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# Understanding Consumers' Behaviour when Using a Mobile Phone as a Converged Device

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## Abstract

*This research develops an empirical model to explore the factors that influence consumers' behaviour while using a mobile phone as a converged device, i.e., using different functions and services on a mobile phone for multiple purposes. Convergence in this domain is particularly regarded as a social phenomenon that has now existed for over two decades. However, empirical research is lacking in terms of individual's perception and behaviour toward using a converged device. This research is the first to provide an exploratory study of individual uses of a mobile phone for personal information management (PIM), e-mail, entertainment, and commercial transaction. It also draws from the Technology Acceptance Model (TAM) and identifies some of the antecedent factors that influence the above behaviours and behavioural intentions.*

*Fifty mobile phone users were interviewed and provided their thoughts and experiences of using a mobile phone other than voice communication. The interview data was transcribed and analysed to develop an empirical model. The finding shows that although the TAM has been effective in explaining behaviours in the context of single-functional technologies, it needs further enrichment when applying it to multi-function (converged) technologies. Therefore, the result provides a significant step towards a better understanding of consumer behaviour and creates a better strategy for the market of technology convergence in the future.*

### Keywords

Technology adoption, technology convergence, mobile phone, consumer behaviour, TAM

## Introduction

The concept of convergence was described as having a huge impact on the digital economy and the industrial structure since it was introduced to the public over two decades ago. It originated from the convergence of information, communication and entertainment industries (Brand 1988). Although the types of convergence have been defined differently (Fransman 2000) and documented in numerous publications (Lind 2004), the core concept is still vague and often confusing to the public as a result of different interpretations (Katz 1996). For example convergence has been used in various contexts including technology, industry/market, network, policy and consumer product and service (Bohlin 2000; EuropeanCommission 1997; Fransman 2000; Rangone & Turconi 2003). For instances, describing in the industrial evolution towards convergence, Rosenberg (1976) considers the convergence as "the process by which different industries come to share similar technological bases (Gambardella & Torrisi 1998, p. 445)." From the networking perspective, the European Commission (EC) in 1997 defined convergence as "the ability of different network platforms to carry essentially similar kinds of services, or the coming together of consumer devices such as the telephone, television and personal computer" (Bores, Saurina & Torres 2003, p. 3). Moreover, Greenstein (1997) defined convergence as "the coming together of previously separate technologies in new products and services." Regardless of the definitions found in the literature, this concept of convergence is hard to conceive in reality and less explored in the research community (Lind 2004).

From the different aspects of convergence, this research aims to create an empirical model that draws from the technology convergence and explores the consumers' perception and behaviour while using a mobile phone as a converged device. The wider diffusion of mobile handsets coalescing with ubiquitous network infrastructure, have made the use of a mobile phone part of an individual's daily life (Palen, Salzman & Young 2001). However, despite of social communication, it is unknown how consumers will respond to the changes as different functions and services get converged over a mobile device and how this directs the way people interact with technology (Stipp 1999). Existing information technology/information systems (IT/IS) literature has yet to fully explore consumer behaviours under the settings of consumers interacting with various functions and services on a converged device. The antecedent factors that influence an individual's decisions to adopt a

converged device and the dynamic usage patterns when dealing with different technologies and services are not sufficiently investigated.

In spite of the salient comparisons between different models and theories, Technology Acceptance Model (TAM) is the most referred to theoretical framework in the field of IT/IS that pervasively applies to the understanding of individual's e behaviour towards a new technology (Lee, Kozar & Larsen 2003). However, researchers who apply TAM and other theoretical constructs to their research contexts while on the one hand suffer from the problems of low variances on verifying the constructs when more variables are incorporated into TAM, but on the other hand lack parsimony for further exploration (Lee, Kozar & Larsen 2003; Legris, Ingham & Collerette 2003). To avoid this problem and develop a better understanding of consumer behaviour in a new setting, such as the emerging of technology convergence, an empirical research model is needed that not only explains the individual's general adoption but also illustrates the factors that drive consumers to use different technological functions and services in an integrated manner. The purpose of this paper is therefore to arrive at such a model. Specific research question that the paper addresses include:

1. *For what purposes do people use their mobile phones?*

2. *What are the factors that influence people's decisions to use their mobile phone for different purposes other than voice contact?*

