital advertisements. Then, consumers' emotional responses (i.e., joy, attraction, arousal) will occur when the organism processes the stimulus (i.e., information). Kim and Lennon (2013) demonstrated that the organism could be separated into two intermediary states: cognitive and affective states. The cognitive state represents the information in consumer's decision-making procedure which concerns acquisition, retention, retrieval, and processing (Lee *et al.*, 2011). The affective state represents the feelings and emotions that are evoked by the external stimuli (Kim and Lennon, 2013). There is various research related to the cognitive and affective components in consumer behaviour.

2.2.1. Cognitive attitude

Wu *et al.* (2014b) explained that consumers' attitudes related to online information is a psychological tendency. It is developed during the cognitive state aiming to evaluate the information with favour or disfavour. The previous research about online retailing confirmed that the structure and content of the information posed by the seller's online influence consumers' cognitive decisions, satisfaction, and purchase intention (Eroglu *et al.*, 2001; Eroglu *et al.*, 2003; Wu *et al.*, 2014a).

In Eroglu *et al.* (2001)'s research, the atmosphere, visual cues of the online retailer (i.e., colours, graphics, online shop design, and the layout), all affect consumer responses. Wu *et al.* (2014a) further proved that the layout of a website has a significant indirect influence on consumer purchase intention. Other pieces of literature further proved that attitude, pleasure, emotional arousal mediate the relationship between the signals from online shops and consumer's purchase responses. Moreover, other online contexts such as performance

expectancy, effort expectancy, entertainment all played a vital role on consumer cognitive attitude towards the stimuli online (Kim and Stoel, 2004). It is also be proved that the context from the website and social media have a strong influence on E-WOM on consumer attitudes towards purchase behaviour (Vermeulen and Seegers, 2009; Ayeh *et al.*, 2013).

2.2.2. Affective attitude

In the original Input-Output model, the affective response as a reaction to the environmental stimuli includes pleasure, dominance and arousal (Mehrabian and Russell, 1974). Furthermore, Russell *et al.* (1989)'s research confirmed that pleasure and arousal would affect the emotional response adequately. However, some research argues that the existing three dimensions are too narrow to explain the new variations of emotional response in social media activities (Machleit and Eroglu, 2000; Kim and Lennon, 2013). Based on the S-O-R model, the emotional response has an important role in meditation the relationship between advertising stimuli and consumer response, speciality shop online (Wu *et al.*, 2014a).

Research related to technology and information systems usage demonstrated that usability and aesthetic of the product and information from online platforms affect consumer intention (Zhang and Li, 2005). The performance expectancy, effort expectancy, social influences, and consumers' emotions will all affect consumers' responses (Zhang and Li, 2005; Venkatesh and Bala, 2008). Therefore, the affective attitude function referring to consumers' reaction towards the function of the product.

2.2.3. Response: consumer purchase behaviour

In the S-O-R framework, Donovan *et al.* (1994) and Robert and John (1982) described that purchase behaviour is the outcome of the stimuli and emotional determinants. Moreover, intention is also influence by individual's internal organism. In addition, studies also analyses the consumer's behaviour under the influence of social media activities attributed to the internal organism. The consumer will make the judgment related to whether the information from the social media activities is useful, attractive, and eventually, they will form the intention to purchase (Kamboj *et al.*, 2018).

We use the keyword "S-O-R", "Stimulus-Organism-Response" and "consumer behaviour" limited the result from the year 2000 till 2020 and chose the journal above level 2 in the ABS list and limited the topic related to technology adoption. The result gives 354 acritical from the World of science and 30 from Scopus. After browsing the papers, we choose seven papers for further analysis. The literature related to this research topic is present in Table 2.1.

Articles	Stimuli	Organisms	Response	Construct	Research area
Alam and Noor (2020)	Service Quality	Corporate Image	Customer loyalty	Customer Loyalty GenerationY	Mobile internet technology
Bigne et al. (2020)	Encounter environment	Consumer consciousness consumer automatic processing	Consumer experience /response	Online reviews	Bibliographic study
Kim et al. (2020)	Authentic experience	Cognitive response Affective response	Attachment to VR Visit intention	Virtual Reality Tourism	Hospital e-commerce purchasing system
Zhu et al. (2019)	Online Environment Cues	Cognitive and Affective	Online Repurchase Intention	Online Repurchase	E-Blackboard system
Wu and Li (2018)	social commerce marking mix	Customer value	Loyalty	Social commerce	E-learning Internet service
Kim and Johnson (2016)	Brand-related UGC	Pleasure, arousal, information quality	Brand engagement Future-purchase intention	Consumers using social media	Biometric system adoption
Kourouthanassis et al. (2015)	performance expectancy effort expectancy	Pleasure, arousal, dominance	Behavior intention	Tourists	Technology-based systems
Kim and Hahn (2012)	High-tech involvement Experiment proclivity Fashion/brand leadership	Ease of use usefulness enjoyment	Attitude	Mobile devices	Online family dispute resolution (OFDR) system
Animesh et al. (2011)	Technological Spatial	Telepresence Flow social presence	Purchase intention	Virtual World	MP3 player Internet banking

Table 2.1. S-O-R Model literature review

2.2.4. Stimuli–Organism-Response Framework

The marketers realize the importance of external environmental as a tool for stimulating (S) the organism (O) will be able to forecast the consumers' behaviour response(R). There have been numbers of S-O-R related research in marking context which confirmed the relationship among environment, organism and consumer response behaviour (Choi et al., 2011; Li et al., 2012). In this research, within the digital milieu the external environment stimulus manifests the factors which reflect the company's performance in social media (e.g. WeChat company's official account). The organism represents the procedure of consumer processing the

information form external stimuli, such as technology information and brand related information. The information is related to consumer's both cognitive and affective state of which also served as intermediary platform leading to specific response behaviour (Sánchez-Franco and Roldán, 2005). Moreover, the mobile service market starts to focus on both technical function as well as brand influence. In this research we explore the purchase intention for 5G mobile serive bundles through response to all the aspects and emphasis on the impact of social media activities.

2.3. Social media activities

The social media and digital technologies changed the landscape of marketing competition. The company increased the usage of social media platform for the business purpose when they acknowledge the advantage of the platform. Social media is defined as an internet-based application that is built on ideological and technology of Web 2.0. The technology also allows a certain exchange of user-generated content (Kaplan and Haenlein, 2011). There are different types of social media networks, such as social network sites, online communities, and microblogs. In the virtual world, customers and the company share experience, information, and insights. There is certain benefit to using social media for business promotion, for example, help build brand image, reputation (Dwivedi *et al.*, 2019), developing collaboration products and services (Mangold and Faulds, 2009), build marketing strategies (Laroche *et al.*, 2013). Social media give the customer more control over the information and marketing promotion process, which also offers the company opportunities as well as challenges (Del Giudice *et al.*, 2013). Consumers will generate the message and share information about the product and service, which the customer more power over the information than before (Sashi, 2012). In the new landscape, the company and the customer are both embedded in social media, for instance, Twitter, Facebook, Instagram and YouTube, where they co-build a brand and even co-promote a brand (Tynan *et al.*, 2010) .

Social media is considered an important promotion tool for reaching out to the market and the customers (Sashi, 2012; Risius and Beck, 2015; Lamberton and Stephen, 2016). Social media assist companies to achieve many goals earlier than before. For instance, social media plays an essential part in helping consumers build strong marketing knowledge (Bharati *et al.*, 2015). Moreover, social media is an efficient channel for commercial and institutional communications, representing a hybrid element of the marketing promotion mix. In social media platform environment, consumers shar their opinion about the products, interacting with other individuals and the company. Besides, in social media, the companies can also encourage consumers to engage more to build trust for long-term relationships (Sashi, 2012).

It also forms a collaborative relationship with the customer to develop new products (Hollebeek *et al.*, 2014). In general, social media enhance marketing promotion in many ways. Firstly, social media platforms enrich the customers' relationship with the company. Secondly, the company holds the brand online community for marking promotion. Thirdly, in the social media platform, the information generated by the customer is usually updated and corrected by other individuals, which provides more accurate news and knowledge for the product and service (Kumar and Mirchandani, 2013; Antonacci *et al.*, 2017).

Social media cause new challenges for the company, some of them have to re-shape their traditional business model to adopt to the social media environment. In fact, although the use of social media for marketing promotion in most industries is growing rapidly (i.e., luxury and fashion industries), the technology product companies also have been hesitant for a long time (Chevalier and Mazzalovo, 2008; Kapferer and Valette-Florence, 2016). In this research, we explore the influence of social media marketing activities on technology products and services. More and more companies have started to dedicate their resources from traditional advertisement to official microblogs to establish more trust and form closer relationships with their customers (Coyle et al., 2012; Kim and Ko, 2012; De Vries et al., 2012). Compared to the traditional brand advertisement, microblog communications between the company and the followers exist in every stage of the marketing process: per-purchase, purchase, post-purchase, even for customer service and sales (Labrecque, 2014; Coyle et al., 2012). The brand microblog relationship with the followers is one-to-many. The markers send their communication message to all the followers, and the followers can re-post the message, read others' reviews, comments about their re-post message, and interact with each other (Xu and Schneider, 2011). Thus, the brand microblogs deliver their own marketing messages and build and maintain relationships with the followers (Hsu et al., 2010). According to Kim and Ko (2010a)'s study, social media advertisements can improve brand reputation significantly.

The report of Lab (2021) shows that 70% of the consumer like to search product information from social media, and 40% of them make their decision to purchase according to the suggestions they find on social media; 45% of those customers who search information in social media engaging in the E-WOM activities. Social media is an ideal tool for brand promotion, and the consumer will be helping to generate and spread brand-related information within their social circles if they feel connected with the brand (friends, peers, other acquaintances) (Kim and Ko, 2012; Godey *et al.*, 2016). Jansen, Zhang, Sobel, and Chowdury (2009) research shows that in Twitter, many consumers are involved in the brand

information dissemination procedure, which includes brand comments, sentiment, and their own opinion.

The current study focuses on social media marketing activities, which refers to advertising and promotional activities on social media, which can be divided into five dimensions: interactivity, informativeness, WOM, Trendiness and personalisation (Kim and Ko, 2012). These dimensions provide an in-depth analysis of the motivation of consumers towards social media marketing. Social media marketing activities (SMM) can help enhance brand equity (Godey et al., 2016; Kim and Ko, 2012), and purchase intention (Dutta and Bhat, 2016; Gautam and Sharma, 2017). Furthermore, the five dimensions represent the use of social media for marketing activity in which the company starts to share information about the new product release, product promotion activities, and other brand-related information in their official blogs. These activities and information aim to attract more followers to respond to their posts on social media and spread them through their individual social connections (Hsu et al., 2010).

We use the keywords "social media marketing activities", "consumer behaviour" in the database WOS and Scopus from the year 2000-2020 to identify the literatures which related to technology adoption. We filter the articles from the ABS list above rank 2, and we find 744 articles in total. After skimming the acritical, there are 13 articles left. These studies all proved that SMM activities and E-WOM have a positive influence on behaviour intention, CBBE and other related factors (Sweeney *et al.*, 2014; Reimer and Benkenstein, 2016). Please see table 2.2 below the literature on SMM.

Articles	**Dependent Variable**	**Mediator**	**Independent Variable**	**Research Area**
Wang et al. (2021)	Future performance	Value equity brand equity relationship equity	Loyalty intention	Traditional market
Zollo et al. (2020)	Intention	Brand experience social media benefits	CBBE	Luxury brand
Moslehpour et al. (2020)	Intention	Trust brand image		Traditional market
Yustlan (2020)	Intention	Value equity brand equity relationship equity		Mobile phone

Aji et al. (2020)	Intention	Brand equity	E-wom	Tea brand
Chen and Lin (2019)	Intention	Satisfaction	Social Media Marketing Activities, Social Media Marketing Activities, Perceived Value	Social media marketing
Liu et al. (2019)	Customer engagement		Customer engagement	Luxury brand
Seo and Park (2018)	E-WOM commitment	Brand equity	E-WOM commitment	Airline
Algharabat (2017)	Brand loyalty	Brand love	Self-expressive	Facebook brands
Godey et al. (2016)	Reference price premium loyalty	Brand equity	Customer response	Luxury brand
Ural and Yuksel (2015)	Intention	Value equity brand equity relationship equity customer equity		Car
Sano (2014)	Intention	Customer satisfaction	WOM	Travel service
Kim and Ko (2012)	Intention	Value equity brand equity relationship equity	Customer equity	Luxury brand

Table 2.2. Social media marketing activities literature review

Kim and Ko (2012) defined the concept of SMM activities in luxury product industry and its five sub-dimensions. The result proved that SMM activities have a positive influence on value equity, relationship equity and brand equity. Godey *et al.* (2016) study later confirmed the five dimensions of SMM activities in the luxury sector, verifying their positive influence on brand equity, brand awareness and brand image. The result also implied that SMM activities affect consumer's response the brand equity. In luxury product industry, SMM activities was also proved that have a direct influence on CBBE (Zollo *et al.*, 2020). SMM activities have showed an impact on brand experience and social media benefits. Moreover, the research also demonstrated that brand experience and social media benefits mediate the relationship between SMM activities influence and CBBE (Zollo *et al.*, 2020). The study of luxury products also proved that SMM activities have a positive influence on customer engagement

(Liu *et al.*, 2019b). For the traditional products, Wang *et al.* (2021) research showed SMM activities as an influence on value equity, relationship equity and brand equity and further impact loyalty intention and future performance. Researcher tests SMM activities in the airline industry as well which SMM activities show a positive influence on brand equity and customer response (Seo and Park, 2018). The study also proved that SMM activities have a positive impact on purchase intention in the luxury industry, fashion industry, which all mainly related to fast daily consumer goods.(Kim and Ko, 2012; Sano, 2014; Ural and Yuksel, 2015; Aji *et al.*, 2020; Moslehpour *et al.*, 2020). Based on the study of how social media marketing activities investigating the influence factor of Purchase Intention, Participate Intention, and Continuance Intention, the result shows that SMM activities have effect on continuance intention, participation intention and purchase intention (Kim and Ko, 2012; Chen and Lin, 2019). The study also mentioned that the characteristic of social networking website and how these will influence the usage demands and usage behaviour much be conduct in future study. Further study can also test personality or technology readiness will influence social media marketing activities.

2.3.1. WeChat advertisement

In the Chinese market, the leading social media platforms are WeChat and Weibo, especially WeChat (Lin et al., 2016). The relationship and interaction from these social media and between the bloggers and the followers in are expanded massively and becoming more interpersonal. Therefore, companies start to build their own account on social media platform and promote their new product and service through their own official account as well, in order to enhance the value of the product as well as brand equity (Shen, Wang, Lo, & Shum, 2012). This situation leading to the trend of increasing the investment for advertising in WeChat. In China, the microblog social media platforms have gained rapid growth in the past 20 years, which experienced three stages: web novel stage (1997–2003), exaggerated words or pictures stage (2003–2010), and SNS digital celebrities stage (2010–present) (China Internet Celebrity Big Data Report, 2016). Notably, Chinese social media platforms are expecting a rapid growth at the third stage (Liu, 2017). During this stage, the social media platform incorporates advertisement and e-commerce increasing profoundly.

At the previous stage, the individual bloggers, such as digital celebrities, are trying to build intimate relationships through frequent interactions with their followers on Weibo and WeChat. The blogger in China aims to develop an affinity relationship and emotional connection to stimulate empath and closer relationship with the followers (Liu et al., 2017). After the brands realized the power of the social media platform which can directly influence

the connection and communication with their customers result in increasing the sales number, at the third stage the brand start to accelerate the speed of social media marketing activities online. The SMM marketing activities help the company and customer generate positive information to affect purchase intentions (Liu et al., 2017). The company and brand's SMM activities aim to build the channels to engage with the customer through posted topics and conversations from their own social media account (Ceballos *et al.*, 2016). SMM activities also allows the brand create personalised information and send to customer by their request which will also increase the consumers' perception of the quality of the product (Poulis *et al.*, 2018). Moreover, the literature showed that SMM activities from the company and the brand considered as more reliable information resource compare to other individual bloggers which has higher credibility value and manifest a strong impact on perceived quality and brand trust (Wong *et al.*, 2021).

WeChat is the dominant mobile social media platform in China, which has 1.2 billion users and 1.09 billion daily active users (Tencent, 2020a). As a closed-source multifunctional platform, WeChat platform combines instant messaging, voice/video call, blog space (Facebook's function), mobile payment, micro-applications, interactive games, e-commerce, public service, etc. (Liang and Yang, 2018; Chu et al., 2019; Liu et al., 2019a). WeChat provides the user with an innovative way of communication and becomes "one-stop" APP in Chinese user's daily life. WeChat is one type of applied company-host account on WeChat. WeChat is adopted by enterprise organization, merchants, celebrities to communicate and interact with followers through posts. The posts usually use text, images, voice, and sometimes even short videos to communicate with the followers.

Since WeChat is a closed-source social media, which requires the followers to subscribe to the WOA to obtain the information. If the followers don't voluntarily decide to subscribe to the WOA, WeChat cannot push the account to the followers just based on the suggestion mechanism and algorithm (Chen et al., 2019). WOA is currently the most effective and widely used marketing promotion media in China. There are 20 million WOA till the end of 2020, and 80% of the WeChat users subscribe WOA, and every day, around 360 million uses read WOA posts (Tencent, 2020a). Shankar and Balasubramanian (2009) proposed three steps to comprise the consumer's decision-making process in mobile marketing promotion, consisting of the basic theory of purchase process in social media platform. From the WOA campaign, followers received the marketing message from the enterprise; then, they decided to click the message and read it. In the second phase, the followers read the campaign post in detail and decide whether to purchase or not. In the last phase, followers decide to purchase

through the campaign and become a customer of the company. The crucial stage in this process is attracting the follower's attention in the first place. There is also other possibility that if the post can grab the follower's attention, although they are not directly interested, they can still forward the message to other people in their network who might consider purchasing the products or to subscribe the WOA. Because of the unique features of how information is shared within WeChat, this platform is influential and trustworthy (Lu et al., 2018). As a result, WeChat has become a highly targeted advertising platform in China (Zhang et al., 2020). 41.9% of users adopting WeChat platform for business purposes till the end of 2020 (Tencent, 2020b). The data also shows around $7.1 billion investment on corporation WeChat communication and promotion purpose till the end of 2020 (Lab, 2020), which indicates WOA has become the most important platform for a marketing campaign in China.

Before proceeding further, it is important to address the concept of social media activities in WeChat. As defined by Kim and Ko (2012), social media refer to the applications or platforms designed for online content sharing, collaboration and facilitate interaction. In the digital environment, social media appearance in different types, such as blogs, podcasts, images, social blogger marking, microblogging, wikis, video, etc. WeChat is one of the examples. However, there is lack of research on WeChat platform, and particularly research about social media marketing activities through WeChat is limited. Social media marketing activities (SMM) are defined as a process in which companies and brands create, interact, and deliver product information and marketing offerings to the customer to establish and maintain relationships with customers by facilitating communication and information exchange activities (Kim and Ko, 2012).

According to the previous studies, social media marketing activities have a strong positive influence on brand equity (Bill Xu and Chan, 2010; Lim, 2015; Liu *et al.*, 2017). However, social media advertisement are never tested with the UTAUT model and used as exogenous factors before. In our study, we use WeChat officinal blogger as exogenous factors to test how it will impact the UTAUT model and other constructs in 5G products/services. To be more specific, in this research, we want to test how the advertisement in the carrier's WeChat official bloggers will affect the customers' opinion about the performance expectancy and effort expectancy of 5G products and services and how it will affect their intention to purchase. Furthermore, this study also wants to analyse how the official advertisement will influence consumers' opinion on the CBBE and self-efficacy of using 5G products/services.

In the technology industry, SMM activities for innovative products and service promotion are particularly important. Numerous studies implied that market factors, company factors,

and technology factors will all affect the marketing campaign (Hall and Khan, 2003). The companies and brands use marketing campaigns to spread awareness and persuade consumers to adopt the products and services. Regarding 5G mobile service, the three carriers in China all have a similar 5G mobile network and launch a similar mobile service bundles at the same time. Moreover, the most exceptional character of mobile service bundles is the customer need to sign the contract with the carries for at least one year. Therefore, the customer will choose their service provider more carefully at the beginning. This circumstance led to fiercer competition among the three carriers. Therefore, the SMM activities allow the company to identify the customer who are most likely to become the adopter through interaction and communion with the customer. Comparing to traditional marketing activities, social media is more efficient in helping customers become familiar with the 5G products and services (Filieri, 2015; Wang et al., 2020). SMM activities also allow the company to share product information in real-time with their customers, share brand value, and cultivate customers to share the same image and passion with the brand. The company generate the WOA post with the company assets, attributes, information and knowledge, which contribute to brand building, enhance consumer self-efficacy, and even emphases the features of the products and service (Kim and Ko, 2010; Kim and Ko, 2012; Al-Qeisi et al., 2014). The consumer will be motivated to visit the WOA, read the post, interact with others, share experience and opinion, required customized service, and share the information with their social circle. The customer will realize the company promotes the product and service and wants to enhance the positive brand equity and improve the consumers' self-efficacy (Godey et al., 2016). Based on these SMM activities, the company aims to reinforce the future purchase intention of the customers (Yadav and Rahman, 2017; Wang et al., 2020).

Research classified SMM activities differently. For instance, the combination of communication, providing information, support for daily life, promotion and selling, and social response (Lee, 2017), or the components of information, immediacy, responses, and access (Chang, 2012). Kim and Ko's (2012) research on luxury brands first defined SMM activities as composed of five dimensions: entertainment, interaction, trendiness, customization, and word of mouth (WOM). Tis conceptualisation has later been applied to the fashion industry and Fast-Moving Consumer Goods (FMCG) (Algharabat, 2017; Yadav and Rahman, 2017; Wang et al., 2020). The concept of SMM activities was applied to different industries; some of the studies changed the dimensions according to different product categories. In this study, we consider the original five dimensions of SMM activities:

entertainment, interaction, trendiness, customization, and word of mouth (WOM) (Kim and Ko, 2012).

2.3.2. The components of social media activities

The components of social media activities have been studied by different studies. Kim and Ko (2012) defined social media marketing activities in the luxury product industry into items which are entertainment, interaction, trendiness, customization, and word-of-mouth (WOM). Sano (2015) uses four items interaction, trendiness, customization, and perceived risk for social media marketing activities in the insurance industry. Lee (2017) suggest using the components of companies in communication, providing information, support for daily life, promotion and selling, and social response and activity in the study of the importance of companies' social media activities. Kim (2017) uses information, immediacy, responses, and access to identity the consumer attitudes online. Jo (2013) classify social media marketing as events, information, and advertisements. Chang (2012) uses customer participation, information display, unique differentiation, content suitability, information usage, and response to customer define social media activities. Seo and Park (2018), in their study about social media activities in the airline industry, use the components of entertainment, interaction, trendiness, customization, and perceived risk. Based on the characteristic of the social media platform and the activities in the company account which we are targeting, we use the item entertainment, interaction, trendiness, customization, and word-of-mouth (WOM) in this research.

Entertainment is used to describe the playfulness of the experience of using social media (Agichtein *et al.*, 2008). One of the motives people use social media is the hedonic perspective which is seeking entertainment, amusement, and pleasure from social media. The virtual community in social media is also aiming for general interest to gather people together online (Bagozzi and Dholakia, 2002; Manthiou *et al.*, 2013). Besides, entertainment is one of the significant components of social media that contains positive emotions, enhances participant behavior, and intends for continuous usage (Kang, 2005). Various research proved entertainment is a strong motivation for the consumer to use social media (Park *et al.*, 2009; Muntinga *et al.*, 2011). For instance, it is implied in Shao (2009)’s research that entertainment is a strong motive for people to make user-generated content (UGC). Park *et al.* (2009) research also demonstrated that entertainment is also a driven force for individuals to participate in the social network. Muntinga *et al.* (2011) demonstrated that the individual consumes the brand and product and service relate information from social media messages

for enjoyment, spend their free time and relaxation. Courtois *et al.* (2009) support the result that relaxation and escapism are the reason for pursuing entertainment in social media.

Social media is a place for people to exchange and discuss ideas. The function of interaction in cyberspace offers insight for analysis which contribute to a specific brand and product and service and discuss with other people online (Muntinga *et al.*, 2011). The interaction is changing the communication between company and customer fundamentally, which also encourages the creation of user-generated content (Gallaugher and Ransbotham, 2010; Kaplan and Haenlein, 2010). Furthermore, the social media also provide the latest information which makes it the most practical tool for the consumer to search for product and service-related information (Naaman *et al.*, 2011). Based on the connection and interaction within social media, Zhu and Chen (2015) categorize social media as two types which are profile-based and content-based. Profile-based social media mainly depend on individual group members. In profile-based social media, the information and topics are all related to the group members and encourage the individuals to connect with these topics and information. Profile-based social media also interested in uses personal characteristics behind the profile. For instance, Facebook, Twitter, WhatsApp.

In social media activities, trendiness is a concept that describe social media as a product search channel able to provide the latest information and popular discussion topics (Naaman *et al.*, 2011; Godey *et al.*, 2016). The customers usually use social media to obtain information. They tend to consider social media as channel providing trustworthy information source compare to the traditional promotion activities sponsored by the corporation (Vollmer and Precourt, 2008; Mangold and Faulds, 2009). Muntinga *et al.* (2011) consider in online environment trendy information satisfy four motivations: surveillance, knowledge, prepurchase information and inspiration. Surveillance describes the observing and remaining update in social media environment. Knowledge related to the company and product which consumer obtain from other customer and their expertise to know more about the product and service. The information related to Pre-purchase denote the positive and negative reviews related to the products and service which help the customer making a purchase decision. The inspiration is used to describe customers obtaining new ideas through brand-related information. In this way, the brand-related source is considered as inspiration. In this paper, we use trendiness as the latest and the most popular information about 5G.

Customization is the character that makes social media is different from traditional advertisements media. Customizations provide the customer with individual information generated by a variety of resources and also strategy to build consumers' positive perceived

control and satisfaction. Customization is a tool for the company and brand to deliver the uniqueness of the brand, which helps to increase preference and loyalty towards the brand (Martin and Todorov, 2010). Zhu and Chen (2015)'s research demonstrated there are two categories of posts. Based on the different level of information customization, which categorize the customized information as Acustomized messages and customized broadcast. The customed message focus on small group and specific individual. The broadcast message target the people who is interested in the information. In this research we defined the customization as social media provide customized search for the information and customer service (Kim and Ko, 2012).

Word of mouth in social media is related to customers' online interaction about the brand and its products and services (Muntinga *et al.*, 2011). Previous literature implied that E-WOM is perceived highly credible, empathic and relevant compared to company-related promotion online (Gruen *et al.*, 2006). Consumers create and spread brand-related messages in their social circle through social media (Vollmer and Precourt, 2008; Kim and Ko, 2012). Based on Jansen *et al.* (2009)'s research, customers post information dissemination process, which contains their opinion, comments and brand-related information. Chu and Kim (2011) proposed three perspectives of the use of E-WOM in social media, which are opinion seeking, opinion giving and opinion passing. Opinion seeking drive consumer to seek advice and information from other customers. Opinion-giving customers also called opinion leaders, which have the passion behaviour of giving other people opinions. This behaviour makes them have an essential influence on other consumers' purchase attitude and behaviour. The information passing behaviour is another character of E-WOM that facilities the information flow online. In this paper, WOM refers to the consumer of WeChat official account follower pass along the information on social media (Sashi, 2012).

2.4. The unified theory of acceptance and use of technology (UTAUT)

In this section, we will present an overview of the unified theory of acceptance and use of technology (UTAUT) and demonstrate the modifications which will make the UTAUT fit the individual 5G technology products/service context.

2.4.1. UTAUT for new technology adoption

Venkatesh *et al.* (2003) combined eight theories (theory of reasoned action, technology acceptance model, motivational model, theory of planned behaviour, a combined theory of planned behaviour/technology acceptance model, model of personal computer use, diffusion of innovations theory, and social cognitive theory) in order to analyse user technology acceptance behaviour and intergraded them into a framework known as UTAUT. The

UTAUT combines the constructs from the eight theoretical models into four fundamental constructs: performance expectancy, effort expectancy, social influence, and facilitating conditions. These four constructs are considered as the critical antecedents of technology adoption intention and actual use.

The first construct is the Performance Expectancy (PE) which is defined as the degree to which the use of technology will benefit consumers in performing certain activities (Venkatesh *et al.*, 2003b). The second construct is Effort Expectancy (EE) which defines the degree of ease associated with consumers' use of technology (Venkatesh *et al.*, 2003b). The third construct is Social Influence (SI) which indicates the extent to which consumers perceive it as important others believe they should use a particular technology. The last construct is Facilitating Conditions (FC) refers to consumers' perceptions of the resources and support available to perform a behaviour (Brown and Venkatesh 2005; Venkatesh et al. 2003; Venkatesh et al. 2012).

Furthermore, according to Venkatesh et al. (2003), performance expectancy, effort expectancy, social influence affect behavioural intention, while facilitating conditions and behavioural intention are believed to influence actual use (Venkatesh *et al.*, 2003b). The four moderators used in UTAUT (age, gender, experience and voluntariness), contribute to a more precise understanding of the acceptance behaviour (Venkatesh et al., 2003b). As shown in Figure 1 (Venkatesh et al., 2003a).

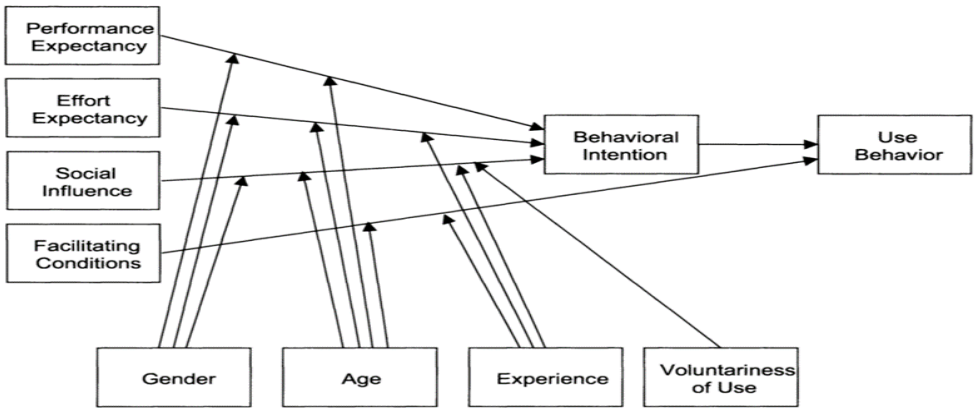


Figure 1. The original UTAUT model

Based on the original UTAUT model, a lot of studies tailored the UTAUT model and added other additional constructs and relationships to fit into other consumer use content. For instance, Venkatesh *et al.* (2012b) developed the UTAUT2 model, which expanded the UTAUT model to the field of adoption for mobile internet. UTAUT2 model added hedonic

motivation, price value, and habit as independent variables with original UTAUT factors to describe mobile internet adoption behaviour. In order to have a clearer idea about the previous studies using UTAUT and expended UTAUT model, we reviewed the papers published in Scopus and World of Science from 2000 till February 2020, and we used the keywords "UTAUT", "consumer behaviour", and "new technology adoption" to target the paper. This searching approach led to the selection of 277 papers. We picked out papers that are ranked above level 2 according to the Association of Business Schools (ABS) list. After reviewing the papers, 28 of the papers are found suitable for examining carefully. These papers mainly related to innovative technology adoption for personal usage, especially mobile technology (see Table1). From the existing literature, it is obvious that some of the studies mainly used the original UTAUT and changed the model based on the different research topics.

The original UTAUT model only has four constructs to explain adoption behaviour. More specifically, PE and EE are considered as IS/IT technology constructs, FC and SI are organisational and contextual constructs. From previous literature, all the papers verified that performance expectancy, effort expectancy, social influence, and facilitating conditions all play an essential role in technology acceptance (Venkatesh, 2006; Venkatesh *et al.*, 2012a; Jackson *et al.*, 2013; McKenna *et al.*, 2013; Miltgen *et al.*, 2013; Sun and Jeyaraj, 2013; Šumak and Šorgo, 2016; Dwivedi *et al.*, 2017; Jeon *et al.*, 2019; Zhou *et al.*, 2020). In the studies related to E-system use, mobile technology-based services or other information services, UTAUT shows excellent support in many ways. For instance, UTAUT proved that can explain 70% of the variance of the intention for technology adoption and 50% of the variance in technology actual usage. It is much higher compared to other technology adoption model (Venkatesh *et al.*, 2003b; McKenna *et al.*, 2013). The findings indicate that consumers' adoption behaviour of technology products could be explained partly by UTAUT (Yueh *et al.*, 2016; Chopdar *et al.*, 2018; Choudrie *et al.*, 2018; Dasgupta and Gupta, 2019; Duarte and Pinho, 2019; Al-Saedi *et al.*, 2020; Arfi *et al.*, 2021; Yu *et al.*, 2021).