3. *What theoretical model can be used to understand the consumer behaviour when using a mobile phone as a converged device?*

This research is significant on three counts. First, it highlights the impact of technology convergence on consumer behaviour based on individual's perception and utilisation of mobile phone as a converged device. Second, it is argued as critical to retrospect the empirical technology studies from the scope of post-adoption and explore the technological dynamics between the product integration and the consumer behaviour (Anderson & Ortinau 1988; Shih & Venkatesh 2004). Finally, this research proposes an empirical model for further research to explore the issues of technology convergence and provide a better strategy for practitioners in their quest to meet the increasing demands from consumers.

In addition, this paper is organised by the following order. First, it briefly introduce why a mobile phone can be used as a converged device. Second, a review of the related theoretical frameworks and literature that supports the understanding of consumer behaviour while interacting with new information technology, such as TAM. Third, in-depth interviews are conducted that draw insights from consumers and the results are analysed to compose an empirical model. Lastly, discussion and conclusion are made for future research.

## The Utilisation of a Mobile Phone as a Multifunctional Tool

Developments in digitisation and the ubiquitous Internet implementation have changed the ways that people interact with technology in both organisational and individual settings. People may not be aware of the changes directly from technology convergence, but the proliferation of digital technologies already allow consumer products to become more complex and multifunctional (Stieglitz 2003, for a roadmap of handheld device market). Researchers have acknowledged the challenges of balancing between the individual value and technology complexity (Constantiou, Damsgaard & Knutsen 2006). As both digital technology and Internet accessibility eventually evolve towards convergence and provide consumers with more capacity to use their products in different manners, different issues with regard to consumer behaviour start to unfold. For example, service providers are challenged how to precisely target a specific group of consumers to market different converged products and services. In addition, they face challenges to fulfil demands from their consumers either when one technology is used to provide many consumer utilities or different technologies are used to access the same or different services simultaneously.

The penetration of mobile phone handsets and the diffusion of mobile technologies have been dramatically increasing in recent years. While it is still too early to predict that a mobile phone will become the ultimate converged device, people already carry their mobile handsets anytime and anywhere and use them for different purposes. Although a mobile phone was initially designed for voice communication, its functionalities have been increasingly expanded to perform various tasks and fulfil different purposes (Fang et al. 2006; Leung & Wei 2000; Nysveen, Pedersen & Thorbjornsen 2005), such as listening to mp3 music, playing WAP games, watching video (Shchiglik, Barnes & Scornavacca 2004; Xu, Ma & See-to 2006) and can be used for a list of m-commerce services (Anckar & D'Incau 2002; Nysveen, Pedersen & Thorbjornsen 2005). Therefore, a mobile phone can be considered a representative technology to study consumers' behaviour in the context of technology convergence in this research.

Based on Based on previous studies, the use of a mobile phone can be divided into four main categories - communication-oriented (i.e. sending or receiving e-mail), entertainment-oriented (i.e. listening to music, playing a game, and watching a movie clip), personal information-oriented (i.e. using personal organiser, alarm

clock, and office applications) and commercial transaction-oriented (i.e. checking bank account, doing shopping, and paying bills, etc) (Carlsson et al. 2006; Carlsson et al. 2005; Nysveen, Pedersen & Thorbjornsen 2005; Pagani 2004; Siau, Sheng & Nah 2004) (See Table 1).

Table 1: Technological Function and Consumer Utility on Using a Mobile Phone as a Converged Device

| Technology Category | Consumer Behaviour |
|---|---|
| Personal Information Management | Setting alarm clock, checking personal schedule, taking notes |
| E-mail Communication | E-mail with friends and e-mail for business contacts |
| Entertainment | Listening to music, watching a video clip, playing a game |
| Commercial Transaction | Checking bank account, paying bills, doing shopping |

## Theoretical Background

In the field of social psychology, researchers have a long history of verifying the components that reside within the process of individual's decision-making that lead to the changes of behaviour. Existing IT theories used to illustrate the underlying technology adoption and diffusion are mostly derived from the psychological theories, such as Theory of Reasoned Action (Ajzen & Fishbein 1980) and Theory of Planned Behaviour (Ajzen 1991). The purpose is to draw the psychological traits and the social contexts that affect individual's decision toward the anticipated behaviour as the reflection of behavioural outcome and value expectancy (Ajzen & Fishbein 1980). TAM (Technology Acceptance Model) (Davis 1989), is one such popular model derived from the Theory of Reasoned Behaviour (TRA) (Ajzen & Fishbein 1980; Fishbein & Ajzen 1975). It is one of the most notable and discussed subject among IT/IS theories in the last two decades (Lee, Kozar & Larsen 2003; Legris, Ingham & Collerette 2003).