Šumak and Šorgo (2016) and Dwivedi et al. (2017) tried to combine UTAUT with attitude. They used the meta-analysis method to generate other studies about UTAUT's constructs. The result indicates that attitude can be used as a mediator of technology adoption intention. Other studies added personal innovativeness in the area of E-system and mobile service adoption (Lin and Filieri, 2015). Results show that the more people have innovative personality traits and subjective knowledge, the more they are likely to have a positive attitude towards new technologies (Lian(Lin and Filieri, 2015) & Lin, 2008). However, in the paper of Chiu and Hofer (2015), personal innovativeness is used as a moderator. The result shows that personal

innovativeness only has a moderate influence on PE and EF. Chiu and Hofer (2015) illustrate that based on the sample from different countries, the moderator has a different effect.

In the study for mobile banking which combine the UTAUT with perceived risk, perceived trust, innovativeness. The result shows that social influence dedicated mostly, and perceived risk, perceived trust, innovativeness all proved to have an influence on mobile banking adoption (Giovanis *et al.*, 2018). Ramírez-Correa *et al.* (2019) use UTAUT2 in the study of online games in mobile devices, the result shows that UTAUT2 compared to UTAUT, with the addition of hedonic motivation, price value, and habit, has a higher explanation power of intention to use and actual use. In the study for mobile commerce, which the result proved that perceived value is influence by both PE from UTAUT2 and perceived privacy concerns (Shaw and Sergueeva, 2019). The study also suggested that further research should consider the kind of personal data mobile commerce requires, which might affect the result. However, in the study of cashback programs use UTAUT2, the result shows that Effort Expectancy, Social Influence, Facilitating Conditions, Ease of Use, Personal Capacity, perceived risk, and behavioural aspects did not show significant relation to the intention to use (Christino *et al.*, 2019). Chawla and Joshi (2019) used UTAUT model to conduct research about mobile wallet usage which did not include social influence because Bashir and Madhavaiah (2014) research found out that social influence does not have a significant influence on intention. The result also suggested consider advantage, perceived cost, perceived enjoyment, personal innovativeness, perceived credibility, perceived benefits, and attractiveness in the future study (Chawla and Joshi, 2019). Gursoy *et al.* (2019) conduct a study about artificial intelligence with UTAUT. This study did not include facilitating conditions and social influence. The reason why this research did not use facilitating conditions is Venkatesh et al. (2012) implies that FC is more relevant for actual behaviour, not in the decision-making process. Other research tested UTAUT with the usage of smartphone app for purchasing a flight ticket which combined with consumer innovativeness, involvement, and perceived trust (Jeon *et al.*, 2019). The result shows effort expectancy, social influence, and customers' involvement showed a non-significant influence on intention and suggest considering customers' experience, customers' personality traits, and technology self-efficacy in future study (Jeon *et al.*, 2019). Zhou *et al.* (2020) is the first study test perceived risk and satisfaction with UTAUT as a mediator which shows that perceived risk and perceived satisfaction influence adoption behaviour. The detail of the related research is present at Table 2.3.

Articles	Dependent Variable		Moderate	Mediator	Independent Variable	Research Area
Venkatesh et al. (2012)	Intention use	actual	Age,gender, experience		Hedonic motivation price value habit	Mobile internet technology
Dwivedi *et al.* (2017)	Intention use	actual		Attitude		Bibliographic study
Jackson et al. (2013)	Intention				Personal innovativeness perceived behaviour control	Hospital e-commerce purchasing system
Sun and Jeyaraj (2013)	Intention				Personal innovativeness self-efficacy perceived compatibility	E-Blackboard system
Oh and Yoon (2014)	Intention use	actual	E-learning/ online game		Trust, flow experience	E-learning Internet service
Miltgen et al. (2013)	Intention use	actual			Trust, compatibility innovativeness privacy perceived risk	Biometric system adoption
Tsourela and Roumeliotis (2015)	Intention use	actual	Gender age technology readiness			Technology-based systems
Casey and Wilson-Evered (2012)	Intention				Trust in technology, web innovativeness	Online family dispute resolution (OFDR) system
Im et al. (2011)	Intention use	actual	Culture			MP3 player Internet banking
Chiu and Hofer (2015)	Intention		Personal innovativeness			Self-checkout service
Barnett et al. (2015)	Intention use	actual			Conscientiousness, openness to experience, neuroticism extraversion agreeableness	Web-based course management system

Magsamen-Conrad et al. (2015)	Intention		Age, gender experience			Tablet devices
Alalwan et al. (2016b)	Intention use	actual			Hedonic motivation, price value perceived risk	Telebanking
Oliveira et al. (2016)	Intention use	actual			Hedonic motivation, price value, compatibility, innovativeness perceived technology security	Mobile payment
Šumak and Šorgo (2016)	Intention use	actual	Age,gender, experience, voluntariness user type,		Attitude	Interactive whiteboard
Alalwan et al. (2017)	Intention use	actual			Hedonic motivation trust	Mobile banking
Harris et al. (2018)	Intention use	actual			Training	Structured Query Language (SQL)
McKenna *et al.* (2013)	Intention use	actual			Theory of organizational information services (TOIS), self-efficacy	Information online service
Lu et al. (2009)	Intention		Age, gender experience, income, location			Mobile data
Martins et al. (2014)	Intention use	actual	Gender, age		Perceived risk	Internet bank
Giovanis et al. (2018)	Intention use	actual	Experience		Perceived risk. Perceived trust innovativeness	Mobile banking
Ramírez-Correa et al. (2019)	Intention use	actual			Hedonic motivation price value and habit	Online game in mobile device
Chawla and Joshi (2019)	Intention use	actual		Attitude trust	Security, life compatibility	Mobile wallet
Gursoy et al. (2019)	Intention use	actual		Emotion	Anthropomorphism hedonic motivation	AI

Jeon et al. (2019)	Intention				Customer innovativeness customer involvement perceived trust	Smart phone app
Shaw and Sergueeva (2019)	Intention		Personal innovativeness		Perceived privacy perceived value perceived privacy concern	Mobile commerce
Christino et al. (2019)	Intention use	actual			Hedonic motivation habit, ease of use personal capacity perceived risk, behavioral aspects	Cashback programs
Zhou et al. (2020)	Intention use	actual		Perceived satisfaction perceived risk	Perceived satisfaction perceived risk	Self-service parcel services

Table 2.3. UTAUT literature review

Furthermore, in research on E-system and online information system, researchers add self-efficacy in the UTAUT model (McKenna *et al.*, 2013; Sun and Jeyaraj, 2013). Self-efficacy explains how the customer considers the confident of using innovative services/products as one of the evaluation procedures which affects adopting behaviour (McKenna *et al.*, 2013). More specifically, it is important for the product and service to be suitable for the consumers' using habit to persuade the consumers to use new products and services easily (Hernandez, Jimenez, & Jose Martin, 2009; Hsu, Ju, Yen, & Chang, 2007).

2.4.2. UTAUT road ahead

Many scholars have extended UTAUT to study technology adoption (Venkatesh *et al.*, 2016). Most of the previous studies that use UTAUT, only pick some constructs or include new moderators (Al-Gahtani *et al.*, 2007; Venkatesh *et al.*, 2012b; Esteva-Armida and Rubio-Sanchez, 2014)). Although many studies have applied UTAUT in different industries, there is still a lack of research for analysing individual adoption behaviour (Venkatesh, Thong, and Xu, 2012). In 2012 Venkatesh, Thong, and Xu (2012) proposed the UTAUT2 model, extending UTAUT to personal use content. Personal use situation involves innovative devices, applications, or services targeting personal customers (Venkatesh *et al.*, 2012b). These studies also tailor the model for the individual using purpose (Stofega & Llamas, 2009). For instance, change the relationship in original theory constructs and create a new path, especially in

UTAUT2, which added new constructs for analysing individual usage contexts (Stofega and Llamas 20).

Alvesson and Kärreman (2007) suggest a 3-steps procedure to build a model for a new study. Step (1) identifies essential factors from previous theory for both general and specific situations of customer adoption and use of technology. Step (2) adjusts alternative relationships in original phenomenal and conceptual models. Step (3) involves new variables and relationships to re-shape the theory. Following the three steps, Venkatesh *et al.* (2016) introduced four changes to the original UTAUT model. The first change involved new exogenous variables (i.e., external predictors), which will influence the original variable in UTAUT. For example, Neufeld et al. (2007) proved that charisma (i.e., exogenous variable) has an influence on performance expectancy, effort expectancy, social influence, and facilitating conditions. The second suggestion is adding new endogenous mechanisms, such as adding new predictors of intention and use behaviour to enrich the four original UTAUT variables (Venkatesh et al., 2008; Eckhardt et al., 2009). Venkatesh et al. (2008) examined the influence of behaviour expectation on actual technology use. The third suggestion is to add new moderating variables (Venkatesh et al., 2008). The fourth suggestion is adding new outcome variables, such as new consequences of intention and actual technology use. For instance, Xiong *et al.* (2013) analyse the impact of intention to use the information and communications technologies on the development of small businesses. (Figure 2).

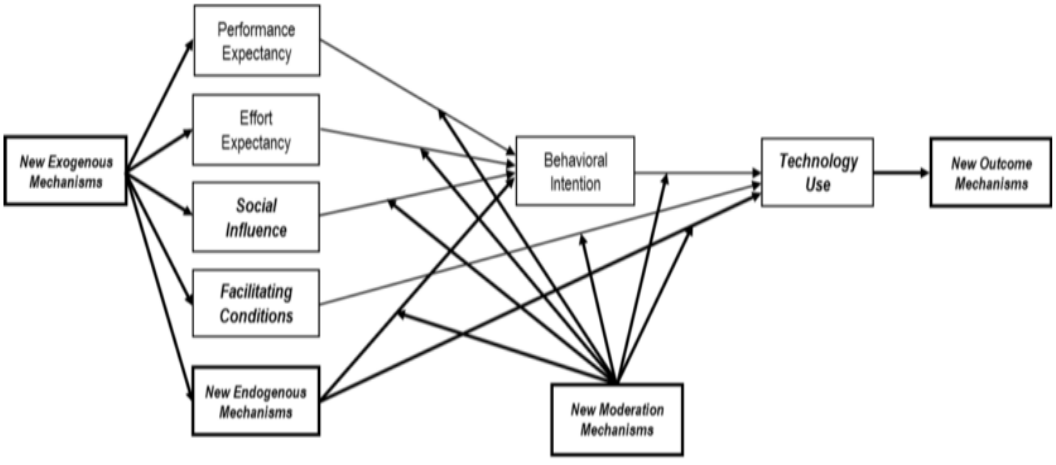


Figure 2. UTAUT extended model

Following these steps, this study added new constructs in the UTAUT model to suit the context of the 5G mobile service. Ovčjak et al. (2015) noted that more factors should be considered and analysed in order to encourage customers to purchase 5G mobile service. Self-efficacy has been proved that play an important role in studies of individuals' behavioural

intention in mobile service adoption (Fu et al., 2010; Ovčjak et al., 2015; Sanakulov and Karjaluoto, 2015). Furthermore, social cognitive theory (Bandura, 1991) demonstrates that in behavioural modelling, human has the capacity for observational learning, in which self-efficacy is a key factor (Peng et al., 2019). From a customer's perspective, unlike be an employee and use technology in the workplace, technology self-efficacy plays an essential role in an individual's adoption decisions (Pavlou and Fygenson, 2006b; Sun and Jeyaraj, 2013). In this research, we try to understand whether the individuals' self-efficacy has an impact on adopting 5G mobile service bundles.

Furthermore, SMM activities have a direct influence on purchase intention and actual purchase (Jalilvand and Samiei, 2012; Liu *et al.*, 2017). Secondly, branding researchers revealed that CBBE affects consumer adoption intention and actual purchase choices in different product categories, including the acceptance of new technologies (Melewar *et al.*, 2010; Lee, 2011; Wang and Li, 2012; Morgan-Thomas and Veloutsou, 2013; Lam and Shankar, 2014; Moreira *et al.*, 2017; Foroudi *et al.*, 2018). CBBE refers to the different effects of brand knowledge on the response of the customer to a specific brand (Yoo and Donthu, 1997).

Integrating CBBE and self-efficacy with UTAUT will complete the influence of purchase intention and focus on the driven power of the characteristic of the technology products/service itself. Besides the changes of the original UTAUT model, this research will discard facilitating conditions and the original moderators (age, gender, and experience), which we will explain further in the following section.

2.4.3. UTAUT for 5G mobile network-based products and services

Whetten (2009) suggests two ways to adjust the existing research model for change research topic: 1) Identify new context that influences the combination configuration, 2) Adding new contextual moderators that interact with other constructs. In order to follow this suggestion from the new model, we should start with the limitation of the original model of UTAUT. The literature review above has demonstrated that the original UTAUT model needs new constructs related to individual behaviour, making the model more suitable for analysing individuals' adoption and use behaviour. The exogenous constructs in the original UTAUT represent technology attribute and contextual elements. The missing part in UTAUT is the individual's character. For instance, previous literature already includes self-efficacy in the UTAUT model (Carter and Schaupp 2008; Venkatesh et al. 2011a).

Secondly, following previous studies by Lu *et al.* (2009), Jackson *et al.* (2013) and Casey and Wilson-Evered (2012), did not include the construct of facilitating conditions. As

mentioned in the research of Venkatesh *et al.,* 2003, the influence of facilitating conditions is only significant under the moderating effect of age and experience. For instance, Venkatesh *et al.* (2003a) mentioned it might be more important for senior female citizens who think the availability of resources and support from the organisation is vital for them to accept new technology. Furthermore, researches indicate that part of effort expectancy and facilitating conditions overlapped (Venkatesh *et al.*, 2003a). The explain variance from effort expectancy is contribute more than facilitating conditions which is the reason of facilitating condition does not have a significant influence in some studies. Moreover, this is also the reason that some of the studies do not include facilitating conditions in their model (Venkatesh *et al.*, 2003b; Venkatesh *et al.*, 2012b). Similar to the researches discussed above, customers do not have the experience to use 5G products/services at the early stages of their introduction in the market, hence, they are more likely to be influenced by effort expectancy and performance expectancy (Wu *et al.*, 2007; Kuo and Yen, 2009). Besides, in the new model, we will involve self-efficacy and CBBE; and some of the items in these scales would overlap facilitating conditions (Cobb-Walgren *et al.*, 1995; Pihlström, 2008; He and Li, 2010; Chen, 2017). Therefore, facilitating conditions is excluded from the research framework.

Fourth, social influence is another important construct in the UTAUT model. However, the relationship between social influence and behaviour intention is not confirmed in many studies. Most studies show a positive relationship between social influence and intention (Chen, 2017; Venkatesh et al., 2012; Dasgupta, & Gupta, 2008; Venkatesh et al., 2003). However, some other studies indicate a negative relationship between them (Anderson et al., 2006; Casey and Wilson-Evered, 2012; Alalwan et al., 2016b) and Goncalves *et al.* (2018) research proved that social influence has no impact on behaviour intention. In the previous literature review, social influence mainly refers to the influence of peers or company management (Casey and Wilson-Evered, 2012; Jackson et al., 2013; Harris et al., 2018; Venkatesh et al., 2003). However, in our study, social influence refers to other people whose opinion is important for the customers to believe they should use 5G mobile service. For instance, family and friends who consider as strong social ties will have a vital influence on consumers' intentions (Venkatesh *et al.*, 2003a). We also focus on another type of external influence, which is social media marketing activities. We incorporate the influence of the company's official social media account advertisements in the new model, and we test whether the SMM activities from the WeChat company's account as an exogenous construct that will affect social influence from friends and family. The other factors will be explained in detail in the following sections.

2.4.4. Performance Expectancy

Performance expectancy is strongly related to behavioural intention (Venkatesh et al., 2003). Based on the research of Venkatesh *et al.* (2003a), there are mainly three factors that determine performance expectancy: perceived usefulness (TAM/TAM2/C-TAM-TPB), extrinsic motivation (MM), and job fit (MPCU) (Shin, 2009), which offer the researchers a relatively comprehensive explanation and guidance to the performance expectancy research.

In this research, we focus on an individual's intention to purchase 5G mobile services. As for products/services in the telecommunication market, performance expectancy is mainly referring to customers belief that they will get more benefits in their daily activities by using the new technology telecommunication product/service (Chong *et al.*, 2012). Many studies have already proved that performance expectancy has a positive influence on consumers' purchase intention in the area of mobile network adoption, mobile phone adoption, and mobile-based service usage decisions, such as mobile banking (Park et al., 2007; Casey and Wilson-Evered, 2012; Venkatesh et al., 2012; Wang et al., 2006). It is also be proved that the use of social media will support the task of criticising the effect of performance expectancy on adoption behaviour (Hsu (Donmez-Turan, 2019)et al., 2013). We expect to determine whether performance expectancy will have a positive relationship with the intention to adopt a new technology product/service under the influence of social media.

2.4.5. Effort expectancy

Effort expectancy refers to the degree of easiness associated with the use of technology (Venkatesh et al., 2003b). In the telecommunication industry, effort expectancy is related to the degree of simplicity of the use of telecommunication products and services (Abdulwahab and Dahalin, 2010). Venkatesh et al. (2003b) generalise three sub-dimensions that are essential for effort expectancy: consciousness of easy to use (TAM/TAM2), systematic complexity (MPCU), and operating simplicity (IDT). For the telecommunication industry, effort expectancy implies no matter how innovative the new technology product/service is, it should be easy enough for the customer to use immediately. For instance, when the telecommunications company launches the new 5G network, one of the important things to consider is whether the 5G mobile service is easy for the customer to use (Zhou, 2012). Is the service bundle clear enough for the customer to understand? Even the procedure of getting 5G services is simple or not will be considered by the customer as one of the evaluations for effort expectancy of the 5G product/service (Wu et al., 2008). Venkatesh et al. (2003b) and Venkatesh et al. (2012) show that effort expectancy has a strong positive relationship with behavioural intention.

2.4.6. Social influence

Social influence is defined by Venkatesh et al. (2003a) as the degree to which the individual valued that important others believe they should use specific technology. In model TRA, TAM2, TPB/DTPB, and C-TAM-TPB, social influence is represented by the concept of social norms. Social norm was first introduced by Thompson et al. (1991), who define social norm under the situation of the individual has an agreement with their reference groups. They also acknowledge that the concept of social norms which is similar to the definition of social norms in TRA. While different models named social influence differently, each of the constructs all contains the notion that individuals' intentions or behaviour will affect by the opinion of important others, which will force individuals to change their behaviour or opinion or to comply with the opinion and behaviour of 'significant others or the social group they belong to. In previous studies, social influence becomes an influential positive factor when the usage is mandated. For instance, in some company use internet technologies for work (Dasgupta and Gupta, 2019) and use mobile technology for finishing certain task is mandatory (Yueh *et al.*, 2016). Venkatesh and Davis (2000) implied that social influence effects in the mandatory situation could be contributing to the notion of compliance. For instance, people must use certain software and systems to finish a task (Venkatesh and Davis, 2000). Moreover, in mandatory settings, they mentioned that social influence only shows a significant effect at the early stage when individuals have little experience with the technology, which fades over time with continued usage. On the contrary, in a voluntary context, social influence affects individuals' decision by influencing perception towards the technology. For instance, use personal mobile banking to make life easier (Choudrie *et al.*, 2018; Picoto and Pinto, 2021); use mobile health systems to keep tracking personal health conditions (Duarte and Pinho, 2019).

The function of social influence in consumers' technology acceptance decision procedure is complex and subject to a series of contingent influences. According to Venkatesh and Davis (2000) and Warshaw (1980), social influence mainly affects consumers' behavior through three mechanisms: compliance, internalization, and identification. The function of compliance makes individuals alter the intention in response cause social pressure. The functions of internalization and identification are related to altering individual belief structure and result in individual's responding to protentional social status gains. Previous research implies that individuals are more willing to comply with important others' expectations when their desired behavior is rewarded or punished (French and Raven 1959; Warshaw 1980). The literature of compliance from technology acceptance literature indicates that reliance on others'

suggestions is significant only in a mandatory context in the early stages of technology adoption (Karahanna et al. 1999; Venka- tesh and Davis 2000). The normative pressure attenuates after time, because of the increase of individuals experience, informed of their own opinion which provides more instrument basis for an individual to use a technology or a new system. On the contrary, some studies show social influence's relationship with intention is still unclear. Anderson et al., 2006 study reported a negative relationship and as well as Casey and Wilson-Evered, (2012) and Alalwan et al. (2016b). Furthermore, according to related literature, most of the studies were conducted about technology usage in a business context, not for personal use.

Otherwise, the product or service we focus on is mainly chosen for individual usage in the telecommunication industry. Social influence's impact on mobile technology adoption has been considered as an influential factor in consumers' adoption decisions (Bauer et al., 2005; Nysveen et al., 2005). According to another study from Lu *et al.* (2008), the meaning of latest mobile technology for customer is changed from communication equipment to fashion trend. In the research context of 5G, we define social influence as to what extent their own social network effect individual to adopt 5G product/service (Song et al., 2015). Other studies also imply that friends, spouse, parents, colleagues will influence their mobile technology adoption, such as 3G and 4G (Bauer et al., 2005; Nysveen et al., 2005). Carlsson et al. (2006) use the UTAUT model analysis consumers performances in the European mobile market, which showed that performance expectancy and effort expectancy have a significant relationship with intention to use mobile technology; whereas social influence impact is significant but does not have a strong effect. Unlike European countries, consumers in China are more likely to be influenced by their social circles (Lu et al., 2008; Lu et al., 2009). The culture in China is considered collectivist (Hofstede, 2011). The direct influence from social networking (guanxi) in the Chinese market is strong and important (Ha et al., 2007). Under such cultural influence, the social circle of friends, peers, and family members effectively affects people in general (Filieri *et al.*, 2017; Filieri and Lin, 2017). It is under our consideration that in China, the opinions from social influence affect individual behaviour intention.

2.4.7. Adoption readiness

The research of Guo et al. (2013) related to the usage of the mobile health system for elderly people defined the variable of adoption readiness. Performance expectancy and effort expectancy are considered as components of the adoption readiness construct (Guo *et al.*, 2013). Guo *et al.* (2013)'s research proved that performance expectancy and effort expectancy all have a positive influence on technology adoption behavior (Venkatesh *et al.*, 2016), it also

but they also try to provide a deeper understanding of the relationships among the original four factors from UTAUT (performance expectancy, effort expectancy, social influence and facilitating conditions). From this point, researchers try to evaluate the four factors from the UTAUT model as one whole multi-dimensional construct known as "adoption readiness". Beginning with Venkatesh et al. (2003b) and Venkatesh et al. (2012a) realised that the factors within the UTAUT model have strong correlations among them, which implies they could be considered as a whole single factor. Other researchers also proved that the four factor could be considered as one multi-dimensional factor, for instance, Thakur and Srivastava (2014b) and Donmez-Turan (2019).

In this research, we consider adoption readiness will be influenced by the information from SMM activities which will give a consumer a more positive attitude towards the technology products and services. The information implied performance expectancy, effort expectancy, and social influence would all influence the adoption intention of the 5G mobile service. In addition, based on previous research, we proposed that the UTAUT model is considered one multi-dimensional construct (Thakur and Srivastava, 2014b) and expanded to include consumer-based brand equity and self-efficacy to predict consumers' purchase behaviour towards 5G.

2.5. Self-efficacy

Self-efficacy is defined as an individual's ability to satisfy the demands of the current situation (Wood and Bandura, 1989). Based on motivation theory, self-efficacy is an essential process before the action of adopting, which is also the resource needed for the cognitive process (Wood and Bandura, 1989). Also, according to Bandura (1986)'s definition of self-efficacy, the primary basis of behaviour is the individual's judgment. Wood and Bandura (1989) generalised the definition of self-efficacy as individuals' belief in their capability to perform a specific task. Bandura (1989) also suggests that the determination of self-efficacy should fit into a specific domain or particular situation, which will also maximize the accuracy of self-efficacy to predict an individual's capacity.

Furthermore, Compeau and Higgins (1995) expanded the study of self-efficacy into the information and technology domain. In the telecommunication industry study, we use self-efficacy as technology self-efficacy, which refers to individual belief in their ability to use technology products, especially telecommunication product/service. Rare research has examined the relationship between self-efficacy in the context of telecommunication products' purchase intention. The only available study is from Pedersen and Ling (2003), who showed self-efficacy is positively related to mobile phone use in Scandinavia. Mao et al. (2005)

confirmed that self-efficacy is not related to usefulness; however, it has a significant relation with ease of use which influences intention to use a mobile phone. The telecommunication industry has a wide range of products and services. Lu et al. (2005) research showed self-efficacy has a positive relationship with the use of wireless internet service. In the use of iCloud computing, the influence of self-efficacy on actual use is positive as well (Ratten, 2013).

In this research, we use keywords "self-efficacy" "consumer behaviour" in WOS and Scopus, target the paper from 2000 to 2019 which related to technology adoption, and only including the journal above level 2 in the ABS list. We have 592 papers shown in the result. After reading the papers, 17 papers related to our research were selected for further study. In these studies, self-efficacy mostly tests with TAM model, which was used as both construct and moderator. In these studies, self-efficacy is tested in e-commerce, self-service system usage, mobile service, and other smart system adoption studies (Wang *et al.*, 2006; Hernandez *et al.*, 2009; Yang, 2012; Park and Huang, 2017; Wang *et al.*, 2019; Yang and Lin, 2019; Wu, 2020). The papers proved that self-efficacy has a positive relationship with behaviour intention both directly and indirectly.

Self-efficacy has also been tested with UTAUT as well. The study of Sun and Jeyaraj (2013) and McKenna *et al.* (2013) proved self-efficacy has a positive relationship with the intention to adopt. For further studies, the studies suggested the researchers should test more the relationship between self-efficacy with actual purchase behaviour in different products categories and eventually using a longitudinal study approach (Irani et al., 2009; Park and Huang, 2017). Whereas in the study of social media, the research show that self-efficacy has a complicated relationship with social media, such as Facebook, Twitter (LaRose and Eastin, 2004; Gangadharbatla, 2008; Krämer and Winter, 2008; Seidman, 2013; Hocevar *et al.*, 2014). Nonetheless, there is less literature about how SMM activities will affects the way people evaluate their self-efficacy. In this study, we expect to find a significant relationship between technology self-efficacy and telecommunication product adoption behaviour. Moreover, we also try to explore how SMM activities will affect customers' self-efficacy towards new telecom products and services. The literature related to self-efficacy is presented in Table 2.4.

Articles	Dependent Variable	Moderate	Mediator	Independent Variable	Research Area
Hernandez et al. (2009)	Intention		Perceived usefulness perceived ease of use	TAM	E-commerce

Dabholkar and Bagozzi (2002)	Intention	Self-efficacy		Attitude ease of use performance fun	Technology based self-service
Ben-Ami et al. (2014)	actual use			Difficult to adopt (DTA)	Difficult to adopt product
Yang (2012)	Intention	Self-efficacy innovativeness		TPB	Mobile shopping adoption
Van Beuningen et al. (2009)	Intention	Role engagement	Perceived financial performance perceived value	Credibility argument quality	Self-Service
Ooi et al. (2011)	Intention			Control constructs normative constructs attitudinal constructs	Broadband
Mou et al. (2016)	Intention	Self-efficacy		Threat outcome expectancies	Health information seeking
Mäntymäki and Salo (2013)	Intention			UTAUT perceived enjoyment perceived network availability	Online hotel booking
Hsu and Chiu (2004)	Intention actual use		Intention	TPB perceived playfulness	E-service usage
Park and Huang (2017)	Intention		Motivation inhibitors		Smartphones booking hotel
Lee and Lyu (2016)	Intention		Attitude	Personal value	Self-service technology
Wang et al. (2006)	Intention		Perceived ease of use	Perceived financial resources perceived credibility perceived usefulness	Mobile service
Vijayasarathy (2004)	Intention		Attitude	Usefulness ease of use compatibility privacy normative	On-line shopping

			beliefs	
Duane et al. (2014)	Intention		TAM personal innovativeness mobile self-efficacy trust	Mobile pay
Irani et al. (2009)	Intention actual use	Intention	TAM resources utilitarian outcomes	Adoption of broadband
Pavlou and Fygenson (2006a)	Intention actual use	Intention	External beliefs getting information	Information search

Table 2.4. Self-Efficacy literature review

2.6. Customer-based Brand equity (CBBE)

Brand equity theory is a combination of brand name, signs, symbols, and design in which customers can identify the company or the brand and differentiate it from other brands (De Chernatony et al., 2006). Brand equity can be divided into multi-dimension for deeper analysis, such as brand loyalty, brand image, perceived quality, brand associations, brand awareness, and market behaviour (Keller, 1993; Aaker, 1996; Yoo et al., 2000). Brand equity can be measured in terms of customer-based brand strength (equity) and financial brand equity (Yoo et al., 2000). Financial brand equity refers to the value of a brand in the accounting context, and customer-based brand equity represents the familiarity and the individuals' experience with the brand in their memory (Keller, 1993; Yoo et al., 2000). Moreover, the dimension of customer-based brand equity should be considered with the consequence of consumer behaviour and customers' response to the brand together (Keller, 1993; Shocker et al., 1994). In this study, we mainly focus on customer-based brand equity.

The concept of customer-based brand equity is defined from the individual's perspective, which represents how the brand knowledge will affect customers' response to a specific brand (Keller, 1993; Shocker et al., 1994). Customer-based brand equity only exists when a customer holds enough information about a brand and has a strong memory of the brand (Kamakura and Russell, 1991). In this study, we put the research content in the telecommunication market; therefore, we use four dimensions to define customer-based brand equity. The dimensions we chose are brand loyalty, brand awareness, perceived quality, brand association. Generally, CBBE has a significant influence on perceived uncertainty in purchase contexts. For instance, strong CBBC will reduce the time and energy that customer spend on information search for product and service comparison (Berry, 2000; Keller, 2008). As for

high-tech products and services, like the telecommunication industry, the uncertainty of the product and information research cost is high compared to other product/service categories. The uncertainty is mainly caused by the lack of relevant information for a particular product/service, which requires some level of expert knowledge. Besides, when similar products and brands are available in the market at the same time, customers cannot differentiate them easily. It becomes even more challenging for the customer to evaluate their choice among similar products from different brands. Under these circumstances, Customer-based brand equity will give the customer a strong preference, help them make the decision easier.

In previous research brand equity has a positive relationship with brand preference, and brand preference has a strong positive influence on purchase intention (Chang and Liu, 2009). In the telecommunication industry, brand equity has a positive impact on customers' choice of mobile phones in the Chinese market (Liaogang et al., 2007). Brand equity has a strong effect on an individual's purchase decision of mobile service providers, especially brand awareness and perceived quality (Cobb-Walgren et al., 1995; Chang and Liu, 2009; Bruhn et al., 2012). Furthermore, social media now becomes the primary communication channel between customers and brands (Kaplan and Haenlein, 2010). Bruhn et al. (2012) and Godey et al. (2016) research proved that social media activities enhance customer-base brand equity. Bruhn et al. (2012) implied that social media substantially impacts brand awareness and brand image. Kim and Ko (2012) and Godey et al. (2016) revealed that brand equity under the influence of social media has a positive relationship with purchase behaviour. Therefore, in this research, we aim to build a clearer picture of how CBBE will influence customers' purchase behaviour when they choose among different carriers, partiality under the influence of WeChat. In this research, we use the definition of customers' brand equity as composed of three dimensions, which are brand awareness/brand association, brand loyalty and perceived quality. These three dimensions show that brand information influence brand choices and that brand knowledge influences customers' response to the market activity of the brand (Aaker, 1996; Chang and Liu, 2009; Baker et al., 2010; Keller, 1993). In the current literature, these three dimensions are the most used scales to measure CBBE in the technology products and service market since brand awareness and brand association are difficult for the customer to differentiate (Chang and Liu, 2009; Wang and Li, 2012).

First, brand loyalty describes a long-term commitment to the consistent and repetitive purchase to support a brand (Foroudi *et al.*, 2018). Brands have a strong customer loyalty would generally spend less on advertising (Baker et al., 2010; Kim et al., 2008a; Yoo et al.,

2000). Brand loyalty is an essential factor in the dimension of brand equity, which is also a key element to build brand awareness barriers (Baker et al., 2010). Brand awareness barriers also help prevent price competition, and if the barrier is strong enough, brand awareness can become a threat to competitors (Aaker, 1996).

Secondly, brand associations/ awareness referring to everything from customer's memory which can be linked back to a specific brand (Aaker, 1991; Keller, 1993). Aaker (1991) and Keller (1993) proposed that brand association present all the thoughts and judgment of customer towards a brand. Brand association is the intangible characteristic of the product, which is related to brand knowledge and brand image (Yasin et al., 2007; Cheng-Hsui, 2001). Foroudi *et al.* (2018) showed that brand association includes both emotional attributes and functional attributes from the product/services. In other words, brand association represents all the customers' feelings related to the brand (Foroudi et al., 2018). brand awareness is the strength of the existence of a brand in consumers' memory. The strength of the memory reflects by consumers' ability to identify the brand from others under different conditions (Baker et al., 2010; Kim et al., 2008a; Yoo et al., 2000). Stronger brand awareness leads to stronger brand perception. In other words, when customers establish strong brand awareness, they will have the ability to recall and recognise a brand (Keller, 2008). Moreover, they can recognise the brand without the brand appearance, especially at the time of purchase. Studies show that with strong brand awareness, the brand will be more likely to be selected when the customer what to make purchase (Mohd Yasin *et al.*, 2007). However, in practice, brand awareness and brand association definition overlapped with each other. In this research, we combine these two concepts as one factor (Bill Xu and Chan, 2010; Chatzipanagiotou *et al.*, 2016).

Third, perceived quality is how the consumer evaluates the product quality from intangible perceptions, such as judgment, thoughts, and beliefs (Baker et al., 2010; Yoo et al., 2000; Foroudi et al., 2018). Some other researchers consider perceived quality as a physical attribute (Lassar *et al.*, 1995). Moreover, perceived quality has an intimate relationship with price. In other words, the customer usually links the product with a high price to high perceived quality. Furthermore, perceived quality also stimulates a positive attitude towards the brand. The higher the perceived quality, the more positive attitude towards the brand (Fatima, Jahanzeb, & Mohsin, 2013). In practice, the brand always tries to reinforce the perceived quality and use it as a competitive advantage (Aghdaie, Aliabadi, and Rezaei, 2012). Ramaseshan & Tsao (2007) suggested that warranties, prices, and information of the brand all affect the reinforcement of perceived quality.

The concept of customer-based brand equity has been applied to different studies. The customer-based brand quality perception depends on product price, appearance, characteristics, and features of the product, and the marketing activities will change the consumers' evaluation towards these qualities (Aghdaie et al.'s, 2012). Some researchers highlighted that personalised and interactive media advertisement is an important marketing tool to interact with customers and encourage the customer to interact with each other. Social media will help increase brand awareness and loyalty (Smutkupt et al., 2011; Troshani and Hill, 2011). Especially in the mobile communication industry, the study of Baker. et al. (2010) confirms that brand equity is an essential factor in generating consumer purchase intention to purchase mobile communication products/services. Jurisic and Azevedo (2011) implied that brand reputation helps the brand build and maintain consumer-brand relationships in the mobile industry. The brand usually achieves this by valuing the issues that consumers concern the most, and this gesture also increases consumers' emotional attachment with the brand.

Few studies use customer-based brand equity directly to explore consumer behaviour in technology product adoption research and the telecommunication industry. One of the rare studies on the topic is Rondeau's (2005), who explored the brand-building strategy of mobile applications. He mentioned that the function of mobile applications affects brand perception. Qi et al. (2009) implied that brand equity significantly affects customers' attitudes towards mobile data services. He and Li (2011) point out that in the study of mobile service, brand association mediates the relationship between service quality and brand loyalty. Wang and Li (2012) conducted a study on value-added mobile services. The result shows that brand loyalty, perceived quality, brand awareness, and brand association positively influence purchase intention. Despite all the studies, future research still needs to explore variables that will enhance the ability of the conceptual model to predict the relationship of brand equity with purchase intention (Wang and Li, 2012). This study will aim to investigate the relationship among social media advertising impact, the components of CBBE, and purchase intention of 5G users.

In order to conduct a systematic review about customer brand equity related to our study, we use keywords "customer-based brand equity" and "purchase intention or behaviour" search in World of science and Scopus which related to technology adoption. We limited the result from the year 2000 till 2020 and chose the journal above level 2 in the ABS list and limited the topic related to technology adoption. The result gives 612 acritical from the World of science and 56 from Scopus. After browsing the papers, we choose seven papers for further analysis. These papers choose different dimensions of CBBE according to the different

research areas and product categories. All the papers proved that brand equity has a positive relation with purchase intention. Customer-based brand equity is tested in the area of the luxury brand, service marketing, retail market, and mobile value-added service. Netemeyer *et al.* (2004)'s study proved that customer-based brand equity is positively related to actual purchase. In these studies, the result also indicates that not all dimensions have the same influence on purchase behaviour. In the study of Foroudi *et al.* (2018), the result indicates that brand awareness has more effect on behaviour intention than other dimensions. The study also proved that social media activities has an influence on luxury brand equity (Kim and Ko, 2012; Godey *et al.*, 2016). From previous research which also mentioned that for service brand, superior service quality has a substantial influence on brand equity (Berry, 2000). In technology industry, high-tech brand with substantial brand equity is a good source and preference for their customer, which will also influence customers purchase intention (Parasuraman and Grewal, 2000). The result gives 612 acritical from World of science and 56 from Scopus. The related literature is present in Table 2.5.

Articles	**Dependent Variable**	**Independent Variable**	**Research Area**
Kim and Ko (2012)	Intention	Social media marketing activities Value equity relationship equity customer equity	Luxury fashion brands
Chang and Liu (2009)	Intention	Brand attitude brand image	Service marketing
Godey et al. (2016)	Intention	Social media marketing effort consumer respond (preference price, premium loyalty)	Luxury brands
Foroudi et al. (2018)	Intention	Brand fondness product country image brand perception	Brand involvement
Moreira et al. (2017)	Intention	Brand experience sensory stimuli	Restaurant
Wang and Li (2012)	Intention	M-commerce (usability personalization, identifiability, perceived enjoyment)	Mobile value-added services
Netemeyer et al. (2004)	Intention /Actual use	Perceived brand value for cost, brand familiarity	Retail market

Table 2.5 CBBE literature review

2.7. Research gap

In the past, the carriers relied heavily on the monopoly marketing position and the fixed period contract bundle to secure the customer. However, the recent release of 5G mobile service bundle followed by a heated competition and the unforeseen changes in the industry. The most fundamental change of all is the influence of the companies' marketing activities in social media (PWC, 2021). Before, the carriers communicate with customers mainly through traditional ways such as their retail shops. In the era of 5G and social media, the carriers realize the need to form a new relationship with the customer, which results in turning their focus on social media. Accordingly, all carries have their own social media account on WeChat, which build a new way to interact with the consumer and to capture their intention (Gallaugher and Ransbotham, 2010; Kim and Ko, 2012). Social media also changes the way how consumers obtain information before they make a purchase decision. For instance, consumers could check other people's comments on the product before their purchase, and they can even provide their suggestions via social media. Many companies also use social media to support brand building, which can help engage customers and deliver the product information more effectively (Kim and Ko, 2012).

Based on the research of CNNIC (2020), the current mobile network usage rate is 99.2% in China. This number implies that the consumer who has used 5G mobile network (or intends to use 5G mobile service in the future), already had the experience of using a carrier in China. Clearly, the carriers have had their own brand for long periods and built the relationship with the customer before 5G mobile service emergence. Therefore, when 5G mobile service comes to the market, there is an opportunity for the consumer to re-evaluate the brand image and their relationship with the carriers. Hence, CBBE as one of the elements which participate in customers' decision of 5G mobile service cannot be ignored (Ovčjak et al., 2015). Previous studies emphasized that Social Media Marketing (SMM) activities can influence Customer-Based Brand Equity (CBBE) as well as purchase intention, especially in luxury product industry and Fast-Moving Consumer Goods (FMCG) industry (Bergström and Bäckman, 2013; Liu et al., 2019b; Wang et al., 2020; Zollo et al., 2020). To date, in the studies related to new technology product and service adoption, CBBE receives limited attention (Kim and Ko, 2012).

Ovčjak et al. (2015) noted that more factors should be considered and analysed in order to encourage customers to purchase 5G mobile service. Self-efficacy has been proved that play an important role in studies of individuals' behavioural intention in mobile service adoption (Fu et al., 2010; Ovčjak et al., 2015; Sanakulov and Karjaluoto, 2015). Furthermore, social

cognitive theory demonstrates that in behavioural model, human has the capacity for observational learning, in which self-efficacy is key factor (Peng et al., 2019). In this research we try to understand whether the individuals' self-efficacy has an impact on adopting 5G mobile service bundles.

Among the many research trying to address new technology product and service adoption and usage, the Unified Theory of Acceptance and Use of Technology (UTAUT) proposed by Venkatesh et al. (2003b) is the most popular framework. It has been proved by many studies that UTAUT has high explanation power, close to 70% of the total variance of user behaviour intention and 50% usage of new technology products and services. The results achieved by this framework are more reliable compared with results obtained from other technology acceptance models, which can only explain 17%-53% of user intention (Taylor and Todd, 1995; Venkatesh et al., 2012a). Therefore, this study adopts UTAUT as the main research framework for analysing consumers' behaviour for 5G mobile service bundle adoption. However, with more studies using UTAUT, some researchers tried to have a deeper understanding of the inner relationship of the factors in the UTAUT model. Therefore, we will evaluate UTAUT as a multi-dimensional construct, namely Adoption Readiness (AR) (Thakur and Srivastava, 2014a; Donmez-Turan, 2019) and its impact as a whole on behavior intention of 5G mobile service bundles. Hence, this study also has sought to extend the UTAUT by incorporating different constructs which are relevant to characteristics of 5G mobile service and Chinese users.

Drawing from the prior research, this study aims to propose a conceptual model that measures how AR, CBBE and self-efficacy will affect purchase intention together and test the role of SMM activities in technology product and service adoption. Moreover, this research aims to analyze how AR, CBBE, and self-efficacy will mediate the relationship between customer perceived SMM activities and the 5G mobile service bundle purchase intention. We also attempt to expand the knowledge of companies' SMM activities, CBBE, adoption readiness and self-efficacy to new technology product and service marketing promotion context.

In this research, a new stimulus factor will be added to the UTAUT model. The new exogenous mechanisms will shift the paradigm, extent UTAUT to a different context and put the usage context into consideration. In this context, the environmental attributes can be considered in the model. For instance, previous studies tested the impact of charismatic leadership (Neufeld et al., 2007), organizational culture (Dasgupta and Gupta, 2012), team climate for innovation (Liang et al., 2010) which all have a positive impact on the four factors

in original UTAUT model. Moreover, from the perspective of SOR model, Zhang and Benyoucef (2016) revealed the content characteristic such as customized advertisements, information availability/valence, and trend discovery could all work as the stimulus. In our research, we mainly focus on the influence of SMM activities on consumers' adoption behaviour of 5G mobile service. SMM activities as environmental factors stimulus in this study are suitable to be considered as new exogenous mechanisms, i.e., the stimuli.

In conclusion, the original constructs of UTAUT lack of the ability to reflect the impact of carriers' brand and individual self-efficacy on purchase intention. Therefore, in this research, we extend the adoption readiness model by integrating self-efficacy and multi-dimensional construct CBBE as dependent variables and SMM activities as the antecedent for all the constructs in the model.

Chapter 3. Research Model and Hypothesis Development

3.1. Introduction

This chapter will discuss the development of the hypotheses and research model. The theoretical framework and the hypotheses tested in this research will be presented in this chapter. In section 3.2, the hypotheses will be presented. In Section 3.3, I demonstrate the structure of the conceptual model for study consumes' purchase intention. Section 3.4 is the conclusion of this chapter, where all the tested research hypotheses will be presented together.

3.2. Hypotheses development

3.2.1. Social media marketing (SMM) activities

Miller *et al.* (2009) examined the influence of social media activities and proved that there is an influential link between the company and consumer. Social media activities enhance instantaneous interaction between consumers and brands without time or geography limitation. Social media pages have become the channels where consumers obtain information about every product they want to buy. Social media marketing activities (SMM) is a process which companies or brands create, interact, deliver company, brand and most importantly product and service information and marketing offerings to the customer. Brands use SMM activities to establish and maintain relationships with customer by facilitating communication, information exchange activities (Kim and Ko, 2012; Yadav and Rahman, 2017). Furthermore, social media activities also provide the company an opportunity to help brand building, which can influence purchase intention (Gallaugher and Ransbotham, 2010). The previous research showed that SMM activities have a positive influence on purchase intention in luxury industry and also for daily consuming goods (Yadav and Rahman, 2017; Almohaimmeed, 2019; Aji *et al.*, 2020). The effect of SMM activities on purchase intention never be tested with technology product before, so in this research we argue that,

H1. SMM activities influence purchase intention.

It's showed that compared to the traditional communication led single-sided by the company, social media marketing activities with consumers' participation will have greater impact on consumers' behaviour and brand image. The extant literature about SMM in the digital industry has focused on the construct of social commerce intention, social commerce characteristics, and social commerce constructs (Kim and Park, 2013; Hajli, 2015; Lu *et al.*, 2016). The research proved that SMM activities in the luxury products industry has an impact on brand equity (Kim and Ko, 2012). Chae *et al.* (2015) report that when a consumer is

motivated to participate in social media, they are more likely to form a positive influence on consumer interaction and brand equity. The research also showed social media activities in the food industry significantly influence brand equity (Song, 2012). Godey *et al.* (2016) study about SMM activities in luxury brands showed significant affect brand image and brand awareness. The study in the luxury industry also proved that SMM activities affect customer-based brand equity (Zollo *et al.*, 2020). However, as we discussed previously till now there is no research analysis the influence of SMM activities on technology products and services. For this research we hypothesis that:

H2. SMM activities influence CBBE.

Zhang and Benyoucef (2016) research about consumer behaviour and the function of the external stimulus, which demonstrated utilitarian value as one of the organisms will be affected by the stimulus. The stimulus in this circumstance is SMM activities which include technology-related information, and utilitarian value refers to the functions of the 5G mobile products and services, such as performance expectancy, effort expectancy and social influence. Therefore, we proposed that:

H3. SMM activities influence adoption readiness.

3.2.2. UTAUT and adoption readiness

Performance expectancy is used to describe the degree to which using 5G mobile service will provide the benefits to consumer when they perform daily activities (Venkatesh *et al.*, 2016). Users will have the intention to use the technology products and services when they have positive attitude towards the outcomes (Compeau and Higgins, 1995), such as the increasing speed of the mobile service, stable connections and better signal (Strumpf, 2020). Performance expectancy has been identified as one of the essential constructs of predicting consumers' purchase intention. Besides, the Performance expectancy has a positive impact on purchase intention (Sanakulov and Karjaluoto, 2015). Effort expectancy is another important influencer of purchase intention (Venkatesh *et al.*, 2012b). Venkatesh *et al.* (2012b) recognized that to a certain extent, when the technology is easy to use, the consumer will be more willing to adopt the new technology products and services. Venkatesh *et al.* (2012b) also suggested that as an antecedent of behaviour intention, social influence has a positive influence on purchase intention. Social influence represents the social environment around consumer which will have an influence on consumers' purchase intention. For instance, the opinion of family members, friends, and suggestions form the people whose opinion consume care about (López-Nicolás *et al.*, 2008; Venkatesh *et al.*, 2012b). The influence of social influence on consumer purchase intention has been proved in the research related to mobile

services (Hsu and Chiu, 2004; Ovčjak *et al.*, 2015; Indrawati and Utama, 2018). Additionally, we assume that people who use 5G service tend to be considered trendy, professional, and effective.

As we mentioned in the previous chapter, the factors from UTAUT have been proved to have strong correlations, after evaluation, we consider UTAUT as a single latent construct which is adoption readiness (Thakur and Srivastava, 2014b; Donmez-Turan, 2019). Thakur and Srivastava (2014b) research showed adoption readiness has an influence on adoption intention. Therefore, we suggest that:

H4. Adoption readiness has an influence on the purchase intention of 5G mobile services.

3.2.3. Hypotheses related to Customer-Based Brand Equity (CBBE)

Brand knowledge is a concept which represents a network of brand association and brand image in consumer's memory which vary based on the strength, favourability and uniqueness of the brand reputation (Keller, 1993). The total brand estate and association are reflective of consumer-based brand equity. Based on Yoo and Donthu (2001) research, CBBE is a latent high-order factor combined by brand awareness/associated, perceived quality, and brand loyalty.

Brand association could be trade as the emotional impression related with the products and non-product related association (Supphellen, 2000). The emotional expression reacted to brand-related stimuli which already been stored in consumers' memory for a long time. Moreover, consumers' emotion and brand attachments might also help to build brand salience, which is a vital part of CBBE (Romaniuk and Sharp, 2004). This dynamic is specifically in advertising, the form in which the advertisement evokes the emotional impact on consumer behaviour as well as the likelihood (Kim *et al.*, 1998). The brand attachment will reshape the commitment towards a brand (Chaudhuri and Holbrook, 2001). Therefore, we proposed that,

H5. CBBE has an influence on purchase intention.

3.2.4. Hypotheses related to self-efficacy

Ovčjak et al. (2015) noticed that more factors ought to be thought of and dissected to empower clients buying 5G portable help. Self-efficacy has been assumed to be a significant part in investigations of adoption behaviour towards mobile services (Fu et al., 2010; Ovčjak et al., 2015; Sanakulov and Karjaluoto, 2015). Moreover, social cognitive theory explains that human has the ability to learn through observation, form which self-efficacy work as a key factor during the procedure (Liu *et al.*, 2019a).

In this study, we try to explore self-efficacy impact on the adoption of 5G mobile service. Self-efficacy in this research is considered as consumers' confidence in their ability to utilize the 5G service. Previous research analyses the function of self-efficacy in 3G and 4G adoption; however, efficacy never tested in 5G adoption context (wang and wang, 2010; Tapanainen *et al.*, 2018; Tapanainen *et al.*, 2019).

Based on earlier literature, in this research we mainly focus on the influence of social media stimuli on self-efficacy which will encourage the consumer to use 5G services. Therefore, we suggest that,

H6. Self-efficacy has an influence on purchase intention.

Previous research also proposed that social media communication has influence on self-efficacy (Kim and Hawkins, 2020), in this research we suggest that,

H7. SMM activities influence on Self-efficacy.

3.2.5. The mediation effects

Previous research verified that SMM activities have a direct relationship with purchase intention (Yadav and Rahman, 2017; Moslehpour *et al.*, 2020). However, the relationship between SMM activities and purchase intention needs further discussion. In this research, we proposed that SMM activities will affect consumes' self-efficacy and will affect consumer purchase behaviour through self-efficacy.

We also proposed that SMM activities will influence consumers' purchase intention towards 5G with the meditation function of CBBE and adoption readiness. From previous studies the results proved that EE, PE, SI all have influence on purchase intention (Venkatesh *et al.*, 2012b) and SMM activities has effect on adoption readiness, in this research, we propose:

H8. Adoption readiness mediates the relationship between SMM activities perceived by the customer and purchase intention.

The literatures before proved that SMM activities as influence on Self-efficacy (Kim and Hawkins, 2020) and self-efficacy has effect on purchase intention (wang and wang, 2010). In this research we hypothesis that:

H9. Self-efficacy mediates the relationship between SMM activities perceived by the customer and purchase intention.

Previous studies results showed that SMM activities has effect on CBBE (Zollo *et al.*, 2020) and CBBE proved has influence on purchase intention(Kim *et al.*, 1998), in this research we propose that:

H10. CBBE mediate the relationship between SMM activities perceived by the customer and purchase intention.

Bandura *et al.* (1999) study proved that consumer individuals' behavior strongly impacts self-efficacy. For new technology products and service, consumer's purchase intention strongly related to their perceptions and evaluations of the function of the technology itself. Their purchase intention essentially relies on adoption readiness. The sub-constructs of adoption readiness, namely performance expectancy, effort expectancy, and social influence, demonstrated to have an impact on purchase intention in previous studies (San Martín and Herrero, 2012; Venkatesh *et al.*, 2012b). Besides, Self-efficacy has been proved by previous research that has influence on performance expectancy, effort expectancy and social influence (Teo and Zhou, 2014; Sung et al., 2015; Chen and Hwang, 2019). In this research, we proposed that:

H11. Adoption readiness mediates the relationship between self-efficacy and purchase intention.

3.3. Research model

In summary, this research assesses the factors that potentially affect consumers' purchase intention of 5G products and services. The study has developed a model integrating constructs from UTAUT, with marketing constructs such as customer-based brand equity and psychological constructs such as self-efficacy. Based on the literature and theories related to technology adoption, the UTAUT model has the strongest explanation power of technology adoption compared to other models (Venkatesh *et al.*, 2012b). Drawing from prior research, one aim of this study is to propose a conceptual model that improves the explanatory power of UTAUT in consumers' adoption of technology. Specifically, I will assess how strong is the influence of AR, CBBE and self-efficacy on consumers' purchase intention and test the role of SMM activities in technology product and service adoption. Moreover, this research aims to analyse how AR, CBBE, self-efficacy will mediate the relationship between customer perceived SMM activities and purchase intention of 5G mobile service bundle. We also attempt to expand the knowledge of companies' SMM activities, CBBE, adoption readiness, and self-efficacy to the context of new technology product and service promotion activities. Based on previous literature about S-O-R model, in this research we use SMM activities as external stimulus, AR, CBBE and self-efficacy are function as organism in this research model, purchase intention is response of the consumer (Kawaf and Tagg, 2012; Chopdar and Balakrishnan, 2020).

In this research, we also included control variables that might influence purchase intention in order to analyse the research model in a more accurate way. First, personal involvement has an essential influence when consumers evaluate their purchase intention (Lee *et al.*, 2010;

Reimer and Benkenstein, 2016). Secondly, research on social media pointed out that when consumers consult information online for making purchase decision, their attitude towards online information will affect how they will react to the information (Wu, 2003). The integrated model is presented in Figure 3.

Figure3 presents the constructs of adoption readiness including Performance expectancy, effort expectancy and social media; CBBE contained brand loyalty, brand awareness/association and perceived value; social media marketing activities including entertainment, interaction, trendiness, customized and WOM, self-efficacy and purchase intention. H3, H2 and H7 try to demonstrate the influence of SMM activities on adoption readiness, self-efficacy and CBBE (Zhang and Benyoucef, 2016). H4 is address the relationship in the original UTAUT model proposed by Venkatesh et al. (2003b) and Thakur and Srivastava (2014). H6 try to explain the influence of self-efficacy on purchase intention (Mun and Hwang, 2003; Rohatgi et al., 2016 H5 tries to explain the influence of CBBE on purchase intention (Kim and Ko, 2010; Almohaimmeed, 2019). H8-H11 to exam the mediation function of adoption readiness, self-efficacy and CBBE between SMM activities and purchase intention.

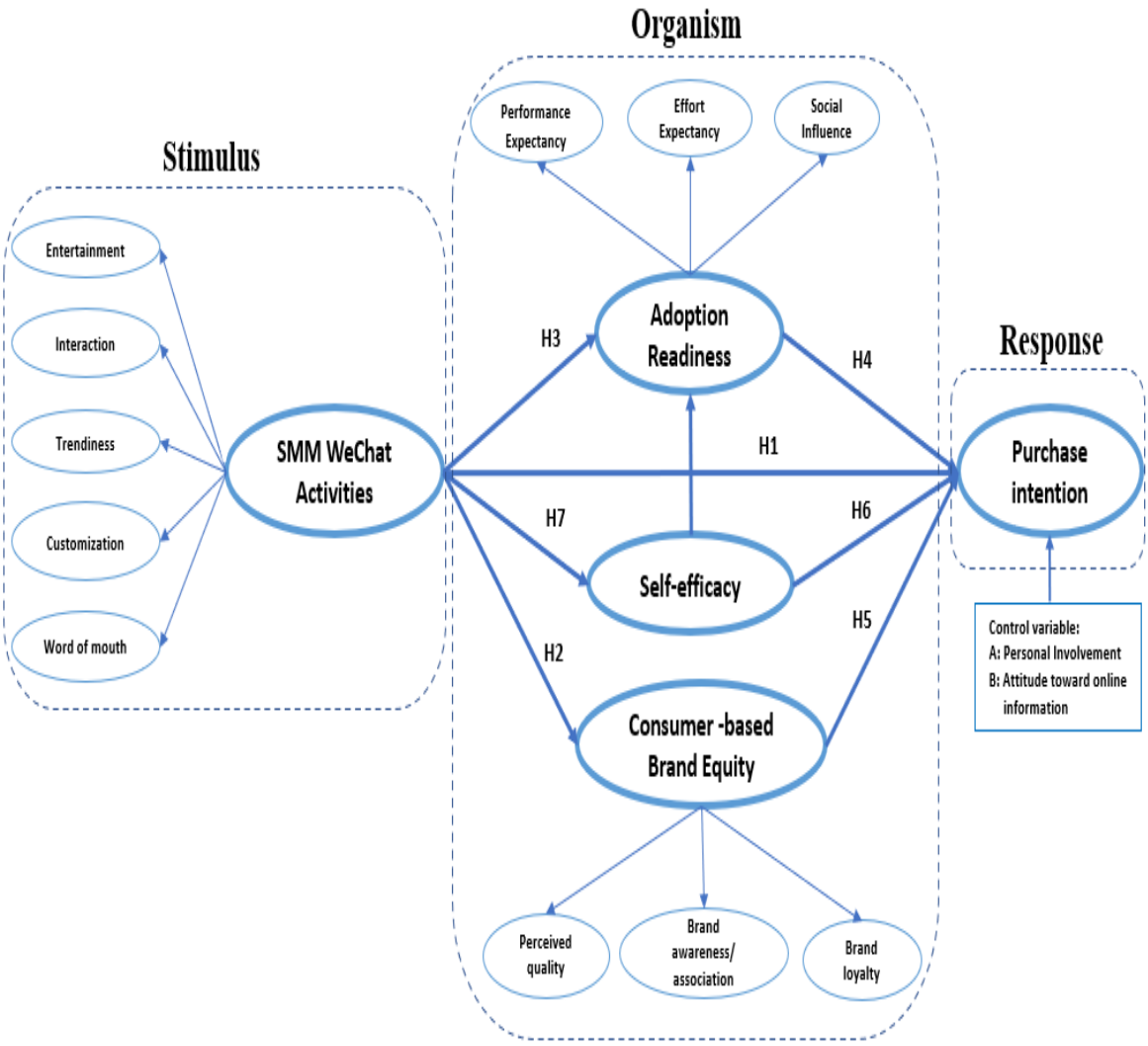


Figure 3. Research Model

All the hypotheses are made based on previous literature and present as follow:

H1. SMM activities influence purchase intention.

H2. SMM activities influence CBBE.

H3. SMM activities influence adoption readiness.

H4. Adoption readiness has an influence on the purchase intention of 5G mobile Services bundles.

H5. CBBE has an influence on purchase intention.

H6. Self-efficacy has an influence on purchase intention.

H7. SMM activities influence on Self-efficacy.

H8. Adoption readiness mediates the relationship between SMM activities perceived by the customer and purchase intention.

H9. Self-efficacy mediates the relationship between SMM activities perceived by the customer and purchase intention.

H10. CBBE mediate the relationship between SMM activities perceived by the customer and purchase intention.

H11. Adoption readiness mediates the relationship between self-efficacy and purchase intention.

Chapter 4. Research Design and Methodology

4.1. Introduction

In precious chapter, relevant literatures were discussed thoroughly. Research gap also identified which is notably relate to the technology adoption behaviour in telecommunication industry. This chapter will explain the methodology and research approaches which will be used in current study. Sampling method, research design, data collection procedure and data analysis method will also be discussed thoroughly in this chapter.

As a critical stage for knowledge expansion, research methodology implies how a researcher gather and analysis data, then leading to final conclusion. This chapter will start by discussing the commonly used research paradigms, research approaches and their differences. Then, we will discuss how to inhere these methods to social science filed and information system research area. Based on these discussions, this chapter will have a conclusion of which research method and approaches are suitable for this study and especially suitable for analysing technology adoption behaviour in telecommunication industry. First, this chapter will have a brief review of research paradigms, research philosophy and approaches, which will be used to explain the research ideology, define the research type, as well as underpin the basic research framework. Secondly, the qualitative and quantitative research skills in social science study will be analysed and compared, moreover, the choose of quantitative method for this study will be justified. Thirdly, the research design for this study will be discussed and fully explained, including each step in the research process. The choice of research population, sampling method, sample unit will be discussed as well. Forth, the questionnaire design, the scale development will be explained in this chapter, and online survey method will be justified as well. The use of AMOS software and ethical consideration in this study will be presented at the end.

4.2. General research approach

In the study of social science, especially in the area of information system, the research approaches formed by different dichotomy and paradigms. The most commonly discussed approaches are positivism, interpretivism, quantitative qualitative, induction, deduction, exploratory and confirmatory (Fitzgerald and Howcroft, 1998). Research paradigm is group of assumption which provide the researcher with philosophy and conceptual framework to guide their research, in order to help the researchers have better understanding of the world (Suppe, 1974; Burrell and Morgan, 2017). The main aim of research paradigms is to guide the

researchers especially when there are important issues challenging the research discipline, or when the researchers develop new theories and models which will help them solve the problems. Research paradigms also provide researchers principles, methods, and process to solve repeated problems (Burrell and Morgan, 2017). While discussing the development of research paradigms, the philosophers is also trying to address the fundamental questions which is how do you know and what we know is the truth (Fitzgerald & Howcroft, 1998; Lee, 1991)? Different schools of philosophy have their own thoughts and answers, and it need to be clarified before conducting a study. Because it will affect the research approach and the outcome of a study (Sarantakos, 2012).

In the following sections we will briefly introduce different research philosophies, approaches and discuss what will be choose for this study.

4.3. Research philosophy

Based on the definition introduced by Saunders *et al.* (2015), research philosophy is a systematic belief and a set of assumption about the nature of knowledge and the building of knowledge which related to conducting a research. Research philosophy usually contains important research assumptions, which help professionals explain how they see and explore the world (Malhotra *et al.*, 2006; Bajpai, 2011). Furthermore, a research project is formed by assumptions. Bajpai (2011) believes that the research philosophy is a belief which describe how the research phenomena will be explained and how the data will be collected, analysed and interpret. Moreover, the research philology is not just about the research resource, it is also related to the nature of the raw data in the research and its further development (Malhotra *et al.*, 2006; Bajpai, 2011).

Patton (2002) implied that research philosophy is about examining the nature of the knowledge, answer the questions of how it becomes and how it can be passing to others through language. To be more clearer, it is equal to further exploratory of the knowledge and try to reach the core of the knowledge. Guba and Lincoln (1994) conclude that research philosophy as two major categories: ontology, epistemology. In other words, the philosophy is trying to find the answer to the question of "what is knowledge?" (ontology) and "how the knowledge being formed?". It is also be considered as the how knowledge is accepted in discipline (epistemology). In order to have a deep understanding of the research philology and justify which one will be used in this study, we will discuss this topic further in the subsequent chapter.

4.3.1. Ontology

Ontology is the philology of "being"(Guba, 1990). It is also a study of the nature of social entities and the structure of social reality (Crotty, 1998). The main theme of ontology is the nature of truth (Guba, 1990; Saunders, Lewis and Thornhill, 2015). All of the researchers need to start form a basic ontology theory, which is the starting point of acquiring new knowledge (Collis and Hussey, 2013).

The philology of ontology stands for that the research is objective, which means the reality is external to individual's mind. There are two reasons for this study adopt objective ontology philosophy. First, at an objective position, the researchers are able to analysis and interpreted a phenomenon without the interfere of social actors. In this research, the 5G mobile technology is perceived as social reality. The carries, consumers and other character whoever involved in the adoption procedure are social actors. The 5G mobile technology will still be the same whether the social actors are replaced, or all gone. That is to say, the 5G mobile technology will not be changed or erased by any of the social actors which represent the existence of an objective phenomenon in the structure of social entity. In order to analysis this phenomenon objectively, the researcher need an objective perspective to study a defined world form the beginning. In this way, we can study the adoption of 5G mobile technology without influence of social actors. Secondly, the chosen of objective perspective also has impact on the decision of using positivist epistemology, which is related to research design, research strategy of data collection and analysis approaches (Al-Saadi, 2014). According to Amaratunga *et al.* (2002) objective position often leads to collect quantitative data for the purpose of interpret the social phenomenon. It is widely used in the literatures of information system studies and the usage of questionnaire skill for data collection (Collis and Hussey, 2013). Therefore, this research chooses objectivism ontology as basic research method.

4.3.2. Epistemology

Epistemology is a branch of philosophy which mainly discuss the assumption, the acceptance, valid and legitimate of the knowledge and how to deliver the message to others (Thornhill *et al.*, 2009). Moreover, epistemology is a philosophy which enquire the knowledge from social reality go through certain research procedure, such as validation of hypothesis and other research approaches (Grix, 2002). Orlikowski and Baroudi (1991) and Irani et al. (1999) categories epistemology into three approaches: positivist, interpretive and critical approaches.

Positivism is defined by Saunders, Lewis and Thornhill, (2015) as "the philosophical stance of the natural scientist entailing working with an observable social reality to produce law-like

generalizations". The definition emphasis "highly structured methodology to facilitate replication". For positivist, the world is real and completely objective, which allows researchers to choose a proper measurement to approaching the truth (reality) (Avison and Pries-Heje, 2005). Orlikowski and Baroudi (1991) discussed that positivism guide the researcher to test a theory in order under certain phenomenon. Furthermore, in the study of information system, following the positivism philosophy, research usually conduct by a proposition. The research variables always designed as quantifiable measurements, and the data sample as well as the hypothesis are always representing a specific population.

Interpretivism is a philosophy which assert the social context, shaping the knowledge only when social constructions, consciousness, meaning, or document leading to it (Myers, 2008). For further explain, interpretivist believe that individuals are different from each other, it is impossible to study them all with the same method. In the research which use interpretive epistemology, the phenomenon usually analyzed and explore by interpreting the part which shared by individual (Walsham, 1995). In the research field of information system, interpretivism mainly served as supplementary method. Because it always affected by social context and the procedure of formatting the interpretation the phenomena (Walsham, 1995).

Critical realism defined by Saunders, Lewis and Thornhill, (2015) as "philosophical stance that what we experience are some of the manifestations of the things in the real world, rather than the actual things". Researcher who adopts this method treat social reality as a product of history and reproduction of individuals (Avison and Pries-Heje, 2005). They consider that individual's intention will influence the people and environments around them socially and economically. Therefor the aim of critical realism is to analysis the factor which constraining people, for instants: political and cultural (Myers and Avison, 2002).

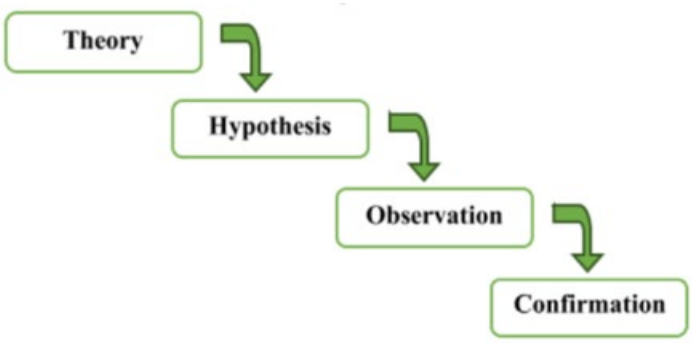
Based on the discussion above, in this study positive epistemology is chosen for the research, which is also consist with objective ontology. Positivism gives the researchers ability to study the phenomenon with group of constructs and tools to generalize the findings as in scientific study (Saunders, Lewis and Thornhill, 2015). In this study, the result will be generalized by analysing the reliable and measurable information from 5G mobile network users and who has the intention to use 5G. It will help the researcher understand which factor will influence the adoption behaviour of 5G mobile technology in China.

As a contribution to the field of adoption behaviour towards 5G mobile services, as well as enrich the research topic of social media influence, it is suitable for this study to adopt the positivist position. Not only because the positivist epistemology can help limited the researchers' personal influence on the research, it is can also make sure there is only objective

reality behind the research context (Hudson and Ozanne, 1988). In the research, the objective reality is about how consumer adopt 5G mobile technology under the influence of social media. This phenomenon will be analysed through objective and reliable data without interfere of personal perspective. Because the research result will be valuable for the research area of 5G mobile technology adoption, and the result can be generalized only under the circumstances that it is based on objective and creditable data. The positivism perspective can guarantee the generalization of the research is in a rational way and without influence of social actors. In order to limit the research's personal influence, we disturbed the questionnaires randomly and the researcher has no contact with the participants. The procedure also guaranteed that the participants are joined the research voluntarily and anonymously. During creating the questionnaire, the order of the question is also arranged randomly to avoid certain bias. We added attention checking questions in different sections to avoid bias from participants themselves (Collis and Hussey, 2013). Therefore, this research chooses positivist epistemology as research method.

4.4. Research approach

Deductive and inductive approaches are two main method of reasoning and method to conduct new research (Malhotra *et al.*, 2006). Deduction approach is focus on narrow down the nature and testing or confirming the research hypothesis (Hussain and Khuddro, 2016). It is shows in the figure below as "top to down" order. The deduction procedure starts from a set of techniques and apply the rigorous theories to the real world for testing its validity (Lancaster, 2005). When utilize the deduction approach, the researcher will get the conclusion through generalize the knowing fact.

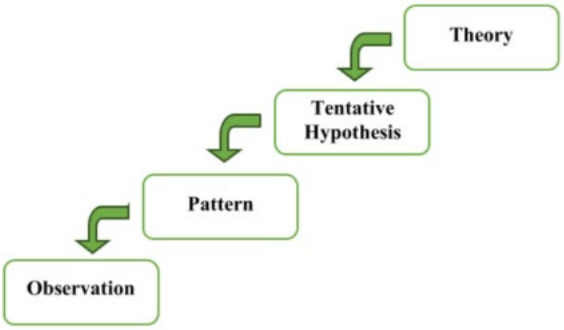


Sekaran and Bougie (2016)

Figure 4. Deduction Approach

This process requires multiple steps which is similar to building blocks, as presented in Figure 4. This is the reason why deduction approach is also called hypothetical-deductive method (Sekaran, 2003). The first and second step is operating the concept in theories and hypothesized in a way that these factors can be measured by empirical observations. The third step is identifying and choosing from alternative approaches or techniques for measuring the concept. It is also including select and design research method. The final procedure is the researcher decide to what extent the chosen theories and hypothesis are falsified (Lancaster, 2005). Therefore, deduction is a procedure of drawing from rational analysis to confirm or to reject the theory (Gummesson, 2000), which is primarily used with positivist paradigms (Crowther and Lancaster, 2008).

Inductive reasoning, on contrary, is the reasoning process which develop a new theory as a result of observe and analysis empirical data, as present in figure 5 (Sekaran, 2003). In other words, the researcher observes a phenomenon, then based on the observation, they logically establish a proposition for the phenomenon (Gummesson, 2000). As it is showed in the figure, it is a "bottom-up" approach. This approach begins with observation, then generalize the finding into hypothesis and new theory. Inductive approaches compare to deductive is more open minded, and the procedure is opposite to deductive approach, which start from observation to theory generalization (Trochim & Donnelly, 2005). Teddlie & Tashakkori (2003) discussed that it is possible to include both deductive and inductive approach in one study. Quantitative questions are deductive and qualitative questions are mainly inductive, which can always be see used in mix method research.



Sekaran and Bougie (2016)

Figure 5. Induction Approaches

Based on the discussion above and considering the chosen positivist paradigm, the deductive approaches is suitable for this research. The deductive approaches require us to find a theory first and confirm its effectiveness by make hypothesis and testing procedure. This approach has already been adopted by previous research related to consumer behaviors in mobile service area (Glavee-Geo, Shaikh and Karjaluoto, 2017; Sampaio, Ladeira and Santini, 2017). In the research area of information system, researchers have already established well tested theory and research models, such as TAM, UTAUT. These are all possible theories which can be used in this research directly. The theories need to be specified and explain with the empirical data which gathered for this research. Therefore, after considering the situation of our research which are firstly this research is based on pre-build theory and the aim of the research is to verify the research hypothesis; Second, this research we use quantitative research method and quantifiable data well as well measurements. In conclusion, the deductive approaches together with positive paradigm will be suitable to develop this entire research.

4.5. Quantitative VS Qualitative research

Quantitative and qualitative are two major methodology employed in scientific research, named as quantitative research and qualitative research (Malhotra *et al.*, 2006). Researchers choose qualitative research method when the aim of the study is to gain a deep understanding, explore the fundamental reason and the motivation of the research phenomena (Ragin, 1987). Meanwhile, quantitative studies utilize the statistics skills and quantified data to generate the result form sample and apply to whole population (Payne and Williams, 2011). The result from qualitative research can be considered as pre-test for generating new ideas and hypothesis for quantitative research, and in some studies the two methods are overlapped (Given, 2008).

Moreover, both methods as its strong parts and weakness. Take qualitative research as am example, the advantage of this method is suitable for researcher who want to develop a new theory for explaining a phenomenon, want to explore a subject and get an in-depth understanding about a topic. In qualitative study, researcher usually use interview as a guide during research process. The interview process helps the researcher gain the ability to orientate the research direction and to form framework according to the new findings. Researcher can also empower the participators and emphasis the value of the information which obtained from the participators (Neuman, 2013). However, because of the inevitable involvement of researchers themselves in the data collection process, the qualitative research always be criticized by its bias and subjective perspective interventions (Neuman, 2013).

Furthermore, due to the roughness in measuring procedure and subjective in research design process, not to mention limited sample data which will all influence the representative of the result. The other weakness is qualitative study data collection procedure is time-consuming. All the disadvantage of qualitative research is leading to the result that the research findings can only be generated to the research context and conditions which are similar to previous research design (Malhotra *et al.*, 2006). Whereas the subjective influence from the researcher can be avoid when adopt quantitative research. In quantitative research, data can be gathered in a less time-consuming way, and the researcher can get more accurate measures for the variables (Malhotra *et al.*, 2006). Usually, the quantitative study requires lager data size which can help the research result adapt to larger population (Payne and Williams, 2011). However, quantitative study still has its own limitations. Such as quantitative method will be ineffectiveness when social phenomenon is difficult to measure. Besides, quantitative study do not consider human interfere as well as subjective interactions, which cannot be reflect in the findings (Malhotra *et al.*, 2006).

According to the discussion above, quantitative and confirmatory method is chosen for this study. Firstly, based on our research philosophy which discussed and chosen above, under the guidance of positivism which hold the perspective that the world is real and all the research factors can be measured separately from the effect of individuals, quantitative method is suitable for this study (Taylor and Bogdan, 1984). Moreover, reswell et al. (2003) and Bryman et al. (2007) mentioned that quantitative research method also consists with the objective ontology, positive epistemology and deductive approach. In additionally, this study mainly adopts theories from previous research to build hypothesis, do not plan to build a completely new theory. Furthermore, this research chooses to use online questionnaire for gathering data. Thus, quantitative method is selected for this study. Secondly, based on the phenomenon in this research, objective measurement of the variables and statistical analysis skill are required. In this research, objective ontology identifies and hypothesis influential variables from previous literatures which related to usage of 5G mobile technology. Thus, the researcher needs to use quantitative research method through statistical analysis to verify the hypothesis and analysis the interactions among all the factors. However, in qualitative research which only focus on explain social phenomena from subjective perspective and involve social factors influence (Taylor and Bogdan, 1984). Thirdly, one of the advantage of quantitative research is it has more accurate results based on the research process which has less influence and bias from researcher (Malhotra *et al.*, 2006). It provides valid and reliable findings which are importance evidence of make improvement in certain research field (Payne

and Williams, 2011). This research plan to contribute for deeper understanding of which factors influence consumer's 5G mobile technology adoption behaviour in China. This research requires researcher utilities quantitative research skills to generate results from large number of data sample. Therefore, quantitative research method is suitable for this study.

4.6. Exploratory and Confirmatory research

Exploratory and confirmatory are two different types of research. Hair et al., (2006) suggested that confirmatory study is employed when the researcher want to test or confirm a specified relationship. Exploratory study usually for researchers who try to define a relationship in a general form and then use different techniques to estimate the result (Hair et al., 2006). In other words, exploratory research is not committed to confirm any theory or relationship which is specified before the analysis. The researcher will use the exploratory method and data to find the nature of the relationships among the variables (Hair et al., 2006). Correspondingly, confirmatory method envisions empirical analysis to confirm or disconfirm previous hypothesis (Gerring, 2001). Confirmatory study mainly used by researcher who has interested in experimental research and theoretical study. Exploratory strategy usually chosen by researcher who interested in behavioral and interpretivism study orientation. Researcher utilize the exploratory research intend to keep the discussion about the conceptualization, theorization and integration open, in order to keep sensitive for new evidence.

Furthermore, Gerring (2001) mentioned that social science research usually chooses the method between exploratory and confirmatory. Nevertheless, exploratory research is always link to inductive approach (Meyers et al., 2005). The advantage of exploratory research is flexibility which regarding to hypothesis generation. It's do not require massive data collection for supporting the hypothesis test. However, the disadvantages are clear as well, such as exploratory research make it difficult for theory falsification. Moreover, the result easily over-fitted because the nature of exploratory method might produce more research bias (Meyers et al., 2005). On the other hand, confirmatory strategy heavily relies on statistic inferences and deductive technique, which use pre-specified hypothesis outline the study, then test the hypothesis to answer research questions (Meyers et al., 2005). The advantage of the confirmatory strategy is that it can provide precise information because it uses well established theory and methods. Nevertheless, the disadvantages are all the strategy and analysis lies on the per-formed ideas, which makes it difficult to notice and handle unexpected results (Stebbins, 2001). For instance, UTAUT, to form the research model. Therefore, based on the discussion above, confirmatory study is chosen for this research as a skill to confirming the hypothesis in 5G mobile technology adoption context

4.7. Research design

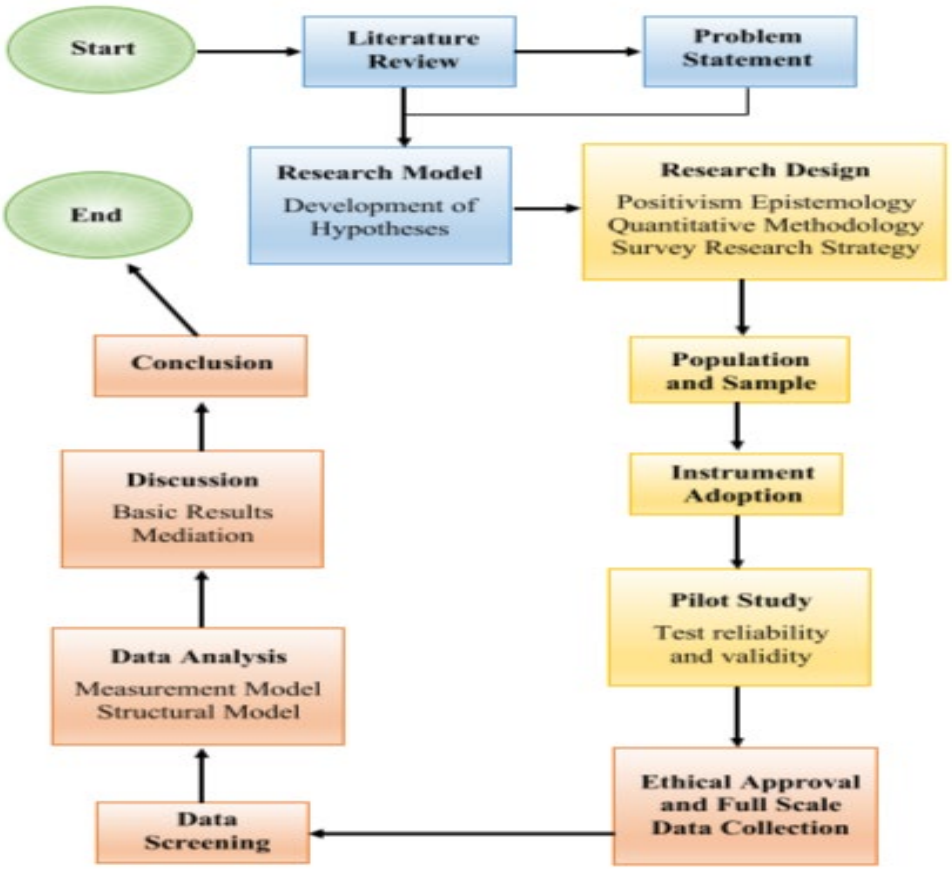
Research design is an essential stage in the whole research process, because it is the link between theory which leading to hypothesis, and empirical data collection activities (Malhotra *et al.*, 2006). Research design is also a set of organized research activities which need to conduct in a certain way to achieve the goal of the research (Malhotra *et al.*, 2006). It is the researchers' responsibility to make sure that the chosen strategy for conducting the research consist with the research questions. Therefore, researcher usually start with research hypothesis, research questions, then proceed to research design (Tharenou et al., 2007). In this way, research design function as a guideline which help the researcher to collect and interpret the data (Iacobucci and Churchill, 2009).

The purpose of this research is to investigate which factor will influence consumers' behaviour of adopting 5G mobile technology. In order to find a tool for helping the researcher have a basic understanding of consumers' adoption behaviour towards technology products, the conceptual framework start with UTAUT model which is from previous literature in technology adoption and information system adoption field. While researcher go through the existing literatures topic which related to in information system and technology adoption filed, the researcher realized that extensive works has been done in these field, which suggest that this is a sophisticated area. On the other hand, there is no specific findings can be directly adopted into this study. Moreover, no existing literature and framework for the research questions which are completely consist with this study. Therefore, this research will develop a theoretical framework based on existing theory and related literature, then gather empirical data to test whether its validity for this particular research context. This research will take place in three stages, respectively exploratory, testing and evaluation. At the stage of exploratory research, an extensive literature review was conducted in order to form fundamental theory system and conceptual framework of this study. Especially, the literature related to new technology products adoption behaviour, mainly in teleconnection industry. At the same time, research gaps and contribution of this study are identified as well. Therefore, the rational, aim and objective of the research all developed to fulfil these requirements. Additionally, during the exploration procedure, the theory and related concept with newly developed model were all be critically reviewed. They are all severed as foundation and basis for this study.

At the second stage the main focus is on placing the hypothesis which proposed in the first stage for testing. As discussed in the former section, the data collection techniques and research instruments have already been decided, and the survey will be carried by online

survey engine Qualtrics. This online survey will be under the guidance of objective ontology, positivist epistemology and quantitative method. Furthermore, a pilot test will be conduct for the purpose of exam whether the chosen measurement is suitable for the study. The aim of the pilot test is for the judgement of reliability and validity of the research instruments before collecting large data for final result. Although, the sample used for pilot test should not be include in the formal study, which will still contribute to the final result. We will discuss pilot test in depth in further section.

At the stage of evaluation, the quantitative research approach will be conduct for the evaluation of research hypothesis and conceptual model. The data which collected through online engine will be interpret by software. The statistic for each variable will be analysed and discussed profoundly. SEM (Structure Equation Model) is chosen to delineate the factors which related to research objectives and explain their relationships with 5G mobile technology adoption behaviour in China. The whole research design process is present in the following figure 6.



Li (2018)

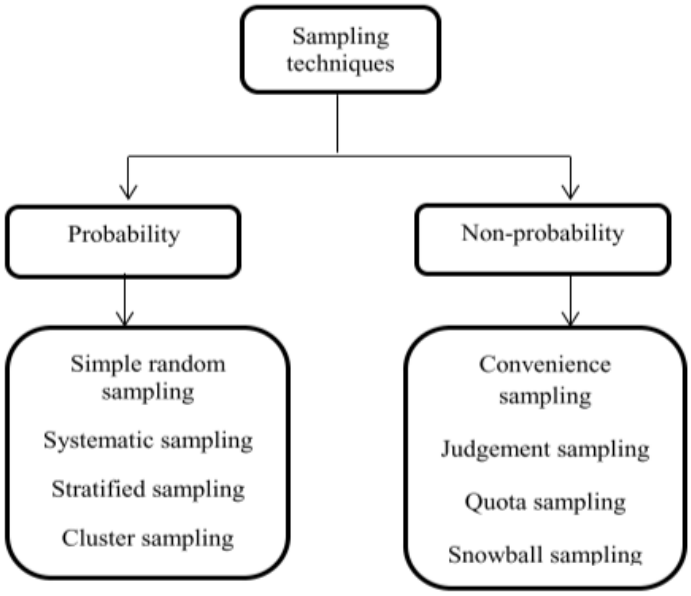
Figure 6. Research Process

4.8. Population and sampling

Sekaran and Bougie (2016) define the population as "the entire group of people, events, or things of interest that the researcher wishes to investigate", and sample is defined as the selected group of subsets of the whole population. Researchers cannot study the whole population, so they usually choose a certain number of individuals from the entire population as research sample, and later apply the result and conclusions to the whole population (Bryman et al., 2007). For this research, the target population is 4G mobile service users who plan to use or already use 5G service.

There are two types of sampling method usually use in social science research, which are probability sampling and non-probability sampling. Probability sampling is a sampling technique which the probability of individual selected from the population has a known, non-zero chance of be chose as sample. In design-based conceptual framework probabilities sampling is basis for interferences (Hansen, Hurwitz, and Madow, 1953; Lohr, 2009). On other hand, non-probability sampling is opposite. The chance of each individual being selected is unknown (Saunders, Lewis and Thornhill, 2015). In practice, probability sampling is more complex and more expensive to conduct compared to non-probability sampling. Although probability sampling can claim to be more representative of the population, for non-probability sampling the researcher can choose whoever is available (Doherty, 1994).

Based on the characteristics of different sampling method discussed above, this research chooses non-probability sampling as sampling method. There are two reasons for this study to choose non-probability technique. Firstly, as mentioned before, non-probability sampling is less time and money consuming, which is more practical. To reach the large population in China is basically impossible by using probability sampling, and non-probability sampling can overcome this problem. The characteristic of sampling technique is showed in the following figure 7.



Hair et al., (1998)

Figure7. Sampling Technique

The disadvantages of choosing non-probability sampling are the uncertainty of the representative of the whole population, which makes it is unavoidable to calculate the margins of errors and confident interval (Sarle, 1938). In order to control the sample errors during data collection process, this research choose the respondent from current 4G and 5G mobile service users and who has the intention to use 5G in the future. 5G mobile services just newly into the market, choosing 4G services users which makes it easier to pursue the representativeness of the entire population of who want to use or already use 5G service (Chu *et al.*, 2009).

Under the category of non-probability sampling, there are five sub-group sampling method, namely convening sampling, quota sampling, dimensional sampling, purposive sampling and snowball sampling (Suen, Huang and Lee, 2014). According to Sekaran and Bougie (2016), convenient sampling enable the researcher get the sample in the most convenient way. Quota sampling is ensuring that the chosen sample represents certain characters of the population. The characteristics can be defined by researcher from previous literatures (Saunders, Lewis and Thornhill, 2015). Dimensional sampling is similar to the quota sampling, however, dimensional sampling has more complicated multidimensions. All dimensions need to be specified from the previous literatures and paired randomly. In purposive sampling researcher need to decide which sample is fit to the research purpose. It involves more subjective judgment compared to other methods (Emerson, 2015). Snowball sampling is suitable for

community study and observation research. Because it is requiring the initial respondents give the further information and based on which subsequent participators the researcher select.

Emerson (2015) concludes that dimensional sampling suitable for detail-oriented research which requires small sample size. Purposive sampling involves researchers' subjective judgment, which will cause issues like research bias and subjective interference (Malhotra *et al.*, 2006). Snowball sampling requires researcher organize the sampling group and the answers maybe similar to each other. In quota sampling, it is difficult to compare the characteristics of the samples under the condition that lack of the whole population information. After considering the sampling methods, this study chooses purposive sampling method, which the researcher decided to select 4G users which can be considered as representative of the customer who has the intention to use 5G. It is easy to conduct and collect primary data from the sample population. The researcher makes attempt to make sure the samples are representative for a large group of population by choosing the respondent from different occupation and background. For the result to be more accurate, this research does not include student sample.

4.8.1. Research unit and sample size

The unit of analysis is important in research design as well. Unit of analysis represent to what level the data aggregated with the participators. For instance, individual, groups, organizations and cultural group (Sekaran, 2006). The choice of analysis unit depends on the purpose and the interest of the research. In this research, the aim is to analysis the individual 5G mobile technology adoption behaviour in China, so for this research we adopt individual as unit of analysis. The questions in the survey are designed for individuals who is 4G or 5G mobile service user in China. Since the participators has their own perspective on adopt 5G mobile services besides their age, gender, education level and occupation, the aim of this research is to explore the factors which participate in individuals' decision of adoption procedure.

If the researchers want the survey result reliable and trustworthy, the sample size should be determined carefully as well (Sekaran, 2006). When the sample size is smaller than the estimated sample size, it will lead to inaccurate data analysis and inaccurate parameters (Hair et al., 2006). On the other hand. if the sample size large than the estimated one, it will lead to more spending of money, time and effort (Bryman, 2015. In SEM, the path modeling estimation suggest that for reliable results the sample size should be equal to the large one of following conditions (Tompson *et al.*, 1995; Hair *et al.*, 2006): (1) Ten times of the maximum number of the path towards any constructs in the conceptual model. (2) Ten times of the

highest number of the path in structural model towards a particular construct. The sample size should be at least equal or above either of these two rules. Hair *et al.* (2006) also mentioned for structural equation modelling technique, sample size should be depending on the complexity of factors related to the model, expected rate of missing data, and which estimation process will be employed. We will have further explanation in the data analysis chapter.

The population for this study is individual users of 4G or 5G mobile service in China. In technology research area, reliability and accuracy of research sample were criticized for including students sample, which makes the result difficult apply to the whole population (Dwivedi *et al.*, 2017). So, this research targeting actual users and exclude student sample. Although use a controlled experimental research environment will have more accurate results of measuring and capture the participators' behavior, however the resource for this option is not available. This study will utilize self-reported usage behavior as a solution for the research objectives.

The sample size plays vital role for generalizations of the results. The estimation of the parameters' reliability, analysing and testing the models all need proper sample size (Martínez-López *et al.*, 2013). The sample size is mainly related to the time and cost of the research, characteristic of the target population, non-response participants and analysis type (Bell *et al.*, 2018). Iacobucci (2010) suggested that the sample size should be at least 50. However, in Barrett (2007) and Hair *et al.* (1998) proposed the critical sample size as 200 for structural equation modelling approach due to need to reduce the bias for model estimation (Kline, 2011). Chin (1998) mentioned that sample size needs to meet the two criteria as follow: (1) ten times if the formative indicators, or (2) ten times of the paths in the structural model. According to the rules discussed above, the minimum sample sizes at 360 is required to meet our strategy.

4.9. Data collection method for Primary Data

Data resource can be divided into two types, secondary data and primary data. Malhotra *et al.* (2006) mentioned secondary data is the data had been collected for other research purpose rather than for the problem in current study. Malhotra *et al.* (2006) also define the primary data as the data originally collected by the researcher for the purpose of addressing the research problem at hand. In this research we use both ways to conduct our research.

Researchers use different ways for primary data collection. Focus group, interviews, surveys are common skills for conducting research (Malhotra *et al.*, 2006). As discuss in previous chapter, for this study survey is chosen as collection method for primary data. There are two

types of survey, use of internet and non-internet survey. The non-internet survey usually conducts by door -to -door interviews, mall intercept interviews, telephone interviews or mail panels (Sekaran ,2003). All the data collection method has its advantage and disadvantages. The method for data collection should be practical, and also can fullfill the needs of the study.

Due to the study is conduct in China, the wide geographical distribution makes it not economically and time efficiently for face-to-face interview and telephone communication. Since the email address is difficult to collect and has low response ratio, email survey is not chosen for this study. Under the circumstance of consumer is widely spread and lack of available the consumers list, this study adopts convenient sample approach and use online survey service website Qualtrics to make the questionnaire and send through WeChat by telecommunication companies' customer service department.

Comparing with the traditional way of data collection method, the online survey has several important advantages. Firstly, online survey can reduce the response time. Airey and Atak (1998) implied that survey respond through email usually came 2-3 days late, or don't have respond at all. Online survey can also help reduces the money cost, chleyer and Forrest (2000) found out that the spending on online survey is 38% less that mail survey. Compared to other skills, online survey is flexibly and easy to control in terms of display, formats, animation and other related design issues (Arnau, Thompson, & Cook, 2001). Besides, through online survey, the data is easy to entry and manage, the electronic survey tools can transfer data into database and spreadsheet easily, eliminating enter the data manually. Furthermore, online survey can obtain additional information about the respondent. For instance, researcher can identify how many people review the questionnaire compare with the number of who answer the survey. It can also tell the researcher the respondents' answering process and help to easily identify who did not finish the survey (Bosnjak &Tuten, 2001).

When this research chooses to adopt online survey, the limitation of this skills is other important perspective need to be considered as well. First is the representativeness of the sample, because these is related to geographic and demographic character of the people who use internet. For instance, according to the report of CNNIC (2019), at the end of August 2019, the internet cover 88.9% of the land of China and in total has around 0.84 billion users. The main uses are age between 10-39, take part 67.8% of the whole uses. The gender ratio of male vs female is 52.7: 47.3(CNNIC, 2019). Based on this statistic, the nature of online survey has its own bias, the certain portion of population are systematic eliminated from the research sample which will affect the generalization of the research result. Thus, it is the responsibility of the researcher to ensure the defined population for the research have equal

access to internet and have the technology for them to complete the survey (Malhotra *et al.*, 2006). Secondly, response rate. Researcher who uses online survey also found low response rate. In order to solve the problem, some researcher advocate a system of multiple reminders, to notify people for responding (Arnau *et al.*, 2001). The third is measurement errors. For instance, there is little study about the psychometric implication of the changing from paper-and -pencil to electric format, this research has no control of errors related to this type of issue (Arnau *et al.*, 2001). Wyatt (2000) also mentioned that the effect of survey design needs to be investigated as well. The questions could be processed wrongly by participators, which will affect the validity of the data. The fourth is technical difficulties. Researcher must make sure the online survey pages are easily to download and the format are the same in different environments. Additionally, the format needs to be carefully considered for online survey especially when the questionnaire is opened form mobile phone. If the format is a mass or difficult to read , it will also leading to low respond rate (Wyatt, 2000).

According to discussed above, the online survey is suable for this research. Based on a preferred embodiment, the invitation comprises to a communication link send to the individual who believe to fit the description of the target group. Preferably, this link can be sent directly to individuals or contact individual through specific social groups. Following the link, the participators can disclose their information such as their identity and background to determine whether they meet the certain criteria for conduct the survey. For instance, at the beginning this research will set control questions as “Did you use 4G service” to make sure the participators fit the purpose of the study. Moreover, the information will be further used for screening whether the criteria is met with the requirements of completeness, reliable, accuracy, verifiable which are necessary for further evaluation of the integrity of the entire research. For this research, researcher will send the link direct to targeted individual whom the research considers as a fitting sample. At the same time ,the link will be send in WeChat moments and WeChat group. Andrews *et al.* (2003) mentioned that send online survey to online community will get higher responds rate.

4.10. Questionnaire design

In this research, self-administered questionnaire technique is used to design the questionnaire. Self-administered questions refer to the questions which are designed specifically for the participators can completed independently without intervention of the researchers (Lavrakas, 2008). Self-administered questionnaire can be directly send to participators through email or to large social groups and online community (Lavrakas, 2008). For this reason, it is important for the researchers to ensure the questionnaire is clearly put and

easy to process. With the attempt to make the questionnaire suitable for the participators to answer and get maximum feedback , the construction and the flow of the survey need to be considered carefully. There is a set of issues in the questionnaire need to consider in order to increase the response rate, such as layout, introduction part and the ending of the questionnaire.

Qualtrics is employed in this study as a questionnaire building platform, to ensure the questionnaire has a fairly attractive layout to increase the ratio of validity of the complete questionnaires. Lavrakas (2008) implied that a good questionnaire design can help to improve the respond rate. Sarantakos (2012) also suggested that how the questionnaire is present and how assuring the questionnaire make the respondent feel will all affect the responders' decision whether to complete the questionnaire or not. A cover page is usually used at the beginning of the questionnaire as an introduction, in order to help the participators understand the research topic and motivate them respond to the study. In addition, the words and visual design of the questionnaire are essential for making the questionnaire easy to read and fill in and will help to increase the respond rate (Dillman et al., 2008; Saunders et al., 2009). It is also suggested that long questionnaire will have a negative influence on the responding rate (Edwards et al., 2002). Therefore, during the questionnaire design procedure, the researcher tries to avoid the unnecessary question, to make the questionnaire compressed.

Besides, De Leeuw *et al.* (2008) also suggested that for the introduction of questionnaire, the covering letter and appropriate title will help to attract the responder to participate as well. An unbiased title for the research topic and sub-secession of the questionnaire is important for attracting peoples' attention. For this study, the cover letter will put at the beginning of the survey, which is used to explain the research aim clearly for the participators. This is an important step for self-administered questions to gain responders' cognizance. Furthermore, a clear confidential statement is another important element in survey design, which is a statement of all the information collected from participators will be kept strictly confidential and will only be used for this research only. Moreover, the researchers contact details for further information should be also mentioned as well. Additionally, information such as the possible benefit for participate in the survey and thank you for participating message also need to mention in the questionnaire.

4.10.1. Questionnaire development procedure

Questionnaire is used to serve the purpose of current study and it is developed based on previous literatures. As discussed before, the questionnaire needs to be well developed, in order to help increase the response rate and ensure the participators provide complete and

accurate answers. The procedure of the questionnaire development needs to be planed properly and keep checking repeatedly before sending out. The researcher also needs to consider the length of the whole questionnaire and make it easy to complete (Fayers *et al.*, 2005). De Vaus (2002) suggest a guideline to help design a questionnaire:

1. Avoid using technical terms, using simple words instead.
2. Avoid using double-barrelled questions and questions which ask more than one questions.
3. Avoid questions which is too long.
4. Only ask the question that responders can answer easily.
5. If using multiple choice questions, make sure all the possibilities are covered.
6. The questionnaire needs to follow the natural logic, ensure the responders can finish the questionnaire within limited effort and time.

All the procedure are served to ensure the validity and unambiguous of the questions (Iacobucci and Churchill, 2009). In this study, the questionnaire chooses closed question style which encourages the participators to select the answer which fit their situation the best (Iacobucci and Churchill, 2009). According to Foddy and Foddy (1994), this type of question is selected based on four advantages. Firstly, the questions with predetermined answer allowed the researcher to collect the standard responses which can be meaningfully compared among different responders. Secondly, closed-end questions enable the responders to answer quickly and easily. The answers are easy to code for the rest of the research as well. Thirdly, the type of questions does not have much discrimination between less talkative respondents and less articulate ones. Forth, the closed-end questions is test the current recognitions of the responder rather than a recalled task from memory, which the responders will find it easier and the answer will be more accurate (Foddy and Foddy, 1994). The survey in this study covers the questions about the variables which considered will influence individuals 5G mobile technology adoption behaviour from the previous literature review.

According to Foddy and Foddy (1994) and Malhotra *et al.* (2006) there will be two parts in the questionnaire. The first part is the main part of the questionnaire which related to the measurement of dependent variables and independent variables in the conceptual model. They are considered as factors which participators in the consume behaviour. The logic of the questionnaire will be based on the information processing procedure. Consumer will expose to the information from WeChat official account and they will evaluate the information at the same time. It leads to the question of whether the information will influence the adoption decisions towards 5G mobile services. The second part of the questionnaire is general

demographic information and individual identify. This part will adopt multiple-choice questions to seek personal information, such as gender, age, education level and experience of using mobile services. Some literatures raise the question that whether the questionnaire should start with easy questions. The easy questions will put the responders in a comfortable situation which will help them answer the remaining questions. It is also concerned that whether it is preferable for the responder to meet the interesting questions first as an encouragement for them to complete the survey. This study will consider mix these two methods together.

For the main part of the questions, the Likert scale was utilized to simplify the coding and administration process for the researcher (Bowling, 1997, Burns & Grove, 1997). Hair et al. (2006) mentioned that Likert scales are the most efficient tools to use in a self-administered questionnaire and online survey to collect data. Additionally, Likert scale is easy to have a higher respond rate, and the information gathered will be more accurate to reflect the responders' opinion. Moreover, the Likert scale is a dynamic skill to spread the questionnaire to massive responders, and at the same time offers a high reliability coefficient. Likert scale is a valid and reliable skill which be used wildly in marketing research (Iacobucci and Churchill, 2009). By define, Likert scale is an interval scale which usually used to ask respondent whether they agreed or disagree about a topic. Likert scale is ranked with a series of beliefs or behavior statement.

The Likert scale used in this research is code in 7-point Likert-type rating from 1 "Strongly Disagree" to 7 "Strongly Agree". According to Chang (1994) and Joshi *et al.* (2015), compare to 5 Likert scale, 7 point is perform better in the choice of item of the construct defined in the survey. 7 point provides more options for individuals to choose which will increase the chance of reaching the objective reality of participators (Joshi *et al.*, 2015). Moreover, 7 point can eliminate the chance that the choice maybe falls out of the options provide by the scale. The research from Preston and Colman (2000) demonstrated that in 9 and 11 Likert scale the information transfer among the scales appears to decease due to the length of the measurement. Thus ,7 point engaging more to reality, and the statement will be more likely near the truth. Importantly, 7 point has higher reliability and validity statistically (Iacobucci and Churchill, 2009).

4.11. Instrument development

The design of the instrument is an important part of this research framework. It is essential for the researcher to develop a complete, accurate and relevant instrument and scares to achieve our research aim (Sekaran and Bougie, 2016). For testing the model present in

Figure1, the instruments were development for the quantitative research based on pervious literatures to preserve the validity of the content validity. The factors related to UTAUT and purchase intention (performance expectancy, effort expectancy, social influence), the scares items are adopted from Venkatesh *et al.* (2003b). The scare of self-efficacy is adopted from Jin (2014). The concept and scare of CBBE construct including Brand awareness/associations, Brand loyalty and Perceived quality we adopted from Yoo and Donthu (2001). Moreover, it is also demonstrated by Thakur and Srivastava (2014b) that UTAUT could be considered as multi-dimensional construct.

Hence, all the items were validated from previous literature and fit to the need of build the research about purchase behavior towards 5G mobile service. Moreover, we conduct a pilot test to verify whether all the measurements are valid. The pilot test also assists to check the reliability and validity of the instruments which will be used in the research hypotheses. The item of all the constructs will be present in Appendix A. The detailed explanation and definition of each variable which involved in this study will be discussed in detailed in the next section.

4.11.1. Adoption readiness (UTAUT)

Adoption readiness is defined "as degree to which the individual believe they are ready to adopt a new technology "(Thakur and Srivastava, 2014b), in our research content of 5G mobile service. Performance expectancy(PE), effort expectancy (EE) and social influence (SI) as sub-constructs of adoption readiness were used to measure the aspects of the function of 5G mobile technology. Adoption readiness was used to identify the required aspects of the 5G technology as a whole.

Performance Expectancy refer to the degree which consumer convinced that the use of the technology will help them have benefit in their daily life (Venkatesh *et al.*, 2003a). As the factor of performance expectancy, it added more elements compared to perceived usefulness from TAM/TAM2 and C-TAM-TPB , for instance the outcome expectations from Social Cognitive Theory (SCT) extrinsic motivation of motivational Model (MM), relative advantage of Innovation Diffusion Theory(IDT) and job-fit of Model of PC Utilization (MPCU). In this research, we use PE to measure the essential characteristics of 5G mobile service perceived by the customer (Venkatesh *et al.*, 2003a). In this paper, performance expectancy will be present by the statements as following: (1) whether the new technology products/services will enhance my daily activity? (Venkatesh et al., 2003b) (2) Whether the consumer believe that adopting a WeChat recommendation information (from company) will enhance their adopting performance? (Hsu et al., 2013). (3) Whether the adoption of new

teleology product/service and the WeChat recommendation will enhance their social performance in WeChat, and earn social rewards (Hsu and Lin, 2008)? Base on the previous research (Venkatesh *et al.*, 2012b), our research question designed for measuring PE showed in the following Figure 4.1.

Construct	Measurement	Reference
Performance Expectancy	1. I find 5G mobile network-based products/services useful in my daily life. 2. Using 5G mobile network-based products/services helps me accomplish things more quickly. 3. Using 5G mobile network-based products/services increases my productivity	Venkatesh et al. (2012)

Table 4.1. Measurement for Performance Expectancy

Effort Expectancy (EE) is the degree of easiness which associated with the usage of 5G mobile service. Compared to perceived ease of use from TAM/TAM2, EE is different concept which combined complexity from MPCU and ease of use from IDT (Venkatesh *et al.*, 2003a). The factor of EE in this research was used to measure the degree of how much effort the customer needs to put for adopting the 5G technology. Based on precious research (Venkatesh *et al.*, 2003a; Venkatesh *et al.*, 2012b), the items chosen for measuring EE present in the following Table 4.2.

Construct	Measurement	Reference
Effort Expectancy	1. Learning how to use 5G mobile network-based products/services is easy for me. 2. My interaction with 5G mobile network-based products/services is clear and understandable. 3. I find 5G mobile network-based products/services easy to use. 4. It is easy for me to become skillful at using 5G mobile network-based products/services.	Venkatesh et al. (2012)

Table 4.2. Measurement for Effort Expectancy

Social influence use to describe from the consumers' perspective that important others convinced whether they should adopt the new technology products and services. In UTAUT model, social influence represent the concept of subjective normed from TRA, TAM2,

TPB/DTPB and C-TAM-TPB, social factor in MPCU, and image IDT(Venkatesh *et al.*, 2003a). Social influence used to measure how much the consumer influence by the social circle. In this study, social influence used to measure how the consumers' purchase intention towards 5G mobile service will be affect by their social groups. Based on precious study (Venkatesh *et al.*, 2003b; Venkatesh *et al.*, 2012b), the scare choose for measuring SI in this study showed in Table 4.3.

Construct	Measurement	Reference
Social Influence	1. People who are important to me think that I should use 5G mobile network-based products/services. 2. People who influence my behaviour think that I should use 5G mobile network-based products/services. 3.People whose opinions that I value prefer that I use5G mobile network-based products/services	Venkatesh et al. (2012)

Table 4.3. Measurement for Social Influences

4.11.2. Social Media Marketing (SMM) activities

Kim and Ko (2012) research implied that SMM activities perceived by individuals drives all the consumer equity, for instance brand equity, value equity of the product and services, result in influence individuals' purchase intention. Social media marketing activities influence the driven force of consumers' behavior intention by providing customer newly added value which traditional marketing promotion channel cannot provide. Besides, the company and brand social media platform provide the individual a place to have a communication and interaction with other customer and brand. The social media marketing activities clearly has positive influence on consumer relationship equity and brand equity. Social media marketing activities help the brand and company build relationships with the consumer and increase the profit of the corporation as well as increasing customer interests towards the product and service (Kim and Ko, 2012; Yang *et al.*, 2015; Liu *et al.*, 2019b).

In this research we consider SMM activities as multi-dimensional factor with 5 sub-dimensions, which is entertainment, interaction, trendiness, customization, and WOM (word-of-mouth). Entertainment is related to the social media activities try to provide more interesting and fun material for the consumer. In social media environment, entertainment is an essential part for individual to participate in social media and use-generated content (Phelps *et al.*, 2004). Moreover, information which considered to be fun, entertaining, exciting, and amusing will be easy to spread in the digital world. Interaction is brand and

company's ability to allow the consumer share and exchange information with others. The nature character of social media enable the information share and collaboration, which including text, picture and video (Hennig-Thurau *et al.*, 2010). Trendiness is referring to the company share the latest and trendiest information of the brand. With the popularity of the social media, customer requires immediate access to brand and product related information which will help them make purchase decisions (Van Doorn *et al.*, 2010; Dauriz *et al.*, 2014). Besides, consumer also consider social media as trustworthy source compared to traditional marketing instruments, such as advertising and paper print pamphlet (Foux, 2006). In addition, social media is a powerful tool for consumer to get up-to-data brand and product related information about 5G. Customization is used to describe the companies' social media account provide customized information and services. Social media makes it easier for the company to research the audience by customization the information in a more cost-effective way compare to conditional media (Chu and Kim, 2011). Customization is important for the company because it increase the consumers over all commitment and confident towards the company. Furthermore, it is also be considered as mass-direct social media strategy (Hewett *et al.*, 2016). WOM reflect the consumers' willingness to exchange the information from the company's social media platform with other individuals. WOM is consumers' behaviour manifestation of their engagement and activities in social media (Schivinski *et al.*, 2016). The measurements of SMM activities adopted from Kim and Ko (2012) present as follow in Table 4.4:

Construct		**Measurement and Factor loading form reference**	**Reference**
WeChat marketing advertise	Entertainment	1. Using telecommunication company's social media is fun. 2.Contents shown in telecommunication company's social media seem interesting 3. Telecommunication company's social media enables information sharing with others.	Godey *et al.* (2016) Kim and Ko (2012)
	Interaction	1. Conversation or opinion exchange with others is possible through telecommunication company's social media. 2. It is easy to deliver my opinion through telecommunication company's social media.	
	Trendiness	1. Contents shown telecommunication company's social media is the newest information. 1. Using telecommunication company's social media is very trendy.	

Customization	1. telecommunication company's social media offers customized information search. 2. telecommunication company's social media provides customized service
Word of mouth	1. I would like to pass along information on brand, product, or services from telecommunication company's social media to my friends. 2. I would like to upload contents from telecommunication company's social media on my WeChat

Table 4.4. Measurement for Social media marketing activities

4.11.3. Measurement of self-efficacy

Self-efficacy state that behaviour will be impact by the strength of individual's self-efficacy beliefs (Bandura, 1997). Self-efficacy is the concept which describe the individuals assess their ability to perform certain behaviours in specific situations. The previous research demonstrated that strong self-efficacy would enhance users' intention to use 5G services. The measurements of self-efficacy we adopted the scare from Jin (2014) present as follow in Table 4.5:

Construct	Measurement	Reference
Self-efficacy	1. I will get used to obtaining information through 5G mobile network-based products/services. 2.I will get used to obtaining the relevant technology for using 5G mobile network-based products/services. 3.I am able to explain how to use 5G mobile network-based products/services to others. 4. I am able to explain the relevant functions of 5G mobile network-based products/services. 5.I am able to understand the technical terms involved in 5G mobile network-based products/services usage.	Jin, C.H. (2014) Eastin, M.S. and LaRose, R., (2000)

Table 4.5. Measurement for Self-efficacy

4.11.4. Purchase intention

Behaviour intention are instruction for people to behave in certain ways (Triandis, 1979), which will also guide them to perform certain actions. The concept of intention construct originally from the theories of attitude-behaviour relations and health-related behavior (Abraham *et al.*, 1998). In this research we adopt purchase intention scares from Venkatesh *et al.* (2003a), as present in Table 4.6:

Construct	Measurement	Reference
Purchase Intention	1. I intend to use 5G mobile network-based products/services in the next 12 months. 2. I predict I would use the 5G mobile network-based products/services in the next 12 months. 3. I plan to use 5G mobile network-based products/services in the next 12 months.	Venkatesh. et al. (2003)

Table 4.6. Measurement for Purchase Intention

4.11.5 Control Variables

The consumers' personal purchase-decision involvement defined as to what extent the interested and concern that customer will take into bear for making purchase decision (Foxall and Pallister, 1998). In this research we adopted three items from Reimer and Benkenstein (2016). Consumer's attitude towards online information referring to customers' positive or negative feelings towards the information on the social media (Delafrooz *et al.*, 2009). We adopt 4 items of attitude toward online information form Park and Kim (2008).

Construct	Measurement	Reference
Personal Involvement	1. I choose my 5G services carrier carefully. 2. The choice of 5G services carrier matters a great deal to me. 3. Choosing a 5G services carrier is an important decision for me.	Reimer and Benkenstein (2016)
Personal Involvement	1. When I buy a product, I always read the information from WeChat. 2. When I buy a product, the information in WeChat is helpful for making decisions. 3. When I buy a product, the information in WeChat makes me confident. 4. If I don't read the information in WeChat, I worry about my decision.	Park and Kim (2008)

Table 4.7. Measurement for Control Variable

4.12. Validity and reliability

Reliability and validity are the most important evaluation tool for social science research. The data is the foundation of the research information which is needed for explain the objective of the study. The reliability and validity represent the different dimension and the criteria of the data (Lancaster, 2005). The criteria is essential for study evaluation when utilized positivist approach. When it is related to measuring personal attitude or using Likert

scale, the respondents' reaction needs to be measured consistently and accurately, thus reliability and validity are introduced to the researcher (Collis and Hussey, 2013). The reliability is related to the repeatability of the research outcome, and whether the other research can have a similar result (Malhotra *et al.*, 2006). Validity is to describe the result integrity of the research. The validity focus on whether the study analysis what they intend to and all the concepts be measured are all in the research model (Hair *et al.*, 2006).

Validity involves internal validity, construct validity and external validity (Bryman, 2008). The internal validity related to the causality and reality relationships between dependent and independent constructs(Bryman, 2008). Hair *et al.* (2006) indicated that an efficient way of measuring internal validity is using individual judgment together with expertise comment on the words used the items. The items of the constructs are developed based on exploratory interview together with scales which were tested from previous literature (Bryman, 2008). Bryman (2008) mentioned it is essential to make sure the measurements actually reflect the constructs which are trying to measure in the study. In this research, the validity of the research instrument was built on literature review, procedure of item selection and refinement of questionnaire. The pilot test has been used for testing if the constructs in the questionnaire are really suitable for the study context. Moreover, in the procedure of pilot test, the questionnaire will be sent to academics, expert, marketers, top level company manager in the research frame to get their opinions. The suggestions form supervisors are also a good resource for develop the survey instruments and adjust the questionnaire. The result of the polit test should shows the questionnaire covered the important parts from literature review and the item chosen is reflect the participators' opinion. For instance, the EFA and CFA test results showed the data reached a satisfy threshold, however due to the small sample size some hypothesis is non-significant. Under this circumstance, the questionnaire is acceptable for this study and can be proceed to content validity evaluation.

Construct validity is test two forms of validity: convergent and discriminant validity (Bagozzi, 1980). Convergent validity uses to test whether the items measure the same construct and can be clustered together. Discriminant validity is used to access to what extent in the model a variable varies from others. This is shows by the measurements of one item not highly corelated with other measurements, which proves that the two constructs are theoretically different. In order to access the construct validity, convergence validity and discrimination validity need to be evaluated at the same time which will be analysed using component factor analysis (PCA) and Multitrait-Multimethod Matrix. Factor analysis is a statistic analysis procedure which reduce a large set of scale items to smaller number and easy

to manage (Pallant, 2007). PCA is a skill which assist researcher to build component which already in the existing data, and how other variable can add to the components (Field, 2009). Factor loading is wildly used to demonstrate the correlation coefficient between variables and factors as well as the Varimax rotation method. In order to identify the fit between construct and items, the factor loading should be more than 0.5, and no cross-loading involved.

External validity is related to what extent the findings can be generalized at different time and to different group of people (Iacobucci and Churchill, 2009). One of the drawbacks of research is lack of external generalisability. In this research we will not claim to be highly external validity. The validity is determined by define the constructs from previous literatures. These variables were already be used and tested in previous research models which are related to consumer behavior in information system and technology adoption field. The constructs are already be proved validate in related studies which means to some extent the constructs are correlated to each other in the research. Accordingly, in this research factor analysis skill is applied to measure the construct validity. Factor analysis also function as a reduction tool, help to identify the items which were suitable for measuring the constructs. This research also uses SEM to access the relationship among constructs.

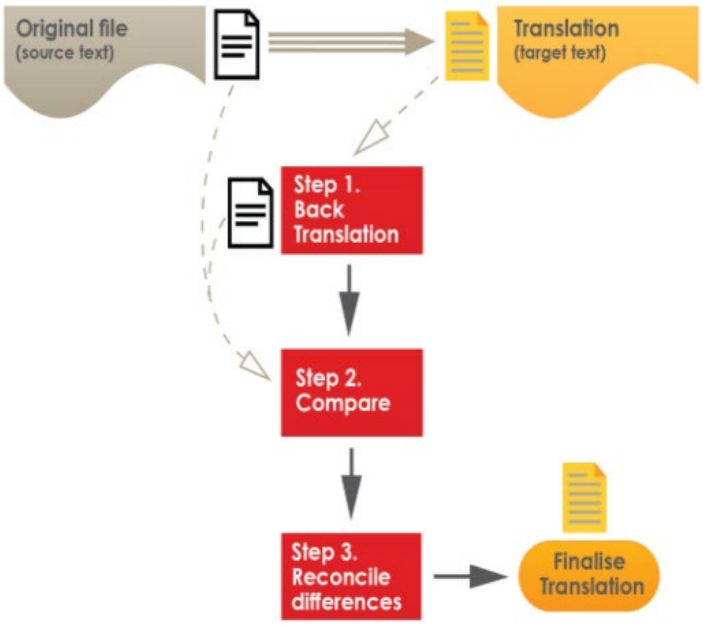
The reliability is concerned about how much random error in the measurement. Cronbach coefficient alpha is the statistic tool which use to describe reliability and present the average correlation among all the items. The value of coefficient alpha is between 0 and 1. The higher value the high the reliability. Hinton (2014) mentioned 4 points to evaluate the reliability, 0.90 and above is excellent reliability, 0.70-0.90 is high reliability, 0.50- 0.70 is moderate reliability, and 0.50 and below is low reliability. However, Cronbach's Alpha is sensitive to the sample size, if the sample size is small, it usually will end up with low Cronbach's values. In this study, it is better to report the mean of inter-item correlation for the item. Briggs and Cheek (1986) suggested the range of the inter-item of correlation of 0.2 to 0.4.

4.13. Questionnaire translation

Since the study is conduct in Chinese market, the questionnaire will be sent to participators in China. For this purpose, the questionnaire needs to translate from English to Chinese to make sure the participators can understand completely.

As researchers expand the study topic globally, international marketing research is becoming popular than before. At the same time, the research becomes more complex as well. More researchers start to use cross-national questionnaire to compare different attitude and interest of consumers from different countries. The diversity of languages means that effective and accurate translation of the whole survey and the instruments in questionnaires are

essential in research. In order to get meaningful and consist results, it is important to insure that establish an equivalence meaning in every language and make sure that each participator understand the questionnaire and instructions clearly. A skill is commonly used to test the accurate and consistence in multi-language translation is back translation (Brislin, 1970; Brislin, 1980). Back translation is a commonly used approach in social science research to help researchers identify problems and egregious errors during the translation. This translation skill is initially developed to help researchers who do not familiar with the target language but need assurance that the participators respond to the same questions in the target language. The procedure as present in figure 8 is designed to provide insights about potential errors and ensure no other means was inserted into the translation.



Collis and Hussey (2013)

Figure 8. Back Translation process

However, it is not necessarily guaranteed the equivalence between the languages. When translation is related to the culture of the target language, it may not be accurate (Douglas and Craig, 2007). The back-translation procedure as shown in the figure 5.7. Spielberger and Guerrero (1976) and Brislin (1980) established four stages for questionnaire translation to assure the equivalence between the original questionnaire and translated form. The four stages are: preliminary translation, evaluation of the preliminary translation, cross-language equivalence, and establishment the reliability and validity of the translated form. At preliminary translation stage, the original questionnaire in English will be translates into the

target language. The translation is best to conduct by someone who is familiar with the research objective and the intention behind each question. The second stage is evaluation of the preliminary translation. At this stage, back-translation is involved. The translator is blind to the original file, who is asked to translate the questionnaire to target language back into the original language. Then the original questionnaire and the back-translation will be compared and examined. If applicable, the questionnaire will be redrafted according to the result. This stage may repeat several times if necessary. The third stage is cross-language equivalence which is tested by both translated questionnaire and the original one to bilingual subjects. The fourth stage is to check the reliability and validity of the translation. If the reliability and validity cannot be confirmed, it should go back to stage two again.

Rayson *et al.* (2004) suggested that the translation of the research instruments should be ideally conduct by professional translators and native speaker. The questionnaire of this research was translated by the researcher first and sent for pilot test to check the feedback. Furthermore, the researcher is a native Chinese speaker and having work on marketing area, which guarantee the researcher has some level of related vocabulary in both Chinese and English. The participators in the pilot test are specifically asked for the feedback of the language in the questionnaire and the change will be made accordingly. Then, the questionnaire will be sent to professional translator for back translation. The researcher will compare the back translation with the original one and make adjustments. It is important to use clear and appropriate languages for the original questionnaire. Moreover, the language in the questionnaire should be suitable for both genders to react.

4.14. Statistic tools and data analysis approaches

The study utilizes the Structural Equation Modelling (SEM) to test and explain the proposed relationship among variables in the conceptual framework. This technique allows for multiple regression analysis of factors among dependent variable and a group of independent variables (Malhotra *et al.*, 2006). Haire et al. (2006) mentioned SEM is an effective tool use for testing theoretical models. SEM usually combined measurement model and structure mode together. The measurement model represents the research theory and how the latent variables in the model be explained by the measurements. The structure model represents in the model how the constructs related to each other. The SEM also allows researchers to compare different sampling groups, which shows SEM is an adequate tool to test hypothesis of the study. Confirmatory factor analysis (CFA) is another analysis skill which can also assesses equivalence and metric invariance and scalar invariance. In addition, CFA can also test the measurement invariance regarding to gender and other demographic factors. Statistical

Package for the Social Sciences (SPSS) issues. 26 and AMOS. 26 are be used in this study for data analysis and screening.

4.15. Ethical considerations

Every research related to human behavior require conscious consideration of ethical issues before conduct the research , during and after the data collocation activities (Malhotra *et al.*, 2006). If the researcher neglects the ethical issues during the data collection procedure, the participator will likely respond with less cooperation and compliance. It will make difficulties for the researchers to collect data (Malhotra *et al.*, 2006; Sekaran and Bougie, 2016). Wiles *et al.* (2008) mentioned that ensure the confidentiality and anonymity of the participators in social research is an important issue. The researchers need to ensure the confidentiality of the respondent in this research will protected.

In this research, at the beginning of the questionnaire, the participators will receive a cover letter which contains all the details of the purpose of this research, in order to make sure the responder fully aware of the aim of the research. Moreover, the responder will be informed that the participate is voluntary, if they have questions regarding to the survey they can ask at any time. The participators can withdraw their questionnaire whenever they want (Wiles *et al.*, 2008). Additionally, the personal information of all the participators will be protect and kept confidential which will be only used for research and academic purpose. At the same time, the researcher will also ensure the responder that their information will not be used for marketing promotion and other sales activities.

In order to make sure the research project is under the protection of privacy and confidentiality; the ethic approval form was submitted to Newcastle university, together with the cover letter prepared for the responders (Wiles *et al.*, 2008).

4.16. Conclusion

For sum up, this chapter demonstrated the methods and approaches which were chosen for this study. Based on previous research suggestions, this research choose positivism, deductive approach, confirmatory research and quantitative techniques as methodology. This research will use online survey method for conduct the study. This chapter place the foundation for the next chapter, the data analysis and the result will be present in detail in the following chapter.

Chapter 5. Data analysis and results

5.1. Introduction

The research model present in previous chapter needs detailed assessment and check the validity, reliability and significance of the measurements. This chapter we will explain the survey procedure, and analysis the data result in detail. Section 5.2 introduce the process of selecting test material and pilot study. Based on the result of pilot test the final questionnaire was developed and send out through Qualtrics. Section 5.3 describe the data screening process which including the steps of handling missing values, outliers, and factor loading in detail. In section 5.4 we will discuss demographic information, data analysis, reliability and validity test. We will also discuss the result of structure model and hypotheses. The last section is the summary of this chapter. SPSS and AMOS 26 are employed for the data analysis and hypotheses test.

5.2. Design of the testing material

Pilot study is recommended to the researchers before the starting of an actual survey, especially when the questionnaire needs to spread to a large population. Unlike the interview process, when the questionnaire is sent out, there is no opportunity to make any changes (Wiles *et al.*, 2008). The pilot study process is designed for further adjustment of the questionnaire and to avoid the errors which will affect the participant ratio and analysis process (Saunders et al., 2007). To be more specific, the common mistake in the research can be solved by pilot study process, such as spelling errors, inconsistent word and phrase, overlapping question and answers, inappropriate collection of demographic information, unclear instructions, impropriated length of the survey, and lack of motivational techniques.

This survey utilizes the pilot study techniques introduced by Dillman (2000). Dillman (2000) suggested four steps for pilot study, the first step is inviting colleagues who have related knowledge or professional skill go through the survey which can help ensure the efficiency, relevancy, appropriate format and completeness of the survey. Secondly, a cognitive test procedure is needed, which formed by observation and the protocol of “thinking loud”. The third step is the study need to emulate the procedure proposed in the main study. Dillman (2000) also suggested 100-200 respondents are needed for pilot test, to make sure the survey is capable of measure the correlations of the variables and the scale of the question match the objective of the study. The fourth step is checking for the inadvertent typographical errors by someone have no relationship with the survey.

As suggested, in this research, my supervisors help me reviewed the questionnaire. He suggested filter questions and control variables need to be added. For the think loud protocols, this research conduct with colleagues with related academic knowledge, and asked about the length of the survey. Furthermore, we also find spelling errors and modify some words in the questions for better understanding. The third step, the pre-test is sent through social media. The final stage is conduct with the participator who is unrelated to this survey to check typographical error.

In this research, the survey has two parts. For the first part is the questions for testing how the content of the post from carriers' official account influences the consumers adopt decision of 5G mobile technology service. At the beginning of the questionnaire, we choose one post from carriers official account as a stimulation. In order to get more accurate results, the responders need to read the post before they answer the questions which related to their adoption decisions. The second part of the survey is for testing how the content of the post from the companies WeChat official account influences the consumers adopt decision of 5G mobile technology service. At this part we choose other post form the companies official account for the responders to read before they answer the questions.

Therefore, the pilot study is conduct for two stages. At the first stage, the pre-test is about choosing suitable posts from carrier's official account. The second stage is using the result from the first stage for final questionnaire and send the final questionnaire for pre-test.

5.2.1. Posts from WeChat select procedure

WeChat is the biggest social media platform in China (Intelligence, 2020). In order to target the accurate social media users and analysis how the social media message from popular blogger will influence their 5G adopt decisions, this research will use actual data from WeChat platform. For this research, in order to choose a suitable WeChat official account, we mainly use data from the database Newrank and Data.Xiguaji as references. These two companies are the leading statistical analysis company which mainly focus on WeChat platform. We use data from these two platforms and cross compare each other for more certainty.

The blogger's account in WeChat platform is called Subscription account, and subscribe account have two different types. (Official, 2020). In the category of WeChat official account, including three different accounts: subscription account, enterprise account, and service account. The first one is public Subscription account which own by individual, like popular personal blogger. Enterprise account and service account can only apply by company which

are used for company information, product promotion, advertisement and customer self-service. Subscription account is mainly applied by individuals who want to have a public blog.

WeChat Subscription account is different from private personal account. Firstly, the account can be found and followed by everyone. Secondly, the bloggers can only post one message per day in subscription account. The bloggers usually use this message to promote themselves and communicate with their followers. Till 31/12/2019, there are 981144 public official accounts in WeChat (NewRank, 2020a). As for poplar blogger, in this research referring to the Subscription account which are well-known by the public, has more followers and has more influential power on its follower. To acquire this information, we need the statistic support from statistical analysis company such as Newrank and Data.Xiguaji.

This research aims to analysis how post from carriers' company official account in WeChat will influence consumer adoption decisions of 5G mobile services. To achieve this goal, researcher will choose one post which introduce 5G technology from one of the carriers' company official and use them as stimulating material. The post will put at the beginning of the questionnaire for people to read before they answer the questions. In this way, the researcher will have a result about how the social media activities from carriers' company official account will influence consumers' purchase decisions. For the purpose of guarantee the popularity of the post, which means the post was read by large amount of people, and the agree with the opinion in the post. We will choose two posts from one carrier official account first. Then the researcher will conduct a pre-text, choose one articles which have better test result and use them in the final questionnaire. The post needs to fulfil some conditions for serving this purpose.

We select the post according to the criteria mention by Kozinets (2010). Kozinets (2010) mentioned the post should have relevant information about technology trends and technology products information. It should also has proportionable large amount of activity from the account and should interactivity, communication with the followers, give them necessary information. Furthermore, in WeChat, people usually use "like" button or forward the post to show their attitude of support. At the end of year 2018, WeChat replaced "like" to "WOW", the function is still the same (WeChat, 2018). When a reader likes an article, they will click "wow" button. The article will appear at the top of the "story" section of individual's personal account. Their friends can see the article which "wow" by the users and read it as well. Their friends can also leave comments under the article which will also be showed to the personal who "WOW" the post. So in this article we use the word "WOW" instead of "like".

In this research we need to choose other post from telecommunication companies' official account for testing how the promotion information form carriers official account will influence consumers' decision towards 5G products. When search 5G related information in WeChat, this time we only focus on the information from carriers official account, means the message from China telecommunication company, China mobile, or China Unicom. Each of the companies had its own enterprise account, and service account. Each of the branches in different province, city, and town have their own account which makes it different to gather all the information. Following the post researching protocol mentioned before, we use the information form Newrank and Data.Xiguaji to choose our target account. Enterprise account and service account are mainly carrying the information from the company and product promotion, has less entertainment content. Since enterprise account and service account do not have much entertainment function, this is why company's account do not have many followers as individual subscription account. People only follow this type of account when they need some specific information or help, which makes it is more difficult for them to attract followers. According to the annual top 500 WeChat official account list, China Telecom rank is the highest among other company (NewRank, 2020a). After compare posts from different carriers account and the ranking, we finally decided choose China telecom online service account. In order to have a best result, we need to choose the post introduce 5G product/service, while including the bundle and other related purchase information. If the post carries enough persuasive information, it will help the consumer make the decisions easily.

China telecom online service account is raking 7 among all the companies' official account (Data.xiguaji.com, 2020b). China telecom online service account have 1629003 followers (Data.xiguaji.com, 2020b), and the average number of "wows" is 390 for each post (Data.xiguaji.com, 2020b). The profile of the company's official account can be seen in Table 5.1.

	Follower	**Ranking**	**Average Views/Post**	**"WOW"/post**	**Total visits/Day**
China Telecom	+1 million	7	49075	390	64352
China Mobile	+1 million	10	93321	329	43590
China Unicom	+1 million	19	26883	167	26883

Note: The data is collected at 17/02/2020. WeChat stop showing the followers number after reach 1 million followers (Newrank, 2020).

Table 5.1. Profiles of the carriers WeChat official blog account

We choose two posts from China telecom online service account. One of the posts we choose posted at 31/10/2019 and has been read buy more than 100000 people and "WOW" by 667 people. Other post is post at 03/01/2020, which has been read by more than 100000 people and "WOW" by 221 people. Both posts explained 5G technology and products, introduced the new 5G bundle, and has hyperlink directly guide customer to the page where they can purchase them. For pre-test, we show both posts in the survey and ask questions about expertise, popularity. We will send the survey to around 20 respondents, according to the result present in Table 5.2, we choose post 1 for final test.

Post	Published Data	Word count	Views	"WOW"	Comments
Post 1	31/10/2019	2380	+100000	666	23
Post 2	03/01/2020	2130	+100000	221	3

Note: The data is collected at 17/02/2020 (ChinaTelecom, 2019b; ChinaTelecom, 2019a)

Table 5.2. Profiles of the two selected posts from China Telecom WeChat account

5.3. Questionnaire pilot test

The questionnaire was sent to 56 participators for pilot-test. The supervisory team and researchers in Newcastle business school were asked for advise on the structure and design of the questionnaire. The suggestions from the academic expertise would enhance the validity of the questionnaire and will give suggestions for alterations for prior test (Saunders *et al.*, 2009). The experts were asked to give suggestions on the questions in the survey, mainly identify gaps and inconsistencies. The questionnaire revised twice to make sure there were no unanticipated difficulties (Evans and Mathur, 2005). Following Emond *et al.* (2005) suggestions, participates also asked to provide other suggestions, such as the time required to completed the questionnaire, clarity of the instruction in the questionnaires, the ambiguous of the questionnaire, the layout of the questionnaire and whether the question easy to answer. The final questionnaire takes average of 15 minutes to finish, and easy to read, with better flow, avoid ambiguous. Most importantly, the respondents have no difficulty to understanding and answering the questions.

5.4. Data screening

From 1th September to 17th November 2020, we received 1197 responses. The data were screened to detect missing values, whether it distributed normally and other protentional problems in the dataset.

In the data screening process missing data is a common problem. It occur when the participants fail to answer all the questions (Lynch, 2007). This issue will lead to small sample size and unreliable statistic power (Enders, 2010). Thus, detecting missing values before final data analysis is important. Missing data analyse will also help the research find out if the missing value happen randomly or non-random (Enders, 2010). If the missing value is randomly distributed, there is no bias generated in the dataset. If the missing data is non-randomly distributed, which means the values is bias estimates, and it will influence the generalisability of the result (Tabachnick *et al.*, 2007).

In this research, the result showed no missing data because of the setting on Qualtrics which makes it compulsory for participators to answer all the questions or the questionnaire cannot be submitted. If the participator would not like to answer the questions, they can choose to end the questionnaire. Thus, there is no missing value in the 1197 questionnaires.

After removing the missing data, respondents who did not pass the attention check questions and put the same answer for most of the questions were all removed from the data set. Moreover, we put other two questions relate to the content of the WeChat post. The respondent who answered these questions wrongly have been excluded from the data set, which ensured that the respondents read the material carefully before they answer the questions. Ultimately, 765 valid observations remained in the analysis. In order to test if the indicators of latent factors are normally distributed, we use Skewness & Kurtosis test. The test results shows that Skewness & Kurtosis values are less than 3 for all items which means all the data are normally distributed (Hair *et al.*, 2010).

5.5. Descriptive analysis

Descriptive statistics is use describe the demographic characteristics of the data sample, which will help the researcher understand the information obtained from the dataset (Beins and McCarthy, 2017).

Frequency distribution is employed to describe the value percentage in the dataset (Beins and McCarthy, 2017). Online survey has no limitation regarding to geographical factor (Akram *et al.*, 2018). This research use Qualtrics to collect data from WeChat. 765 questionnaires were valid and use for final data analyze, 432 cases were excluded.

Table 5.3 present the demographic result. In the sample of this study, 68.4% of the participators are man which implies man is more interested in technology related topic. 55.9% of the respondents are between the age 25-35, 78.7% participators have the education level of undergraduate, 83.4% of the total participators are employed full time and 50% have salary above 4000 RMB per month. The results demonstrate that at the early stage of 5G mobile

service, because of the high price of the 5G mobile device and 5G bundle, young people who has high income and certain education level more likely to become early adopter. Based on the result, at early stage it is difficult to find 5G user, 86.7% of the responders are non-5G users.

Age	Frequency	Percentage
18-25	153	20%
25-35	429	55.9%
36-45	118	15.7%
>46	65	8.4%
Gender		
Female	242	31.6%
Male	523	68.4%
Education		
High school	57	7.5%
Undergraduate	604	78.7%
Postgraduate	77	10.3%
Others	27	3.5%
Occupation		
Employed full time	638	83.4%
Employed part time	28	3.7%
Self-employed	78	10.2%
Unemployed	21	2.7%
Income (RMB)		
Under ¥4000	166	21.7%
¥4001-¥6000	223	28.9%
¥6001-¥8000	144	18.8%
¥8001-¥10000	125	16.3%
>¥10001	107	14.0%
Use of 5G		
5G user	102	13.3%
Non-5G user	663	86.7%
Total	***765***	***100%***

Source: *The income category is from National Bureau of Statistics (Statistics, 2020)*

Table 5.3. Sample Demographic Result

5.6. Sample validity

Birks and Malhotra (2006) confirmed that content validity is the technique which evaluate the representativeness of the scales chosen for specific study. In this research, it referring to the measurements which represent all the constructs in 5G adoption behaviour. The researcher conducts thoroughly literature review of the related subject and a pilot test also be conducted to ensure the chosen scare were coherent and understandable. Academic expertise also was consulted for the validity of the scale and the research model. The

communality of all the items are high which is above the threshold of 0.5 (Hair *et al.*, 1998), which represent the validity is established.

Peter (1981) defined Construct validity as reflection of whether the research actually measure the concept they supposed to measure. Campbell and Fiske (1959) suggest using convergent and discriminant validity to assess the content validity. Convergent validity is the "degree to which multiple attempts to measure the same concept are in agreement" while discriminant validity "is the degree to which measures of different concepts are distinct" (Bagozzi *et al.*, 1991). Fabrigar *et al.* (1999) suggested factor loadings would be a good representative of convergent validity which the threshold for single item loading should be above 0.5 and average loading of for the whole factor should above 0.7. The result of this research is present in table 5.13. Moreover, since this research is not comparing 5G purchase behaviour of different demographic group, so discriminant validity was not applicable in this study.

5.7. Reliability analysis

Reliability is a concept describes whether the scale can produces consistent and stable result over time (Hair *et al.*, 1998). Reliability is used to analyse the random error in collected dataset (Malhotra *et al.*, 2017). The general method use to assess reliability is Cronbach's alpha coefficient (Hair *et al.*, 1998). The Cronbach's alpha coefficient is range from 0 to 1, the threshold of 0.7 and above represent a good reliability and the scale in the questionnaire are measuring what we want in the research (Reese *et al.*, 2011).

The Table 5.4 indicate a good internal consistency of the constructs in the questionnaire. Each of the Cronbach's alpha coefficient is over 0.7 which suggested by Hair *et al.* (1998) as a suitable threshold for future analysis

Constructs	**Cronbach's Alpha from reference**	**Cronbach's Alpha in this research**	**N of Items**
Social Media marketing activities	0.770	0.956	11
Adoption Readiness	0.903	0.927	10
Self-efficacy	0.930	0.919	5
Consumer-Based Brand Equity	0.876	0.928	14
Behavioural Intention	0.982	0.962	3

Table 5.4. Reliability Results for Scale Items

5.8. Factor analysis

Factor analysis was introduced in 1904 and assessed by Pearson correlation coefficient (Schumacker and Lomax, 2016). Factor analysis is a technique which conduct to achieve data reduction and summarization (Malhotra *et al.*, 2017). This technique is used to observe the variables and theoretical constructs in this study through variance-covariance characteristics (Malhotra *et al.*, 2017). The basic and most used factor analysis are exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). The EFA is used to find theory support for further data analyse and CFA is used by researcher to exam whether the data sample confirm the research model (Hair *et al.*, 1998). The EFA and CFA test will be explained in the following sections.

5.8.1. *Exploratory factor analysis (EFA)*

Exploratory Factor Analysis (EFA) is considered as a one way of the multivariate analysis techniques. The aim of EFA is to decrease the number of variables in the dataset and exam correlations among the variables. Most importantly, EFA technique can help the researcher to find the items which measure the factors in the research model (Hair *et al.*, 1998).

- ***Assessment of the adequacy of the data***

Kaiser-Meyer-Olkin measure of sampling adequacy (KMO) is used to assess the adequacy of the dataset. Bartlett's test of sphericity is employed to measure the hypothesis that the constructs tested in the research have no relationship with the population (Malhotra *et al.*, 2017). Burns and Burns (2008) suggested the threshold for KMO values is greater than 0.5 and Bartlett's test should be lower than .05 which prove that the variables are correlated. Based on this judgment, the dataset is be ready for EFA analysis. The result is present in Table 5.5.

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		**.959**
Bartlett's Test of Sphericity	Approx. Chi-Square	28716.509
	df	903
	Sig.	**.000**

Table 5.5 KMO and Bartlett's Results

From the table 5.5, we can see the KMO of dataset is 0.959 and Bartlett's test is significant for the data set. It is proved that the data is appropriate for following EFA analysis.

- ***Determining the number of factors***

The determining number of factors in factor analysis also called factor extraction (Field, 2013). The number of factors could be chosen by eigenvalues. In this research we only choose the factor with eigenvalue above 1 (Malhotra *et al.*, 2017). Total variances explain is summary of the factor analysis, which explains the total variables explained by the factor included in this study. The percentage of the cumulative represent the total variance explained by the research model (Malhotra *et al.*, 2017). In this research, with the eigenvalue of 1, the 5 factors (3 multi-dimensional factors) explained 61.1% of the variance, which according to Hair (2009) is a strong result. The result is present in the Table 5.6

Total Variance Explained							
Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total	% Of Variance	Cumulative %	Total
1	**17.188**	44.071	**44.071**	16.804	43.087	43.087	13.700
2	**2.808**	7.200	**51.271**	2.420	6.206	49.292	14.898
3	**2.283**	5.855	**57.126**	1.976	5.066	54.359	7.982
4	**1.811**	4.643	**61.769**	1.458	3.739	58.097	9.439
5	**1.465**	3.757	**65.526**	1.179	3.022	61.119	6.990

Table 5.6 Initial Total Variance Explained

- ***Factor rotation***

Different rotation approaches will lead to different factor loading result and different interpretation for the constructs. The factor analysis will generate the loadings for each combination of extracted factor and observed variables. The aim of factor loading is to identify which items could be group together and associate with specific constructs (Hair *et al.*, 1998). The factor loading situation cannot be analysis directly in research model. Therefore, rotation technique produces a rotation scheme help researcher evacuated the loadings for each factor. Such as varimax rotation which will create a patten which present the factor loading from the highest to lowest (Hair *et al.*, 1998). In this research, as suggested by Hair *et al.* (2006) the factor loading for each item cut-off threshold is 0.5.

Moreover, this research contains multi-dimensional factors which is suggested by Wright *et al.* (2012) conducting EFA for each multi-dimensional construct separately. Due to the reason that the dimension of the multi-dimensional factors is expected to highly co-related. Therefore, if we only run EFA, the item from the same multi-dimensional construct will collapse as one

single factor. It will affect discriminant validity result (Wright *et al.*, 2012). We conduct EFA sequentially for self-efficacy, purchase intention and the first-order constructs of SMM activities, CBBE, and adoption readiness separately. Two items from self-efficacy proceeded the factor loading below 0.5 were removed from the analysis (Hair et al., 2014). One item from interaction factor in SMM activities construct was removed because of crossing loading issue (Hair et al., 2014). The rest of the items loading are all achieved the threshold of 0.7(Hair, 2009). The result for each construct is present at table 5.7- Figure 5.10. Table 5.11 present the EFA for the whole model.

Rotated Component Matrix for SSM activities					
	Component				
	1	2	3	4	5
Ent1				.721	
Ent2				.899	
Int1			.791		
Int2			.924		
ren1					.879
ren2					.805
Cus1		.787			
Cus2		.975			
wom1	.798				
wom2	.949				

Table 5.7. Rotated Component Matrix for SSM activities

Rotated Component Matrix for Adoption Readiness			
	Factor		
	1	2	3
PE1			.722
PE2			.983
PE3			.825
EE1		.801	
EE2		.656	
EE3		.646	
EE4		.949	

SI1	.883		
SI2	.940		
SI3	.895		

Table5.8. Rotated Component Matrix for Adoption Readiness

Rotated Component Matrix for CBBE			
	Factor		
	1	2	3
BA1	.810		
BA2	.808		
BAS1	.769		
BAS2	.758		
BAS3	.784		
BL1		.732	
BL2		.947	
BL3		.597	
PQ1			.932
PQ2			.847

Table 5.9. Rotated Component Matrix for CBBE

Rotated Component Matrix for Self-Efficacy and Purchase Behavior		
	Factor	
	1	2
BI1	.948	
BI2	.977	
BI3	.946	
SE3		.841
SE4		.973
SE5		.757

Table 5.10 Rotated Component Matrix for Self-Efficacy and Purchase Behaviour

Rotated Component Matrix for the model					
	Component				
	1	2	3	4	5
Ent1		.880			
Ent2		.804			
Int1		.902			
Int2		.776			
ren1		.547			
ren2		.710			
Cus1		.741			
Cus2		.723			
wom 1		.870			
wom 2		.811			
PE1	.687				
PE2	.753				
PE3	.766				
EE1	.850				
EE2	.763				
EE3	.888				
EE4	.846				
SI1	.562				
SI2	.556				
SI3	.544				
BA1			.790		
BA2			.751		
BAS 1			.768		
BAS 2			.767		
BAS 3			.779		
BL1			.747		
BL2			.953		
BL3			.658		
PQ1			.847		
PQ2			.641		
BI1				.931	
BI2				.977	
BI3				.948	

SE3					.736
SE4					.738
SE5					.673

Table 5.11. Rotated Component Matrix for whole model

5.8.2. Confirmatory factor analysis (CFA)

CFA is used to analyse the corrections among the variables based on the research hypothesis and factor structure. CFA is one of the procedures in structure equation model to address the issues in the measurement model. In this research, the independent variables and dependent variables are all latent constructs which have underlying unobserved factors. These unobserved items are observed directly through the questionnaire (Hair *et al.*, 2006). Through CAF, research attempt to identify the number of factors and correlations between the factors (Hair *et al.*, 2006). The purpose of CFA is to develop and evaluate the measurement and exam the method effect. CFA is also employed to analysis the validity of the constructs and identify the whether the measurements are keep consist across groups, time and different population (Harrington, 2009). The result of CFA will also use to support the convergent and discriminant validity (Harrington, 2009).

Analysis of moment structures (AMOS) use graphical approach to conduct CFA and SEM analysis which is relying on SPSS dataset (Byrne, 2010). AMOS is also helping the researcher to identify better model for research paradigm. In this research we use AMOS to investigate the factors' relationship and the hypotheses. Moreover, in AMOS we use maximum likelihood estimation approach.

- ***The conceptual measurement model***

Hair *et al.* (2010) proposed that CFA measurement model is used to identify whether the indicators have good ability to determine the latent variables. Based on previous literature review and the test result of EFA, Figure 9 present the measurement model of CFA, in which the observed items are in the left, the latent variables are in the right.

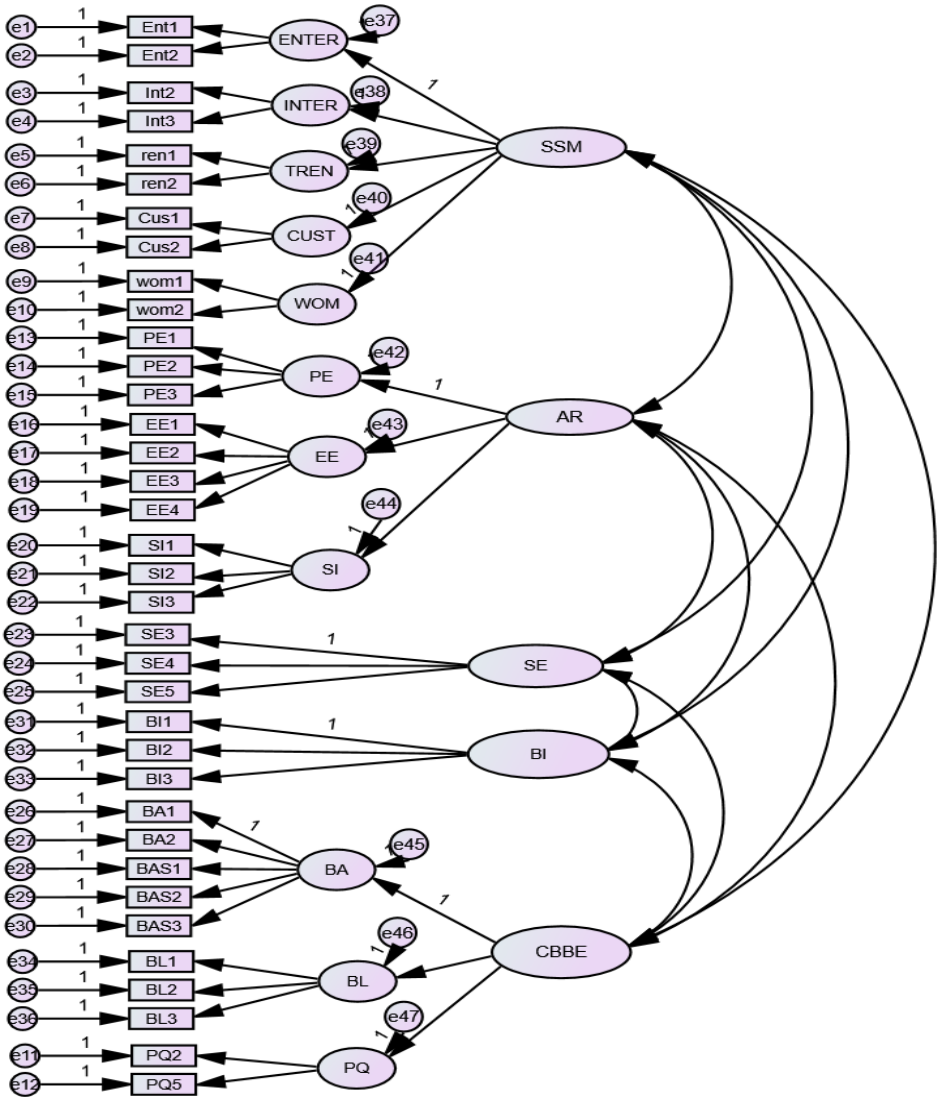


Figure 9. CFA measurement model

- ***Model specification***

Regrading to the examination of the multiple variable relationship in a measurement model, model specification is the first step. In this procedure, the researcher can hypotheses different relationship among variables and test through different estimated parameters (Hair *et al.*, 2013). In CFA measurement model, rectangles are representing observed variables which can be measured through questionnaire. The relationship of observed items and latent variables and connected by single-headed arrows. The direction is from latent variable to observed items which represent the cause relationship. The relations between the two latent variables are joined by factor correlation in standardised factor covariance (Hair *et al.*, 2013). Covariances or factor correlation are presented by double-headed arrows which link the two latent factors together. In the latent factors which always has an indicator directly related to it.

However, there is still some variance in the indicator cannot be count into latent factors which is expressed as error terms (Hair *et al.*, 2013).

- ***Model identification***

Model identification is another important procedure for testing CFA model. Model identifications need to be conduct before the estimation which will help the researcher find the identification issues in the model. In the CFA model, the number of distinct values in the model value matrix suggest by Byrne (2010) as follow:

$$Number\ of\ data\ points = \frac{P(P+1)}{2}$$

In which p represent the number of observed items. The number of free estimated parameters need to lower or maximum equal to the number if distinct values in the matrix (Byrne, 2010). In our research there are 36 observed items. There are 666 data points, and the estimated parameters is 93 which gives the degree of freedom for this model is 573. Based on Hair *et al.* (2006) criteria which is the degree of freedom is above zero, this model can be considered as over identified. According to the identification result the model can proceed for further analysis (Hair *et al.*, 2006).

- ***Model estimation***

It is necessary for the researcher to estimate the factor loadings in the hypotheses model. The factor loading is employed to describe the regression coefficients for present the relationships of the indicators and latent factors (Hair *et al.*, 2006). A high factor loading stands for a close relationship. Based on the criteria of Hair *et al.* (2006), the loadings below 0.3 can be ignored because the relationship is to weak . The loading over 0.7 is considered as excellent, over 0.63 is very good, over 0.55 is fair loading and the loading below 0.3 is poor which mean the relationship is so weak (Hair *et al.*, 2006). The value of factor loadings is shown in variance-covariance matrix by variety of estimation processes. It can be present as standardised and unstandardized estimation. However, in order to have the same metrics for evaluation we use standardised estimation. The factor loadings are present at Table 5.14.

- ***Goodness of fit indices assessment***

After the CFA measurement model, whether the CFA fit or not need to be further determined which also help the researchers to make decision about how to revise the model to make the model fit. The model fit represents whether the sample variance-covariance data fit to the CFA and SEM (Hair *et al.*, 2006). The classification of model fit is in three categories, which are model fit, model comparison and model parsimony. The model comparison value is employed for the research to compare alternative models. The value of model parsimony is to

describe the quantity of estimate parameters in the model which obtained for the model fit (Hair *et al.*, 2006). Goodness of fit indices detail present in Table 5.11

In the CFA measurement model, which was conducted with five factors in total 36 items. The factors are Purchase behaviour(BI), Self-Efficacy (SE), Social Media Marketing (SMM) activities, Customer-based brand equity (CBBE) and Adoption Readiness (AR) which are all loading with the measurements and examined through CFA. Hair *et al.* (2010) suggested that CFA and structure model should be at least tested with four model fit index. The index will be use in this research are including Chis quare (x^2), the degree of freedom (df), Tucker-Lewis index (TLI), comparative fit index (CFI), root mean square error of approximation (RMSEA), and Standardized Root Mean Squared Residual (SRMR). The Table 5.12 present the threshold for the goodness of fit indices and the reference in detail.

- ***Chi-square (χ2)***

The Chi-square (χ2) test is utilised for testing the significant of the theoretical model based on the statistic test which associated with the degree of freedom of the model. The range of chi-square value for observed variance-covariance matrix and the implied variance-covariance matrix is from 0 (perfect fit) to + ∞ (poor fit). If the χ2 value is not significant which indicate to two matrices are basically the same. The data collected through the survey is for supporting the theoretical model. If the probability is less than 0.5 which showed the model is accepted which means the data sample supported the model (Hair *et al.*, 2006). However, the Chi-square is not usually used as the good fit index for evaluating the model. One reason is the chi-square value is usually significant when the sample size is above 200, which is why the chi-square value always used combine with other model fit index (Hair *et al.*, 2006).

- ***Root-mean-square Error of Approximation (RMSEA)***

RMSEA value is used for the evaluation of the degree of freedom and sample size. The value degree of freedom implies the complexity of the model (Schumacker and Lomax, 2016). Schumacker and Lomax (2016) suggested that the threshold of RMSEA should between 0.05 and 0.08 which demonstrate the complexity of the model. If the value is lower than 0.05 which implied good fit of the complexity of the model (Hair *et al.*, 2014).

- ***Comparative Fit Index (CFI)***

The comparative fit index (CFI) is used to describe the "the amount of departure from close fit for the researcher's model against that of the independence (null) model" (Kline, 2015). The rang of CFI value is between 0 to 1 which is useful to select competing models according to the centrality (Kline, 2015). Hair *et al.* (2014) suggested that the value of CFI should be higher than 0.9.

- ***Tucker–Lewis Index (TLI)***

The value of Tucker–Lewis Index (TLI) is to rescale chi-square range from 0 to 1. The TLI value is used to improve the accepted hypothesis fit of the model compare to the independence model (Hair *et al.*, 2014). Base on the criteria of Hair *et al.* (2014), the range of 0 to 1 represent from to fit to perfect fit and the value above 0.95 reflect perfect model fit.

- ***Standardized Root Mean Square Residual (SRMR)***

The value of SRMR based on the change of sample covariance matrix and the predicted covariance matrix with correlation matrices. The SRMR is considered as the distance between the observed correlation and the model implied correlation matrix. The value of SRMR consider the average magnitude of the discrepancies of observed and expected correlations as an absolute measure of (model) fit criterion. Hu and Bentler (1999) suggested that the threshold of SRMR should be less than 0.08 which considered as a good model fit.

Fit Index	**Acceptable Threshold Levels**	**Reference**
$\chi 2$ /df	Less than 5 Adjusts for sample size	Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. Structural Equation Modeling, 6, 1-55. Schumacker, R. E., & Lomax, R. G. (2010). A beginner's guide to structural equation modeling (3rd ed.). New York, NY: Routledge Academic
RMSEA	Less than 0.08 is acceptable Less than 0.06 or 0.07 is good Less than 0.03 represent excellent fit	MacCallum, R. C., Browne, M. W., & Sugawara, H. M. (1996). Power analysis and determination of sample size for covariance structure modeling. Psychological Methods, 1, 130-149
CFI	greater than 0.90 is acceptable greater than 0.95 is great fit	Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. Structural equation modeling: a multidisciplinary journal, 6(1), 1-55.
SRMR	less than 0.08 acceptable less than 0.05 great fit	Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. Structural equation modeling: a multidisciplinary journal, 6(1), 1-55.
TLI/NFI	greater than 0.95	Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. Structural equation modeling: a multidisciplinary journal, 6(1), 1-55.

Table 5.12. Goodness of fit indices

Based on the guideline of Hair (2009), regrading that CBBE, adoption readiness, SMM activities are all multi-dimensional construct, we exam them separately in CFA by AMOS 26. CFA for adoption readiness shows an acceptable model fit: $\chi 2$= 151.605, df =32, $\chi 2$/df =4.7, RMSEA = 0.070, p < .001, CFI = 0.982, TLI = 0.973, SRMR=0.026; CFA for brand equity implied a satisfying model fit: $\chi 2$= 151.815, df =32, $\chi 2$/df =4.7, RMSEA = 0.079, p < .001, CFI = 0.963, TLI = 0.944, SRMR=0.037; The CFA for SMM activities, since we delete the one item from interaction ,the model reach a better fit index as : $\chi 2$=86.962, df =30, $\chi 2$/df =2.89, RMSEA = 0.050, p < .001, CFI = 0.989, TLI = 0.984, SRMR=0.019. According to the standardize factor loadings in Table 4 and the CFA results, all the first-order constructs have strong correlation with the core construct which can also explained by second-order constructs. Besides, the results showed that the first-order factors account for 75.3 % of the variance of adoption readiness, 70.3% of the variance of brand equity and 80.4% of the variance of SMM activities respectively (Chen et al., 2005), then all the multi-dimensional constructs were verified (Figure 9).

CFA for the whole research model was conducted to test the convergent validity of the variable, while Cronbach's alpha (α) and composite reliability (CR) were used to test reliability for each structure. As Table 5.13 reported, all the constructs showed the value of α and CR all above 0.7, which means the required threshold for internal consistent achieved (Hair, 2009). Moreover, the convergent validity is measured by average variance extracted (AVE) showed in Table 5.13, that all the AVE statistics are above 0.5. Based on threshold suggested by Fornell and Larcker (1981), the result showed an adequate convergent validity. As the CFA for the whole research model, test result reached a satisfaction model fit index: $\chi 2$= 1634.283, df =573, $\chi 2$/df =2.8, RMSEA = 0.049, p < .001, CFI = 0.953, TLI = 0.948, SRMR=0.041, all the indexes are reach the threshold.

- ***Model modification***

Model modification approaches has been used for improving the SEM model fit. If the abstained model failed to achieve goodness of fit standards, the researchers will employee the modification information to find alternative parsimonious model to fit the date for same sample. There are two methods usually used for modification are modification index and the Wald (W) test (Bentler, 1995). Anderson and Gerbing (1988) proposed two-step procedure for SEM model with latent factor, which including measurement step and structure model. The two steps will help specify the relationship between the underlying factors and measurement variable which also give the research the opportunity to use modification

approach to improve the model fit in the measurement model. In the SEM model, the hypotheses relationship of the latent variables needs to be considered as well.

The modification method including the analysis of parameters, residuals, modification induces, goodness-of-fit and the change of parameters (Hair *et al.*, 2006). Based on Hair *et al.* (2006) suggestion, error covariance need to be considered at the beginning. There definitely will have random sources errors since we conduct survey to observe the variables. In order to improve the model fit researchers usually add covariance to the error terms, then the new CFA measurement model need to be test again (Hair *et al.*, 2006). Moreover, the factor loading is other important perspective. Only when the factor loading is above 0.5 or higher could prove the factor can be determined by the observed variables (Hair *et al.*, 2006). In the output of AMOS, the MI value should be lower than 10. This is one of the standers for the researcher to decide if the MI value need to be adjust (Hair *et al.*, 2014). The standardise residuals implies the covariance of the variables. If the residual is over 2.58 implied there may be a problem in the relationship. The research usually choose to delete the variable whose value is over 2.58 (Hair *et al.*, 2014).

Based on Hair *et al.* (2014) suggestions and data analysis result, in the final model we delete two items form self-efficacy because of the factor loading did not reach the threshold of 0.5, and one item from factor interaction in SMM activities due to cross loading with the item of WOM. Other items are reach the stander the model fit also pass the goodness-to-fit index, so in this research we did not employee MI to modify the model.

- ***Construct validity assessment***

Hair *et al.* (2010) demonstrated that it is important to validate the CFA result by construct validity method. Construct validity analyse the scales and measure to evaluate whether they can represent the concept in the research accurately. In this research we access the validity of the constructs through convergent validity and discriminant validity. Convergent validity is accessed by factor loading, composite reliability (CR) and average variance extracted (AVE). The threshold for achieve satisfactory of construct validity, which are the factor leading should be greater than 0.5, CR should be greater than 0.7 and AVE should greater than 0.5 (Hair *et al.*, 2010). The reference for CR and AVE is present at Table 5.13.

Fit Index	Acceptable Threshold Levels	Reference
AVE (Average Variance Extracted)	greater than 0.5	Hair, J., Black, W., Babin, B., and Anderson, R. (2010). Multivariate data analysis (7th ed.): Prentice-Hall, Inc. Upper Saddle River, NJ, USA.

CR (Composite reliability)	greater than 0.7	Fornell, C., and Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. Journal of Marketing Research, 39–50.

Table 5.13. AVE and CR Thresholds

As present in Table 5.14, all the values are research the threshold which implied the convergent validity is satisfied.

Factor	Items	Factor loading	Cronbach's α	CR	AVE
SMM activities			0.93	0.947	0.816
	Entertainment	0.89			
	Interaction	0.87			
	Trendiness	0.90			
	Customization	0.86			
	Word of mouth	0.87			
Adoption Readiness			0.89	0.867	0.684
	Performance Expectancy	0.82			
	Effort Expectancy	0.86			
	Social Influence	0.80			
Brand Equity			0.83	0.758	0.526
	Brand loyalty	0.60			
	Brand awareness/association	0.61			
	Perceived quality	0.95			
Self-efficacy			0.72	0.900	0.750
	able to explain how to use	0.78			
	able to explain the relevant functions	0.85			
	able to understand the technical terms	0.79			
Purchase intention			0.78	0.973	0.924
	intended to use in the next 12 months	0.93			
	predict would use in the next 12 months	0.97			
	plan to use in the next 12 months	0.95			
Personal Involvement (control variable)			0.71	0.844	0.653
	I choose my 5G services carrier carefully	0.56			
	The choice of 5G services carrier matters **a** great deal to me.	0.89			
	Choosing a 5G services carrier is an important decision for me.	0.92			
Attitude toward online information (control variable)			0.79	0.909	0.751
	When I buy a product, I always read the information from WeChat.	0.89			
	When I buy a product, the information in WeChat is helpful for making decisions.	0.92			
	When I buy a product, the information in WeChat makes me confident.	0.81			
	If I don't read the information in WeChat, I worry about my decision.	0.53			

*All factor loadings standardized with p-values < .01; CR = composite reliability; AVE = average variance extracted.

Table 5.14. CFA and Reliability Analysis Results

Furthermore, discriminant validity evaluates whether the scale is actually reflecting the concept which this research wants to measure. In this research we use HTMT criteria to access if the set of items measure one trait or multiple traits. When the HTMT value is low means mono-trait measurement and good discriminant validity. The threshold recommended is 0.9 (Henseler *et al.*, 2015). The Table 5.15 represent the result of HTMT value, which shows the dataset reached a satisfy criteria for discriminant validity.

	SMM	AD	SE	CBBE	BI
SMM					
AD	**0.727**				
SE	0.69	**0.763**			
CBBE	0.628	0.697	**0.697**		
BI	0.523	0.637	0.532	**0.528**	

Table 5.15. HTMT for Discriminant validity

5.8.3. Multicollinearity

Multicollinearity issues happed when in the correlation matrix the variable showed extremely high correlation which is correlation coefficient number above 0.9 (Cohen *et al.*, 2002). The correlation coefficients of each factor in this research model are below the threshold of 0.9, therefore the multicollinearity is not an issue in this research. Alternative technique is also used to test multicollinearity problem. The Variance Inflation Factor (VIF) and Tolerance statistics are examined which showed in the table 5.16 below (Thornhill *et al.*, 2009). Hair *et al.* (2014) suggested that the ideal tolerance value should above 0.2 and VIF values should below 10 which indicate no multicollinearity issues in the research model. From the data results which showed all the tolerance value above 0.2 and VIF below 10. The result suggested that there is no threat of multicollinearity.

		Coefficients[a]						
		Unstandardized Coefficients		**Standardized Coefficients**			**Collinearity Statistics**	
Model		**B**	**Std. Error**	**Beta**	**t**	**Sig.**	**Tolerance**	**VIF**
1	**(Constant)**	-.723	.282		-2.562	.011		
	SMM activities	.141	.054	.106	2.607	.009	.476	2.100
	Adoption readiness	.623	.068	.410	9.113	.000	.392	2.554
	Self-efficacy	.067	.048	.059	1.397	.163	.436	2.292
	CBBE	.230	.064	.137	3.565	.000	.533	1.876

a. Dependent Variable: intention

Table 5.16 Multicollinearity

5.8.4. Common method bias

Since the participators need to finish the survey at once, common method bias will be a potential issue for this research. To avoid potential common method bias in this research, firstly, a description about the purpose of this study and guarantee the anonymous of the participators is presented in the introduction section (Conway and Lance, 2010). Secondly, we added two attention check questions as "instruction manipulation check" which were used as filter for haphazard responses (Podsakoff et al., 2003). Thirdly, the order of the measurement items for the same variables are separated and rotated randomly to reduce the response bias (Podsakoff et al., 2003). Moreover, we did not disclose the provenance of the post to prevent further bias towards the telecommunications company (Malhotra et al., 2017).

Moreover, Harman's single factor test was conducted to test whether the common method bias exist in the data set (Harman, 1976). We conduct exploratory factor analysis in SPSS, in which all the items were loaded on one factor. The single factor only explains 34% of the total variance, which is lower than the threshold 50% for determine the issue. Based on this result, common method bias is not a serious issue in this data set (Podsakoff et al., 2003). Also, common laten factor construct approach is conducted in this research to check the common method bias as well which was commonly used in IS study (Liang et al., 2007; Chin et al., 2012; MacKenzie and Podsakoff, 2012). The result demonstrate that the average substantively explained variances of the indicator is 0.7093, meanwhile the average method-based variance is 0.0031. The ratio of substantive variance vs. method variance is about 229:1. The result implied that each indicator's variance explained by the substantive construct is much more than which explained by the method-based factor. This represent that the common method bias will not impact the result in this research (Pavlou et al., 2007).

5.8.5. Structural model and hypotheses test result

This research also employed the fit index to test the structure model (present in figure 10) which inducing Chis quare (χ^2) to the degree of freedom (df), TLI, CFI, RMSEA, and SRMR.

Figure 5.14 present the structure model, the model fit index is: $\chi 2$= 1680.1, df =576, $\chi 2$/df =2.9, RMSEA = 0.050, p < .001, CFI = 0.951, TLI = 0.946, SRMR=0.045, the chi-square was statistics significant and the model fit index reach all the threshold (Hair, 2009), moreover, the model explained 50.2% variance of purchase intention.

- ***The Results of Direct Effects***

The correlation coefficient helps the researchers to analysis the strength of the relationship between constructs. Coefficient values is range from +1.0 to -1.0, from which 0~1.0 demonstrate positive coefficient and -1.0~0 value indicates a negative coefficient

(Schumacker and Lomax, 2016). The parameter of the SEM model is important which represent the significant relationships among all the latent factors in the SEM model. The Table 5.17 shows the standardised estimate of the regression weights.

Form the table and based on the correlation coefficient level suggested by Hair *et al.* (2006), we can see that SMM activities has very strong positive influence on Adoption readiness with the standardised regression=0.836 $p < 0.000$. SMM activities has strong positive influence on self-efficacy with the standardised regression=0.741 $p < 0.000$. SMM activities has very strong positive influence on CBBE with the standardised regression=0.856 $p < 0.000$. SMM activities has weak negative influence on purchase intention with the standardised regression= -0.312 $p < 0.000$. Adoption readiness has moderate positive influence on Purchase Intention with the standardised regression=0.537 $p < 0.000$. CBBE has moderate positive influence on Purchase Intention with the standardised regression=0.560 $p < 0.000$. Self-efficacy has no influence on Purchase Intention with the $p = 0.240$ which is $P > 0.05$.

The Squared multiple correlations R^2 is employed to evaluate the strength of the casual effect between depended variable and independent variables which is also a goodness of fit in regression analysis (Hair *et al.*, 2006). R^2 is the percentage of the variance of the dependent variable which is explained by independent variable (Hair *et al.*, 2006). In multiple regression analysis analyse relationship between independent variables and the dependent variables through regression coefficients (Hair *et al.*, 2006)

From the Figure 10, we can conclude that total 50% (R^2) percent of Purchase intention can be explain by other independent variable; total 51% percent of self-efficacy can be explained by SMM activities; total 75% percent of self-efficacy can be explained by SMM activities; total 70% percent of self-efficacy can be explained by SMM activities. Based on the stander suggest by Hair *et al.* (2006), besides purchase intention has medium explanation power, other dependent variables all have strong explanation power.

The purpose of hypothesis test is aiming to confirm whether the data we collected from the questionnaire fit to the theoretical model (Schumacker and Lomax, 2016). Testing the hypothesis is also a method for identify the relationship between the variables (Schumacker and Lomax, 2016). Before the beginning of the hypothesis testing, we need to identify the null and alternative hypothesis. Alternative hypotheses represent the effect we expected in the research, on other hand the null hypotheses represent no different between the expect value and actual effect. If the result is different the null hypotheses will be replaced by the alternative one.(Malhotra *et al.*, 2017). In multivariate test, if the P-value < 0.05 it represents

the rejection of null hypotheses and showed the significant of the data, if the P-value ≥ 0.05 which showed the acceptance of null hypothesis.

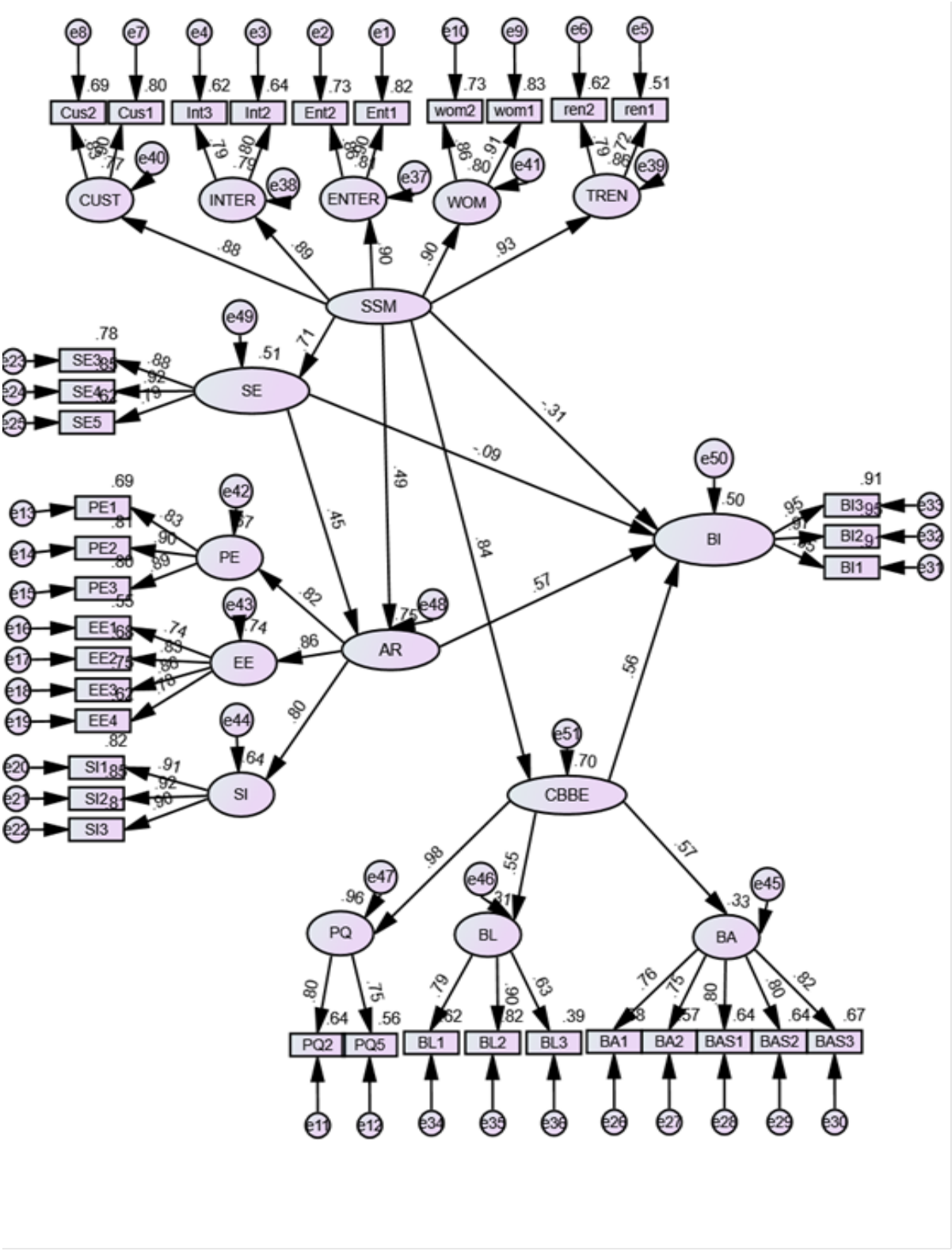


Figure 10. Structure Equation Model

Moreover, in the hypothesis test the critical ratio (CR) should be greater than 1.96 which shows the support of the path relationship (Hair *et al.*, 2006). In this study, the hypotheses were tested with SEM model based on previous literature and the results of EFA and CFA test. The result is showed in the Table 5.17.

Predicted and tested relationship	Estimate	S.E.	C.R.	P-value	Result
H1 SMM activities ⟶ Purchase intention	-0.312	0.118	-2.847	0.008	**Negative**
H2 SMM activities ⟶ CBBE	0.856	0.047	12.134	0.000	Supported
H3 SMM activities ⟶ adoption readiness	*0.836*	0.062	10.537	0.000	Supported
H4 Adoption readiness ⟶ Purchase intention	0.573	0.117	6.507	0.000	Supported
H5 CBBE ⟶ Purchase intention	0.560	0.110	5.584	0.000	Supported
H6 Self-efficacy ⟶ Purchase intention	-0.09	0.075	-1.453	0.240	**Rejected**
H7 SMM activities ⟶ Self-efficacy	0.741	0.056	17.038	0.000	Supported

Table 5.17 Hypothesis Test result of direct effects

A direct effect is describing a dependent variable is affected directly by other independent variable (Hair *et al.*, 2006). In this research we hypothesised seven direct effects in the research model. As presented in the table 5.17, most of the hypotheses are supported. However, H6 the relationship between self-efficacy and purchase intention is rejected, and in H1 the influence of SMM activities on purchase intention is significant but negative.

The results indicated that SMM activities directly and positivity affect the antecedents of purchase intention which are adoption readiness, self-efficacy and CBBE (H3, H7, H2). However, SMM activities has directly and negative influence on purchase intention (H1). Comparing to the traditional marketing activities, SMS activities provide the consumer with more effective and convenient way to gather information and interact with the brand or the company. Because of SMM activities, consumers experienced with more persuasive adopt readiness, perceived high CBBE and enjoyed much stronger self-efficacy of themselves. Besides, SMM activities from the company might lead to negative result, especially when the company is the monopolist in the market (Jung and Seock, 2016).

Among the three antecedents, adoption readiness (H4) and CBBE (H5) positivity affect purchase intention of 5G mobile service bundle. However, self-efficacy did not have significant relationship with purchase intention (H6). The results suggested that compared to previous studies of other mobile service, purchase intention of 5G mobile service will affected by the carriers' brand image which customers have a positive memory about and also

associate with powerful features of the service. Moreover, it is also influenced by the consumer perception about the benefits of 5G service itself. The self-efficacy does not directly affect purchase intention, which showed that self-efficacy might not has enough power to drive the consumers' purchase intention directly. The situation implied the needs for a mediator in between to enhance the relationship

- ***The Results of Indirect Effects***

The indirect effect implied that the effect independent influence dependent variable under the impact of mediating variables (MacKinnon *et al.*, 2004). The mediation effect is a causal hypothesis which transfer the effect to the outcome. The interval or mediation variable is called mediator (MacKinnon *et al.*, 2004). The structure equation model adopted for exam the path hypotheses of direct effects, meanwhile bootstrapping was employed for testing mediation effects.

The indirect effects can be seen in Table 5.17 which shows four indirect effects in the study hypothesis. The indirect effect of the model in this research was examined for statistical significant with 5000 bootstrap examples (Hair *et al.*, 2014). Based on Hayes (2012)'s approach, the indirect mediation effect statistical significance through bootstrap will be evaluated based on whether the estimate value of the mediator variable is zero with 95% corrected and accelerated confidence interval (lower and upper bounds). Therefore, the variable which value with a no-point lies within zero interval consider as statistically significant (Hair *et al.*, 2014).

The result in table 5.18 showed that the indirect effect from SMM activities to purchased intention through Adoption Readiness is statistically significant with the indirect effect =0.128; 95 per cent CI = 0.128-0.466, $p < 0.01$), H8 is supported. For H10, SMM activities to purchased intention through CBBE is statistically significant with the indirect effect =0.47; 95 per cent CI = 0.236-0.788, $p < 0.01$), is supported. H11 describe the Self-efficacy to purchased intention through Adoption Readiness is statistically significant with the indirect effect =0.258; 95 per cent CI = 0.102-0.384, $p < 0.01$), which is also supported. However, H9 which is SMM activities to purchased intention through Self-efficacy is not statistically significant with the indirect effect =0.128; 95 per cent CI = 0.332-0.062, $p > 0.05$), is not supported.

Relationship	Estimate	Lower Bounds	Upper Bounds	P-value	Results
H8 SMM activities ⟶ adoption readiness⟶ Purchase Intention	0.279	0.128	0.466	0.000	Supported
H9 SMM activities ⟶ Self-efficacy ⟶ Purchase intention	-0.063	-0.332	0.062	0.235	**Rejected**
H10 SMM activities ⟶ CBBE ⟶ Purchase intention	0.470	0.236	0.778	0.000	Supported
H11 Self-efficacy ⟶ Adoption readiness ⟶ Purchase intention	0.258	0.102	0.384	0.000	Supported

*** Note: 95% confidence interval, bootstrapping with 5000 sub-samples.**

Table 5.18 Bootstrapping analysis result of indirect effects

Chapter 6: Conclusion and Managerial Implications

6.1. Introduction

This chapter presents the results, discussion and findings from the data analysis process of this study. In the first section, we will discuss the result and insights from the data analysis procedures. In the following section, we will discuss the theoretical implication and practical implications. The last section will present the limitation of this research and further research suggestions.

The objective of this research is how social media marketing activates (SMM) from WeChat enterprise Office Account (WOA) affect 5G mobile service purchase behaviour? In this research, we mainly focus on three research questions which are:

- What factors will influence consumers' purchase behaviour towards 5G service bundle?
- Dose social media marketing activities from WeChat enterprise Office Account influence the adoption readiness, CBBE and self-efficacy towards 5G mobile service bundle?
- Dose the adoption readiness, CBBE and self-efficacy mediate the relationship between SMM activities and consumers' purchase intention of 5G mobile service bundle?

The outcome of this research contains:

- An in-depth understanding of technology and 5G trends in the telecommunication industry.
- The understanding of social media marketing activities and communications in the technology industry.
- literature review concerning the technology adoption model, CBBE theory, self-efficacy concept and most importantly, social media marketing activities related to purchase intention
- Develop the hypotheses based on the literature review.
- Develop the research model for 5G mobile services adoption under the influence of social media marketing activities and focus on the influence of technology characters and CBBE.
- Deeper understanding of consumer's technology product and service purchase behaviour.

- Analysis how the social media marketing activities from WeChat official account will influence the purchase intention towards 5G mobile bundles.
- Conclusions of how the social media as marketing and communication tool affect 5G purchase intention.

6.2. General Discussion

5G mobile industry shows a rapid growing as part of telecommunication industry (Ericsson, 2022). Particularly in Chinese market, 5G mobile service was developed for the effort to change the communication market fundamentally, which will provide new opportunities to converge traditional telecommunication service and also extend the service scoup of the telecommunication industry. The magnitude development of telecommunication industry attracts companies working in this filed also stimuli the researcher to conduct further study as well. This study provides the understanding of the marketing activities from consumer's perspective which also give the marketer unique suggestions of designing marketing strategy in Chinese market. It is also noted that although the rapid revolution of the communication technology is global trend (Doong and Ho, 2012), Chinese market has experienced the most fierce technology revolution compare to the other countries as well as fundamental socio-economic changes. The changes also leads to other trend which is customer shifting from traditional channel to digital ones to get product and service information (Chen *et al.*, 2020). With the introduction of 5G technology the Chinese consumer are busy with catching up with the new technology. The situation raises the question for the marketer is how does the new digital information channel affect consumers' choice to purchase 5G mobile service bundles, for instance WeChat?

The value of technology adoption research also lies in the efforts to understand the complex phenomena of the interaction among consumer behaviour, technology and the social media and how they support each other. One of the challenges is to understand how and why people choose to purchase 5G mobile service bundles. Technology innovation is often considered as key influence factor in technology adoption behaviour. However, Sarker and Wells (2003) argue that there is still lack of understanding of how the environment stimulus, technology and brand related organism guide customer to purchase 5G mobile service bundle. Particularly, if the company want to put the understanding of the consumer behaviour to business application, there should be solid comprehension of how the individual decide to purchase 5G mobile service bundles. Based on the discussion from previous chapter, this is the first study to examine the factors which will affect purchase intention of 5G mobile service bundles from the perspective of Chinese customer.

6.3. Theoretical Contributions

The research shows that the massive use of social media presents a lot of challenges for technology companies. For instance, telecommunication companies which as a monopoly enterprise still need to face the fiercer competition among all the mobile serive suppliers in social media environment. The research analysed how the social media marketing activities from the company's WeChat official account affect consumers' purchase intention of 5G mobile service bundles. Our study contributes theoretically and practically to technology companies' future marketing activities.

The hypotheses of H3, H7, H2, H1 discuss the impact of SMM activities on adoption readiness, self-efficacy, CBBE and purchasing intention. A fair number of studies discussed the theoretical and practical indications of SMM activities effect on building CBBE (Wang et al., 2020; Zollo et al., 2020), and other marketing elements (Liu et al., 2019), which are mainly related to luxury product and Fast-Moving Consumer Goods. Yet, the researchers so far still struggle to find more valid evidence that SMM activities are actually composed of the five parts. Furthermore, how dose SMM activities influence other products and service categories and how the SMM activities subsequently affect consumer response, such as purchase intention, still need further exploration. SMM activities are a complex research object due to their variety of changes in different research content for different people, which also makes the measurements even more difficult to capture (Schultz and Peltier, 2013). Our study contributes to the literature by addressing these gaps through analysing the SMM activity impact on 5G mobile service adoption. In the telecommunication product and service sector, the previous research about mobile service (3G,4G) already points out that different factors have their own ways of persuading consumer to purchase the product and service. However, this is the first study exam 5G mobile service bundles adoption behaviour from the perspective of SMM activities influence (Lu et al., 2008; Ovčjak et al., 2015). The findings and implications of the study support the conclusions as follows.

Firstly, prior literature proved that all the five SMM elements need to be considered as a whole when conduct SMM activities in the luxury product segment (Kim and Ko, 2012; Godey et al., 2016; Zollo et al., 2020). Although in Kim and Ko's (2012) research, trendiness and customization were removed from the model because of factor's poor loading, the left constructs still proved to be essential components for SMM activities. In this research, we expend the analysis of the impact of SMM activities to technology product and service adoption field and chose 5G mobile service as representative. The results cooperating with the previous research of SMM activities. According to our research, from the consumers' point of

view, all the five factors are equally important in the social media promotion activities for technology products.

Secondly, the study provided empirical evidence that SMM activities from WeChat official account affect adoption readiness, CBBE, self-efficacy, and consumers' purchase intention towards 5G mobile service. Previous research already demonstrated that SMM activities can affect CBBE (Kim and Ko, 2012; Zollo et al., 2020). This research is the first to illustrate that SMM activity also influences adoption readiness and self-efficacy. As an integrated marketing activity, SMM activities provide consumers with a more trending and detailed message about the new products and services and show how the technology will benefit their lives. These activities also create reasons for consumers to interact with the company and each other and ultimately contribute to boosting adoption readiness, self-efficacy and CBBE (Wang et al., 2020; Zollo et al., 2020). Similar promotion activities are more difficult to manage in traditional marketing media and might not have the same effect. The result also advanced the literature by demonstrating that SMM activities from the WeChat official account affect consumer purchase decision. Early research only indicated the relationship which has strong social tie-strength will influence consumers' decision-making progress (Lee and Choi, 2019; Luo et al., 2019). Our study shines to light the new situation, which is when consumers seek information and advice on purchasing innovative product and service, they tend to put more value on different factors of the information resource, such as the expertise in certain area.

In addition, the hypotheses of H4, H6, H5 are focus on the impact of adoption readiness self-efficacy and CBBE on purchase intention. There are a considerable number of studies that implement UTAUT for technology adoption research. However, our research is the very few studies which considers UTAUT as a multi-dimension construct (Adoption Readiness). Also, this is the first research that combine AR with brand equity and self-efficacy together and as a driven force for purchase intention. Our results affirmed that from customers' perspective, for new technology product and service adoption behaviour, performance expectancy, effort expectancy, and social influence which combine as AR is working together to stimulate consumers' purchase intention (Thakur and Srivastava, 2014b; Donmez-Turan, 2019). Meanwhile, the study also expanded technology adoption model to explain the new range of adoption phenomena which is 5G technology.

Thirdly, when we discuss customer response in this study, the conclusion echoed with the previous findings, which is adoption readiness and CBBE showed a positive influence on purchase intention for 5G mobile services (Kim and Ko, 2012; Venkatesh et al., 2012; Thakur

and Srivastava, 2014a; Zollo et al., 2020). Early studies related to 3G and 4G mobile services explained that performance expectancy, effort expectancy, social influence all have an influence on consumers' adoption intention (Ovčjak et al., 2015; Song et al., 2015; Tapanainen et al., 2019). However, no research discusses the effects of CBBE in adopting behaviour towards technology products and services. Hence, this study which is integrated CBBE with adoption readiness first time together for technology product adoption research. The result indicates that under the circumstances of intensive use of social media, for the new technology product and service adoption decision, only adoption readiness is no longer enough for persuading the customer. Besides, ensuring CBBE is another major construct will strengthen the consumers' confidence for building purchase intention (Tynan et al., 2010). With the participant of CBBE, the explained variance of purchase intention is improving form 44% (only adoption readiness) to 50.2%, which illustrate that CBBE is an essential factor cannot be overlooked. Particularly, CBBE is specially importance when the technology product and service is newly launched (Kim and Ko, 2012). In addition, under the influence of SMM activities CBBE as important as adoption readiness for consumers' purchase intention of 5G mobile service (Kim and Ko, 2012; Donmez-Turan, 2019).

Moreover, in this study H8, H10 are the first to analyses the impact of SMM activities from WOA on customer's purchase intention through adoption readiness and CBBE. As expected, SMM activities is crucial for technology adoption. Our study contributed to the theory that SMM activities form WeChat official account will partially affect purchase intention in a positive way under the mediation effect of adoption readiness and CBBE. Our empirical research contributes to the literatures by addressing when customer exposed heavily to SMM activities, if the company dedicated more to strengthen the adoption readiness of the mobile service and ensuring good CBBE of the company, customer would be more easily to have the intention of purchase 5G mobile services.

The results of this research showed clear evidence that adoption readiness (performance expectancy, effort expectancy, social influence) and CBBE have positive influence on 5G mobile service purchase intention; SMM activities has negative influence on purchase intention; SMM activities has positive influence on 5G mobile service purchase intention under the mediation effect of adoption readiness and CBBE. These constructs were all validated and carefully measured. The research answered the question that "How the social media marketing activates from WeChat enterprise Office Account affect 5G mobile service purchase behaviour in China." The design and testing a new model about technology adoption brings an important contribution to study on consumers' 5G mobile services adoption

behaviour. Since it is the first research which valid the impact of adoption readiness, CBBE and SMM activities on 5G mobile service purchase intention. The research also the first research proved the mediator effect of adoption readiness and CBBE between SMM and purchase intention. The results are unique and contribute to the knowledge in technology adoption research filed.

The other most important contribution of this research is identified and validated the new factor which influence technology adoption intention: CBBE and SMM activities. The research model with four independent variables and one dependent variable are tested with empirical study. In order to fill the gap of technology adoption and social media activities influence, the relationship between SMM activities and purchase intention were carefully determined by literature review and tested through empirical data. According to the test result, which showed the hypothetic relationship in the model are valid and established. To that fact, the proposed model has been verified and has contribution to the understanding of adoption of 5G mobile service in China. The mediate effect was also validated through the empirical study for SMM activities. The finding informs us the importance of choosing the right directions for SMM activities which related to promote 5G mobile service.

In this research we also validated the SMM activities, adoption readiness and CBBE as multi-dimensional construct in this research model which present in chapter 5. The scales and dimensions which pertaining to 5G mobile service adoption study were re-evaluated and validated. The result proved that the original factors in UTAUT have strong correlation could be consider as multi-dimensional construct namely adoption readiness. The SMM activities and CBBE also be proved should be considered as multi-dimensional construct in 5G adoption study. The discovery added the knowledge to the 5G mobile service adoption research in technology adoption filed.

The analysis procedure also demonstrated that the original UTAUT model cannot be applied to 5G mobile service adoption directly without any modification. Particularly, under the influence of the SMM activity on 5G adoption behaviour. The most distinctive theoretical contribution is a new behaviour model for 5G mobile service bundle adoption behaviour. The role of SMM activities represent environment stimuli has significant impact on the organism which are adoption readiness, self-efficacy and CBBE. Therefore, it determined that in social media environment, the marketing activities from company's social media account have huge influence on consumer's response which is purchase intention through the media effect of adoption readiness and CBBE. Only SMM activities has negative influence on purchase intention. In order to use the social media wisely, the marketers in telecommunication

company need to make customer experience better adoption readiness and CBBE from the marketing promotion activities.

The result also demonstrated that CBBE which related to the telecommunication companies is another important factor which influence consumer's purchase intention. Although the technology functions are vital influencing factor for customer to decide whether to purchase the product. However, as the customer become more rational, the brand they choose to use is equally important. Technology function is not the only perspective they consider when then make purchase decisions. Moreover, the technology company also put more focus on their brand image and reputation, in order to make their products and service become more appealing to customer. Hance, CBBE is proved as other important factor in consumer's 5G mobile serive adoption behaviour.

In general, the existing UTAUT model in 5G adoption behaviour research showed a great explanation power. Moreover, the SMM activities has been used as environment stimuli factor for 5G usage which improved the model's ability to explain 5G purchase behaviour in China. This research is the first which combined adoption readiness with CBBE to explain the adoption situation of 5G service. This combination describes the situation that customer needs to consider both technology factor and brand image. The design of the research model demonstrated the situation of 5G mobile service adoption at the early stage accurately, which is also proved the model is suitable for this research. The most interesting result is that we find out self-efficacy influence on purchase intention is not supported. The meditation function of self-efficacy between SMM and purchase intention also not valid in this study. The result reveal that under certain situation self-efficacy not always works and marketers cannot persuade customer only through boost their confidence for using the product anymore.

6.4. Analysis of the hypotheses not supported, and the negative relationship

In contrary to the logical cognitive process, in H1 SMM activities influence on purchase intention no longer holds for technology products and service. Our study showed that SMM activities has a direct and negative relationship with purchase intention, which is different from other studies (Yadav and Rahman, 2017; Laksamana, 2018). Firstly, the result can be explained by Chung and Lee (2019)'s research which implied that SMM activity form different source will affect the pervasiveness of the information. To be more specific, user generate content is more persuasive than the message from the company. Additionally, telecommunication industry is considered as highly monopoly industry which make the companies have negative corporate reputation. The negative reputation makes the consumer has the feeling to against their promotion information naturally (Jung and Seock, 2016).

Secondly, according to previous research, negative WOM and reviews will decrease consumers' purchase intention (Baker et al., 2016; Viswanathan et al., 2017). Some of the consumers' commented in the WeChat official page raised the concern about the quality, stability and the expensive price of the 5G mobile service at early stage (Naeem, 2019; Chen and Dermawan, 2020). Furthermore, some customers had bad experience with the service before, they are questioning whether the customer service will be improved when they choose 5G mobile service (Naeem, 2019). These factors all lead to negative influence on purchase intention (Bag et al., 2019). Soewandi (2015)'s study also demonstrates that without positive brand equity medias the relationship, SMM activity has negative relationship with purchase intention.

Furthermore, H6 of the research found self-efficacy has non-significant direct effect on purchase intention. Meanwhile, the result also suggests that self-efficacy does not mediate the relationship between WeChat marketing activities and purchase intention. The outcomes are not in line with previous research, which showed significant and positive relationship between self-efficacy and intention in the adoption of mobile data service (Hsu and Chiu, 2004; FADARE et al., 2011; Ooi et al., 2011; Sim et al., 2012). The non-significant relationship mentioned above can be explained firstly by the possibility that the users from our survey have high education level, and secondly the extensive use of 4G in China which indicate they already acquired the basic knowledge and skills for using 5G mobile service (Leong et al., 2013). Therefore, the level of self-efficacy is no longer an essential factor for the intention to purchase 5G mobile service (Mou et al., 2016; Eraslan Yalcin and Kutlu, 2019). It also possible that the function descripted in the WeChat official account's post might be beyond users' daily needs, which is not fit consumer's expectation and leading to diminish the level of self-efficacy (Teo and Zhou, 2014; Wang et al., 2019). Finally, the result also implied that self-efficacy is not strong enough to mediate the relationship between SMM activities and intention to purchase 5G mobile service(Zhao et al., 2008; Teo and Zhou, 2014; Buabeng-Andoh, 2021), which need a mediator in between. However, in H11 adoption readiness fully mediates the relationship of self-efficacy and intention of purchase 5G mobile service. This relationship implied that the customer who perceived themselves as highly able to use technology need to believe that the technology would be easy to use, will enhance their productivity and accepted by their social circle before persuading them form their purchase intention (Teo and Zhou, 2014).

6.5. Managerial implication

The research contributes to marketing practices through diagnosing the factors which affect consumer purchase intention for 5G mobile service bundles. The results will help the telecommunication companies in China as well as other countries to make more effective strategies which introducing 5G mobile service to the market.

The result demonstrated that Chinese customers are eager to embrace the benefits of the mobile technology innovation. Accordingly, when the telecommunications company introducing new products and services, the companies should work on enhance both technology aspects as well as brand factors. It is also highlighting the advantages of the new product and service which can also be taken into the customer communication and interactions channels as part of the content for marketing promotion activities. This research identified that in Chinese market brand factors has significant influence on consumer innovation adoption. The telecommunication companies should try to emphases the brand image through the marketing strategies. Specially, compare to other countries Chinese consumer more easily influence by social media in consumption and new products promotion (Song, 2014). The research also revealed that for Chinese consumer the influence from the social media platform also help to make the purchase decision (Lab, 2021). The telecommunication company should position their product in social media platform which deliver the positive brand image to potential consumers. The function value is other major factor which will encourage the customer trying out the innovation product and service. Consequently, in order to facilitating purchase intention of 5G mobile bundles, appropriate brand strategy should be developed to increase the consumers' confident towards the product and service. The quality and function of the 5G mobile service should also be considered in the marketing promotion activities to improve the credibility of the 5G mobile technology.

Form the managerial perspective, the main purpose of SMM activities of the company is to provide professional information about the product and service, resolve consumers' doubts, offer customized service and serve the purpose of increasing purchase intention. Based on the unique characteristic of the technology products and services, it is particularly difficult for telecommunication company to make the SMM activity content entertaining and attractive to draw followers. Most of the customers visit the carriers' official account mainly seek for specific information and customer service not for entertainment which makes it tough for the company to deliver their promotion content (China, 2020). The company started to promote 5G mobile service before the release date, aiming for cultivating the customer in advance and have a better adoption rate later. Furthermore, social media makes the traditional industry,

such as telecommunication change their conventional promotion method, push them focus more on social media compare (China, 2020).

Based on the data analyse result of this study, firstly, we reviewed the components of SMM activities for the promotion of technology product and service are five factors. Different from fashion industry and luxury product, the SMM activities for technology product and service requires the content including more trending information (0.92) (Kim and Ko, 2012; Wang et al., 2020). This demonstrate that comparing to other factors, what the customer expecting the most from company's SMM activities posts is the latest and the most trending news about the technology product and service. The marketers should pay attention that SMM activities for technology product and service is better designed to focus on providing more trending information for the customer to share with their friends and stimulating them engage more in the SMM activities.

Secondly, the study explored that during consumers' decision-making process, adoption readiness as multi-dimensional constructs which means all the sub-constructs need to be present simultaneously and all at significant level concurrently for the adopting intention to happen (Thakur and Srivastava, 2014b). Additionally, SMM activities form the company has influence on effort expectancy (0.84) and performance expectancy equally (0.84), following by social influence (0.80). The result reminds the technology company that for consumer, the most important attracting characteristics of innovative products or services are still easy to use and productivity (Venkatesh et al., 2016). In addition, the company should mainly focus on promoting these two aspects. Compared to traditional media, social media seems better at bring the advantage of these two factors to customer's attention.

Thirdly, based on the case of our research, CBBE and adoption readiness are both drive force for purchase intention. Since all our respondents have 4G experience with their prior services provider, they already formed their own perspective towards the brand they used. Besides, the telecommunication company do not have good reputation as monopoly enterprise. When they try to increase 5G mobile service purchase intention, the most effective method is using SMM activities to improve their CBBE. SMM activities influence purchase intention through increasing CBBE. The result demonstrated that the SMM activities influence is more relevant to perceived quality (0.95) than brand loyalty (0.58) and brand awareness/association (0.60). This result tells the marketer that if they want to deliver information to customer, SMM activity is more effective to ensure the consumer the product and service has prime quality. Nonetheless, the traditional ways maybe more helpful for the company to advance the

brand awareness/association and brand loyalty, such as improve the service system and more customer rewards programs to attract and keep customer.

This study has difficulty in locating the influence of self-efficacy on purchase intention. SMM activity can increase consumers' self-efficacy for using technology product and service. However, the influencing power of self-efficacy cannot reach purchase intention. This result indicates that at the early stage, if the telecommunication company want persuade consumer to adopt technology product and service, they should try to increase consumers' self-efficacy in a traditional way. Such as show the customer the technology would be productivity and effectiveness from the retail store. The company can also help the customer have more actual experience with the product and service which will increase their purchase intention. The findings are essential for marketing promotion strategies. When planning to implement the social media marketing promotion activities to encourage the consumer to purchase the service, marketers should ensure that the marketing plan are positioning the promotion message in the way that take the influential factors from our research results into account.

6.6. Limitation and future research suggestions

There are some limitations need to be clarified when interpreting the data analysis results. In this research our sampling techniques is online survey. Although the online panel were select from the customer maintenance group from the telecommunication company in Chinese market, based on Rogers (2010) suggestions one of the defects of online survey approach is exclude the elderly population which makes the result always shows the characters of the early adopters are young and educated. The demographic results of the research subjects are clearly fall in this range. The further study can consider use age and education as control variables or moderator and compare the results with this research.

The limitation of the research also shows some interesting direction for future studies. First, this study is focus on 5G mobile service in telecommunication industry, the result may not be suitable for other product and service sector. For instance, self-efficacy has non-significant mediating variable between SMM activities and purchase intention, further research could investigate whether for different technology product or service would have different result, such as driverless car and artificial intelligence devices. Especially, this study only conducted the analysis related to purchase intention for 5G mobile service bundles, further study should exam the adoption intention towards 5G devices, such as the device of internet of things (IoT). The further research can also re-exam the research framework in new 5G usage context, such as smart city or remote medical. Although there are limited use scenarios of 5G, the

telecommunication companies and related industry have been actively expanding the usage of 5G mobile service. It is useful to test the research framework in the new scenario.

Second, since our data is collected at the introduction stage of 5G mobile service, we did not get enough data for conducting the research for actual purchase, the future study may extend the research to actual purchase behaviour. The next study may also conduct longitude research, comparing the changing behaviour. Furthermore, SMM activities may be further unpacked to different layers since short video and E-commerce live streaming are both trending in the social media and become a powerful tool for marketing promotion (Poll, 2021). It would be interesting to investigate how the underlying mechanisms of short video and E-commerce live streaming works as SMM activity in consumer behaviour model which can further discovery which elements in the activities are the most effective in persuading consumer.

Thirdly, we only conduct this research in China with WeChat SMM activities, the future study could take this research to different countries and test with different social media, for instance Facebook or twitter. The research should also further explore the differentiate between Chinese consumer and other countries by examining how the factors influence them differently. It will provide a better understanding of consumer purchase behaviour for technology product and service in different countries. The companies should also be aware of the differences to adopt the marketing strategies accordingly to fit into different customers.

Furthermore, due to the time and cost constrain upon for PhD researchers, the methodology has been chosen for this research was limited to quantitative method. It is also the reason that in this study the researcher only chooses quantitative research papers for literature review. Further research could consider build the research by examining the 5G purchase intention from different perspective in both qualitative and quantitative technical. For instance, if the research adoption qualitative research method, the researcher could use semi-structured interview method to explore more decision-making procedure of purchase technology product and service. Focus group can also be considered to gather opinions from the marketing managers of communication companies or different stakeholders about the issues when they promote the 5G product and service. Samples in this research are only limited to customers, we should have more sample categories to represent different angles. It is also interesting to look at the adoption of the technology from the perspective of companies' performance.

Even for online survey, the research can be improved by conducting large-scale longitudinal study. Moreover, the diffusion of the 5G mobile service procedure is over time, in which the consumers behaviour and attitude changes as the time passes (Rogers, 2010), the

further study should also consider different stages of the diffusion. However, this type of research requires a lot of financial and human resources support. The constructs which affect consumers' purchase behaviour for 5G mobile service bundles also shifts over different stages. Venkatesh *et al.* (2016) also demonstrated that the technology adoption is complex procedure. A successful technology implementation strategy besides technology functions, should also including consumer's emotion, cognitive and adoption context. Further research should consider add these factors into research model to improve the ability to predict purchase intention for 5G mobile service.

New technology product and service research is complicated which cannot be conclude by single adoption model (Venkatesh *et al.*, 2016). Therefore, more research is needed to introduce new theories which can be added to technology adoption research to grow the related literature. As there are wide and clear pictures about the technology adoption procedure, one of the ideas could be explored further is competition situation in the market, which is not related to technology different more depend on other factors, for instance different promotion channels, switching barriers and continuous usage intention.

Appendix A. Questionnaire

Questionnaire English version

Constructs		Questions used in this survey and the factor loading from the reference	References
Influence of WeChat marketing advertise	**Entertainment**	1. Using telecommunication company's social media is fun. (.95) 2.Contents shown in telecommunication company's social media seem interesting. (.92)	Godey et al. (2016) Kim and Ko (2012)
	Interaction	3. Telecommunication company's social media enables information sharing with others. (.92) 4. Conversation or opinion exchange with others is possible through telecommunication company's social media. (.92) 5. It is easy to deliver my opinion through telecommunication company's social media. (.90)	
	Trendiness	6. Contents shown telecommunication company's social media is the newest information. (.68) 7. Using telecommunication company's social media is very trendy. (.93)	
	Customization	8. telecommunication company's social media offers customized information search. (.91) 9. telecommunication company's social media provides customized service. (.83)	
	Word of mouth	10. I would like to pass along information on brand, product, or services from telecommunication company's social media to my friends. (.72) 11. I would like to upload contents from telecommunication company's social media on my WeChat. (.75)	
UTAUT	**Performance Expectancy**	12. I find 5G mobile network-based products/services useful in my daily life. (.87) 13. Using 5G mobile network-based products/services helps me accomplish things more quickly. (.82) 14. Using 5G mobile network-based products/services increases my productivity. (.85)	Venkatesh et al. (2012)
	Effort Expectancy	15. Learning how to use 5G mobile network-based products/services is easy for me. (.78) 16. My interaction with 5G mobile network-based products/services is clear and understandable. (.82) 17. I find 5G mobile network-based products/services easy to use. (.82) 18. It is easy for me to become skilful at using 5G mobile network-based products/services. (.78)	
	Social Influence	19. People who are important to me think that I should use 5G mobile network-based products/services. (.80) 20. People who influence my behavior think that I should use 5G mobile network-based products/services. (.77) 21.People whose opinions that I value prefer that I use5G mobile network-based products/services. (.75)	
Self-Efficacy		22. I will get used to obtaining information through 5G mobile network-based products/services. (.85) 23.I will get used to obtaining the relevant technology for using 5G mobile network-based products/services. (.89) 24.I am able to explain how to use 5G mobile network-based products/services to others. (.88) 25. I am able to explain the relevant functions of 5G mobile network-based products/services. (.84) 26.I am able to understand the technical terms involved in 5G mobile network-based products/services usage. (.83)	Jin, C.H. (2014) Eastin, M.S. and LaRose, R., (2000

Consumer-Based Brand Equity	**Brand awareness/ Brand associations**	27. I can recognize brand of my current mobile service provider brand among other competing brands. (.79) 28. I am aware exist of the brand of my current mobile service provider. (.85) 29. Some characteristics of my current mobile service provider's come to my mind quickly. (.86) 30. I can quickly recall the symbol or logo of my current mobile service provider. (.75) 31. I have no difficulty in imagining the brand of my current mobile service provider in my mind. (.72)	Yoo and Donthu (2001)
	Brand loyalty	32. I consider myself to be loyal to my mobile service current provider. (.77) 33. My current mobile service provider would be my first choice for 5G mobile network-based products/services. (.74) 34. I will not choose other mobile service provider if my current provider is available for 5G mobile network-based products/services. (.70)	
	Perceived quality	35. 5G mobile network-based products/services are worth their price.(.81) 36. The quality of the products/service of 5G mobile network-based products/services seems coherent with their price. (.84) 37. 5G mobile network-based products/services proposes a large choice of products and services. (.88) 38. It is likely that 5G mobile network-based products/services offers excellent features. (.81) 39. It is likely that 5G mobile network-based products/services are very reliable network. (0.77)	
Behavioural Intention		40. I intend to use 5G mobile network-based products/services in the next 12 months. (.87) 41. I predict I would use the 5G mobile network-based products/services in the next 12 months. (.84) 42. I plan to use 5G mobile network-based products/services in the next 12 months. (.85)	Venkatesh. et al. (2003) Šumak, B. and Šorgo, A., (2016)
Control variable	**user**	43.Are you currently a 5G service user?	
	Purchase-decision involvement	44.I choose my 5G mobile network-based products/services carrier very carefully. 45.The choice of the 5G mobile network-based products/services carrier matters a great deal to me. 46.Choosing a 5G mobile network-based products/services carrier is an important decision for me.	Lee, Lee, & Sanford, 2010
	subject's general attitude toward reviews	47. When I buy a product, I always read news that are presented in WeChat. 48.When I buy a product, the news presented in WeChat are helpful for my decision making. 49. When I buy a product, the news presented in WeChat make me confident in purchasing the product. 50. If I don't read the news presented in WeChat when I buy a product, I worry about my decision.	Lee, Lee, & Sanford, 2010

Questionnaire Chinese versions

尊敬的参与者，
您好！
非常感谢您参与此次"关于移动服务接受度"的问卷调研。此次问卷调研是纽卡斯尔大学博士生毕业项目的一部分。在此问卷中，需要您阅读两篇选自微信公众账号的简短推文，然后回答相关问题。这两篇文章将在问卷的不同部分显示。 整个问卷大约需要 15 分钟完成，所有问题没有标准答案，请根据您的个人实际感受选择相应选项。此次问卷调研遵从自愿参加和匿名的原则。您所提供的信息仅会用于此次调研，我们会遵照相关规定严格保密。您所提供的信息不会被用于商业推广活动。
如果您对本次调研有任何疑问，请通过电子邮件 w.huo2@newcastle.ac.uk 联系我们。

非常感谢您的支持。请点击下面的同意按钮，开始填写问卷。

1. 您目前所使用的手机服务网络是:
   A 4G
   B 5G

2. 您刚才阅读的推文来自哪个公司的微信公众号？

   A 中国电信
   B 中国移动
   C 中国联通

3. **5G时延是多少？**

   A **1毫秒**
   B **2毫秒**
   C 1秒

根据您刚阅读的推文，以下问题关于您对中国电信官方微信账号的感受，选择相符合的描述。

4. 中国电信公司官方微信发布的有些内容还挺有意思的

   烈反对
   不同意
   不太同意
   既不赞成也不反对
   有些同意
   同意
   非常同意

5. 我能够与他人分享中国电信公司官方微信发布的信息

   烈反对
   不同意
   不太同意
   既不赞成也不反对
   有些同意
   同意
   非常同意

6. 我可以通过中国电信公司官方微信公众账号与他人沟通或交换意见

   烈反对
   不同意
   不太同意
   既不赞成也不反对
   有些同意

同意
非常同意

7. 在中国电信公司的官方微信账号上表达我的个人观点，很容易。

烈反对
不同意
不太同意
既不赞成也不反对
有些同意
同意
非常同意

8. 中国电信公司的官方微信是有趣的。

烈反对
不同意
不太同意
既不赞成也不反对
有些同意
同意
非常同意

以下问题仍旧关于您对中国电信官方微信账号的感受，请选择相符合的描述。

9. 中国电信公司的官方微信提供的信息，是电信行业的最新信息

烈反对
不同意
不太同意
既不赞成也不反对
有些同意
同意
非常同意

10. 关注中国电信公司的官方微信是一种流行趋势。

烈反对
不同意
不太同意
既不赞成也不反对
有些同意
同意
非常同意

11. 中国电信公司的官方微信账号提供定制化的信息搜索。

烈反对
不同意
不太同意
既不赞成也不反对
有些同意
同意
非常同意

12. 中国电信公司的官方微信账号提供定制化服务。

烈反对
不同意
不太同意
既不赞成也不反对
有些同意

同意
非常同意

13. 我愿意将中国电信官方微信发布的相关品牌信息，产品或服务信息分享给我的朋友。

烈反对
不同意
不太同意
既不赞成也不反对
有些同意
同意
非常同意

14. 我愿意在我的个人微信朋友圈里分享中国电信公司官方微信账号发布的内容。

烈反对
不同意
不太同意
既不赞成也不反对
有些同意
同意
非常同意

15. 使用电信公司的社交媒体没什么意思。

烈反对
不同意
不太同意
既不赞成也不反对
有些同意
同意
非常同意

根据您之前阅读的推文，以下问题有关于哪些因素会影响您对5G产品/服务的使用意向和购买决策，请选择相符的描述。

16. 我发现5G移动产品/服务在我的日常生活中是有用的。

烈反对
不同意
不太同意
既不赞成也不反对
有些同意
同意
非常同意

17. 使用5G移动产品/服务，可以帮助我更快地完成工作和其他任务。

烈反对
不同意
不太同意
既不赞成也不反对
有些同意
同意
非常同意

18. 使用5G移动产品/服务提高了我的办事效率。

烈反对
不同意
不太同意
既不赞成也不反对

有些同意
同意
非常同意

19. 学习如何使用5G移动产品/服务对我来说是容易的。

烈反对
不同意
不太同意
既不赞成也不反对
有些同意
同意
非常同意

20. 我与5G移动产品/服务的交互过程清晰明了。

烈反对
不同意
不太同意
既不赞成也不反对
有些同意
同意
非常同意

21. 我发现5G移动产品/服务易于使用。

烈反对
不同意
不太同意
既不赞成也不反对
有些同意
同意
非常同意

22. 熟练掌握、使用5G移动产品/服务对我来说是容易的。

烈反对
不同意
不太同意
既不赞成也不反对
有些同意
同意
非常同意

根据您之前阅读的推文，请您继续回答关于5G产品/服务的使用意向和购买决策的问题，请选择相符的描述。

23. 对我来说很重要的人，认为我应该使用5G移动产品/服务。

烈反对
不同意
不太同意
既不赞成也不反对
有些同意
同意
非常同意

24. 对我行为有影响力的人，认为我应该使用5G移动产品/服务。

烈反对
不同意

不太同意
既不赞成也不反对
有些同意
同意
非常同意

25. 对我来说他们的看法非常重要的人，他们倾向于我使用5G移动产品/服务。

烈反对
不同意
不太同意
既不赞成也不反对
有些同意
同意
非常同意

根据您之前阅读的推文，以下问题有关于您对于使用5G移动产品/服务的信心，请选择相符的描述。

26. 我会习惯于通过5G产品/服务获取信息。

烈反对
不同意
不太同意
既不赞成也不反对
有些同意
同意
非常同意

27. 我会习惯于获取关于如何使用5G产品/服务的相关技术。

烈反对
不同意
不太同意
既不赞成也不反对
有些同意
同意
非常同意

28. 我能够向其他人解释如何使用5G产品/服务。

烈反对
不同意
不太同意
既不赞成也不反对
有些同意
同意
非常同意

29. 我能够解释5G产品/服务的相关功能。

烈反对
不同意
不太同意
既不赞成也不反对
有些同意
同意
非常同意

30. 我能够理解5G移动网络的产品/服务使用中涉及的技术术语。

烈反对

不同意
不太同意
既不赞成也不反对
有些同意
同意
非常同意

根据您之前阅读的推文，以下问题有关于您对目前自己使用的移动运营商品牌的感受，请选择相符的描述

31. 我可以从所有的移动运营商品牌中认出我所使用的品牌。

    烈反对
    不同意
    不太同意
    既不赞成也不反对
    有些同意
    同意
    非常同意

32. 我能意识到我当前使用的移动运营商品牌的存在。

    烈反对
    不同意
    不太同意
    既不赞成也不反对
    有些同意
    同意
    非常同意

33. 我知道我目前使用的移动运营商品牌的样子。

    烈反对
    不同意
    不太同意
    既不赞成也不反对
    有些同意
    同意
    非常同意

34. 我可以很快的想起我当前使用的移动运营商品牌的某些特征。

    烈反对
    不同意
    不太同意
    既不赞成也不反对
    有些同意
    同意
    非常同意

35. 我可以快速回忆起我当前使用的移动服务提供商的商标的样子。

    烈反对
    不同意
    不太同意
    既不赞成也不反对
    有些同意
    同意
    非常同意

36. 在脑海中回想我使用的移动服务提供商品牌,对我来说没有困难。

烈反对
不同意
不太同意
既不赞成也不反对
有些同意
同意
非常同意

37. 我无法理解5G移动网络的产品/服务使用中涉及的技术术语。

烈反对
不同意
不太同意
既不赞成也不反对
有些同意
同意
非常同意

请继续回答以下关于您对于当前使用的移动服务品牌感受的问题，请选择相符的描述。

38. 我认为我是当前使用的移动服务提供商的忠实用户。

烈反对
不同意
不太同意
既不赞成也不反对
有些同意
同意
非常同意

39. 我当前使用的移动服务提供商，将是我使用5G产品/服务的首选。

烈反对
不同意
不太同意
既不赞成也不反对
有些同意
同意
非常同意

40. 如果我当前使用的移动服务供商提供5G产品/服务，我不会选择使用其他电信运营商的服务。

烈反对
不同意
不太同意
既不赞成也不反对
有些同意
同意
非常同意

41. 5G产品/服务价格合理。

烈反对
不同意
不太同意
既不赞成也不反对
有些同意

同意
非常同意

42. 5G产品/服务物有所值。

烈反对
不同意
不太同意
既不赞成也不反对
有些同意
同意
非常同意

43. 5G产品/服务提供了丰富的产品和服务项目供客户选择。

烈反对
不同意
不太同意
既不赞成也不反对
有些同意
同意
非常同意

44. 有可能5G产品/服务的功能会很出色。

烈反对
不同意
不太同意
既不赞成也不反对
有些同意
同意
非常同意

45. 有可能5G产品/服务非常可靠。

烈反对
不同意
不太同意
既不赞成也不反对
有些同意
同意
非常同意

以下问题关于您是否打算购买或已经购买5G移动产品/服务。

46. 我打算在未来12个月内使用5G产品/服务。

烈反对
不同意
不太同意
既不赞成也不反对
有些同意
同意
非常同意

47. 我预计我会在未来12个月内使用5G产品/服务。

烈反对
不同意

不太同意
既不赞成也不反对
有些同意
同意
非常同意

48. 我计划在未来12个月内使用5G产品/服务。

烈反对
不同意
不太同意
既不赞成也不反对
有些同意
同意
非常同意

以下问题有关于你对选择5G运营商的态度：

49. 我会非常谨慎地选择5G产品/服务运营商。

烈反对
不同意
不太同意
既不赞成也不反对
有些同意
同意
非常同意

50. 5G产品/服务运营商的选择对我而言至关重要。

烈反对
不同意
不太同意
既不赞成也不反对
有些同意
同意
非常同意

51. 对于我来说，选择5G产品/服务运营商是一个重要的决定。

烈反对
不同意
不太同意
既不赞成也不反对
有些同意
同意
非常同意

以下问题关于你对从微信公众账号获取信息的态度：

52. 在我想购买一个产品时，我总是从微信里中寻找相关信息。

烈反对
不同意
不太同意
既不赞成也不反对
有些同意
同意
非常同意

53. 在我想购买一个产品时，微信里的相关信息对我的决定很有帮助。

烈反对
不同意
不太同意
既不赞成也不反对
有些同意
同意
非常同意

54. 在我想购买一个产品时，微信里的相关信息使我对我的购买决定充满信心。

烈反对
不同意
不太同意
既不赞成也不反对
有些同意
同意
非常同意

55. 在我想购买一个产品时，如果我没有在微信里寻找相关息，我会担心我是否做出了正确的决定

烈反对
不同意
不太同意
既不赞成也不反对
有些同意
同意
非常同意

56. 性别

A 男
B 女

57. 年龄

A 18-24
B 25-35
C 36-45
D 46-55
E 55 以上

58. 教育程度

A 高中
B 大学
C 研究生
D 其他

59. 您的职业现状?

A 全职
B 兼职
C 自由职业
D 待业
E 学生

F 退休
G 残障人士

60. 您的月收入?

A 4000 RMB 以下
B 4001-6000 RMB
C 6001-8000 RMB
D 8001-10000 RMB
E 超过 10001 RMB

Appendix B. Testing materials

叮！你有一个新套餐待升级

中国电信营业厅 1/3

5G用电信！

现在的潮流是什么？眼下最潮的莫过于5G
5G仿佛就是上网时候速度与激情的代表！
用了5G才知道什么叫速度
今天我们就来了解什么是5G，
以及5G又有哪些优惠政策

什么是5G？
5G有多快呢？
5G资费贵么？

5G具备超高速率超低时延、超高密度三大特点的第五代通信技术。

5G下载一部4K高电影只需要几秒。5G能将时延降低到1毫秒。例如人的手指被针刺疼，疼痛感传递到大脑需要100毫秒，5G的这个速度是人体反应速度的100倍！

5G套餐更实惠！同等价位的5G套餐比4G套餐包含更多流量。例如4G199套餐包含40G流量，同样价格的5G套餐包含60G流量！同时还可以成为5G会员享受更多会员权益优惠！

如何成为5G会员？5G会员有哪些权益？

5G有机一组可以直接变更套餐或加装5G会员升级包，简单！

5G无产者可以先变更5G套餐或加装5G会员升级包，然后在5G专区购买5G手机，完美！

5G无机生态租，4G套餐可以升级为5G，再给自己添置之一台5G手机，哦了

5G会员可以根据会员等级任选爱奇艺、腾讯视频、优酷视频、全民K歌、QQ音乐、酷狗音乐的VP会员。并且可以选择使用天云游戏、VR、导高清云盘、云电脑应用

5G已来，中国电信邀你一起畅享5G精彩

【十全十美5G畅享融合套餐】专属为你打造

月基本费（元/月）	年基本费（元/年）	国内流量（每月）	国内语音（分钟/月）	国内流量超出资费	包含光网宽带*
129	1548	30GB	500	3元/GB	下行300M
169	2028	40GB	800		下行500M
199	2189	60GB	1000		下行1000M
239	2629	80GB	1000		
299	2990	100GB	1500		
399	3990	150GB	2000		
599	5990	300GB	3000		

套餐说明：

（1）169档次及以上十全十美5G畅享融合套餐的宽带，每月含1TB 字节流量（上下行合计），当月有效，超过后宽带速 降为下行300M/上行30M，次月1日恢复套餐原有速率。

（2）十全十美5G畅享融合套餐国内流量超出后资费收费标准:3元/GB即:不满100MB的，按0.03元/MB收费，达到3元后，100MB（不含）-1GB（含）部分免费使用。超过1GB的，仍按上述原则（即每1GB 收费3元），以此 类推。、

（3）若客户所在区域带宽资源不能满足的，客户可选择继续参加本活动基础套餐其他内容 不变的情况下，宽带速率以实际所能达 到的最高速率为准。

（4）支持年付方式:199/239档次享受付11月12优惠，即年基本费为2189元/年，2629元/年:299/399/599档次享受付10月12优惠，即年基本费为 2990 元/年,3990元/年和5990元/年。

电信业务充值办理，更多贴心服务、活动信息
尽在升级版“电信营业厅APP”

点击阅读原文，立即体验电信营业厅APP！

戳戳这里，下次更好看

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Appendix C. Correlations Matrix

Correlations Matrix																																			
	Ent1	Ent2	Int1	Int2	ren1	ren2	Cus1	Cus2	wom1	wom2	PE1	PE2	PE3	EE1	EE2	EE3	EE4	SI1	SI2	SI3	SE3	SE4	SE5	BAS1	BAS2	BAS3	BA1	BA2	BL1	BL2	BL3	PQ1	PQ2	BI1	BI2	BI3
Ent1																																			
Ent2	.78**																																		
Int1	.67**	.68**																																	
Int2	.58**	.58**	.67**																																
ren1	.58**	.54**	.46**	.44**																															
ren2	.61**	.56**	.55**	.53**	.57**																														
Cus1	.65**	.57**	.56**	.53**	.55**	.63**																													
Cus2	.59**	.54**	.54**	.52**	.52**	.53**	.74**																												
wom1	.69**	.65**	.74**	.62**	.51**	.60**	.65**	.62**																											
wom2	.63**	.59**	.69**	.59**	.45**	.56**	.58**	.58**	.78**																										
PE1	.43**	.44**	.40**	.37**	.43**	.41**	.44**	.42**	.49**	.43**																									
PE2	.43**	.41**	.40**	.35**	.42**	.41**	.46**	.43**	.50**	.42**	.76**																								
PE3	.45**	.43**	.43**	.41**	.43**	.41**	.47**	.46**	.52**	.45**	.72**	.81**																							
EE1	.33**	.35**	.30**	.28**	.36**	.33**	.38**	.34**	.38**	.28**	.51**	.53**	.55**																						
EE2	.45**	.44**	.42**	.41**	.40**	.42**	.45**	.41**	.45**	.43**	.53**	.48**	.55**	.60**																					
EE3	.45**	.45**	.38**	.39**	.38**	.42**	.49**	.41**	.44**	.43**	.58**	.59**	.62**	.60**	.73**																				
EE4	.38**	.38**	.30**	.30**	.38**	.36**	.40**	.32**	.37**	.31**	.45**	.45**	.47**	.72**	.61**	.68**																			
SI1	.43**	.44**	.45**	.41**	.36**	.43**	.46**	.46**	.51**	.53**	.56**	.53**	.55**	.38**	.54**	.55**	.43**																		
SI2	.44**	.44**	.44**	.42**	.36**	.44**	.47**	.46**	.50**	.49**	.52**	.51**	.53**	.37**	.52**	.53**	.44**	.84**																	
SI3	.45**	.44**	.46**	.44**	.38**	.44**	.47**	.47**	.50**	.55**	.54**	.51**	.52**	.37**	.53**	.53**	.43**	.81**	.83**																
SE3	.48**	.49**	.47**	.46**	.42**	.41**	.49**	.43**	.49**	.49**	.48**	.48**	.52**	.44**	.58**	.59**	.51**	.52**	.53**	.56**															
SE4	.48**	.50**	.46**	.47**	.41**	.41**	.48**	.43**	.50**	.49**	.46**	.44**	.47**	.43**	.60**	.58**	.51**	.51**	.54**	.55**	.82**														
SE5	.49**	.46**	.43**	.42**	.38**	.45**	.46**	.39**	.46**	.46**	.38**	.36**	.41**	.36**	.56**	.53**	.43**	.45**	.49**	.50**	.67**	.74**													
BAS1	.34**	.30**	.30**	.27**	.29**	.27**	.35**	.33**	.33**	.35**	.30**	.27**	.33**	.34**	.44**	.39**	.38**	.31**	.32**	.32**	.41**	.44**	.42**												
BAS2	.30**	.29**	.27**	.24**	.26**	.25**	.33**	.27**	.31**	.32**	.34**	.31**	.31**	.33**	.41**	.39**	.31**	.33**	.32**	.33**	.37**	.42**	.41**	.66**											
BAS3	.32**	.30**	.28**	.24**	.28**	.28**	.33**	.33**	.30**	.32**	.35**	.32**	.32**	.31**	.39**	.40**	.35**	.33**	.33**	.34**	.40**	.44**	.41**	.65**	.72**										
BA1	.27**	.26**	.20**	.18**	.29**	.23**	.29**	.30**	.25**	.22**	.32**	.27**	.28**	.32**	.34**	.32**	.35**	.26**	.25**	.26**	.36**	.39**	.39**	.58**	.55**	.59**									
BA2	.26**	.26**	.21**	.19**	.26**	.20**	.30**	.30**	.26**	.23**	.30**	.32**	.31**	.35**	.32**	.32**	.37**	.26**	.25**	.26**	.34**	.36**	.30**	.61**	.54**	.56**	.74**								
BL1	.33**	.33**	.28**	.21**	.30**	.23**	.29**	.29**	.28**	.27**	.24**	.26**	.29**	.25**	.27**	.29**	.27**	.28**	.28**	.28**	.34**	.29**	.26**	.32**	.30**	.30**	.30**	.34**							
BL2	.30**	.31**	.26**	.19**	.29**	.23**	.27**	.26**	.28**	.28**	.20**	.32**	.32**	.25**	.27**	.33**	.30**	.34**	.35**	.33**	.36**	.33**	.29**	.28**	.25**	.30**	.27**	.29**	.71**						
BL3	.17**	.17**	.13**	.15**	.15**	.16**	.16**	.15**	.14**	.18**	.15**	.10**	.12**	.10**	.20**	.19**	.14**	.21**	.21**	.22**	.18**	.19**	.19**	.22**	.20**	.19**	.19**	.17**	.48**	.58**					
PQ1	.50**	.48**	.45**	.41**	.41**	.39**	.49**	.43**	.47**	.54**	.36**	.34**	.37**	.28**	.41**	.43**	.30**	.48**	.43**	.47**	.48**	.47**	.46**	.34**	.37**	.33**	.23**	.22**	.35**	.36**	.32**				
PQ2	.54**	.51**	.50**	.49**	.42**	.46**	.53**	.47**	.52**	.56**	.42**	.41**	.45**	.33**	.44**	.48**	.34**	.52**	.49**	.49**	.52**	.51**	.47**	.33**	.34**	.33**	.23**	.22**	.37**	.37**	.30**	.82**			
BI1	.41**	.40**	.41**	.38**	.38**	.37**	.37**	.34**	.45**	.43**	.52**	.49**	.51**	.37**	.43**	.46**	.36**	.53**	.51**	.50**	.45**	.44**	.41**	.27**	.33**	.33**	.25**	.21**	.26**	.35**	.19**	.45**	.51**		
BI2	.40**	.40**	.40**	.37**	.37**	.37**	.36**	.32**	.44**	.42**	.51**	.48**	.50**	.35**	.43**	.46**	.34**	.51**	.49**	.47**	.46**	.45**	.41**	.28**	.32**	.33**	.24**	.20**	.27**	.35**	.19**	.45**	.50**	.93**	
BI3	.41**	.40**	.42**	.39**	.39**	.39**	.38**	.33**	.44**	.43**	.51**	.47**	.50**	.36**	.42**	.45**	.35**	.52**	.51**	.50**	.46**	.46**	.41**	.27**	.33**	.33**	.23**	.18**	.26**	.35**	.18**	.47**	.52**	.91**	.93**

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