The advantage of using TAM to understand the individual behaviour of IT acceptance is not only because it is parsimonious in theoretical validation but also because it is easy to apply to different contexts (Lee, Kozar & Larsen 2003). However, empirical research also argued for the drawbacks of using TAM. Some of the critics include its oversimplified and linear structure that may produce the results of low variances and inconsistency on predicting the actual behaviour (Jackson, Chow & Leitch 1997; Lee, Kozar & Larsen 2003; Legris, Ingham & Collerette 2003; Mathieson 1991; Taylor & Todd 1995). However, conclusions drawn from a list of TAM studies suggest that future researchers should consider the influences of other constructs, such as an individual's attributes and profession (Agarwal & Prasad 1999; Chau & Hu 2002; Rogers 1983) and/or draw factors from a broad social context (Legris, Ingham & Collerette 2003), and/or use the situational contexts as moderators in their theoretical frameworks (Finneran & Zhang 2003).

The two constructs, perceived ease of use (PEOU) and perceived usefulness (PU) proposed in TAM, have been analysed exclusively and used to link with other external variables such as system attributes and social norms, and are proved as effectively predict the individual's actual behaviour from his/her behavioural intention (BI) (Davis 1986, 1989, 1993). Contingent researchers either extend the TAM with its antecedent factors (Gefen & Straub 2000; Karahanna & Straub 1999; Venkatesh, Viswanath 2000; Venkatesh, Viswanath & Davis 1996) or develop a modified model by incorporating with new components from other theoretical constructs, such as TAM2 (Venkatesh, Viswanath & Davis 2000) or UTAUT (Venkatesh, Vishwanath et al. 2003). While empirical TAM studies have successfully verified why people want to adopt certain technology, but few have ever attempted to explore how people use the technology in width and depth, such as the relationship between product integration and consumer use variety (Anderson & Ortinau 1988; Shih & Venkatesh 2004).

In addition, there is a lack of empirical research to explain how individuals will react to the changes as different technologies emerge to convergence but on the other hand are being used by different groups of people. Although different technologies are investigated individually, at this point little research has been conducted to analyse them altogether.

## Research Methodology

Due to the lack of understanding the consumer behaviour in the contexts of technology convergence, this research is to provide an exploratory study that justifies the consumers' perception and experiences toward using a mobile phone as a converged device and scrutinises the potential determinants that may influence the

individual's behavioural intention (BI) to use a mobile phone for multiple purposes, a qualitative approach is more appropriate as it can directly draw insights from the mobile phone users. Hence, personal interviews are conducted with the consumers who possess or use a mobile phone in Australia.

The purpose of conducting this interview can be divided in three dimensions: the first is to segment the consumer groups based on the types of mobile phone handset and service plan selected; the second is to identify the influential factors from the review of individual practices when using a mobile phone for different purposes. Thirdly is to create an empirical model drawing from the support of the existing theoretical framework, such as TAM, and help to understand the consumer behaviour in the context of technology convergence, which is using a mobile phone as a converged device.

Due to the time limitation and convenient sample, fifty volunteers are recruited and will take part in this phase. Hence, they need to meet the following two criteria, namely they must be above 18 years old and possess a mobile phone for use in Australia.

Volunteers for the interview will be sought from the online forum, such as modaco.com hosted in UK, and mobile01.com and palmislife.com, both hosted in Taiwan. In addition, colleagues, friends, family members from the investigators will be invited to participate for the purpose of convenience and logistics.

Volunteers who accept the invitation posted on the online forum will be interviewed by means of replying he e-mail or through the instant message sent from the investigator. For other participants, oral invitations can be made through personal or phone contact to arrange the appointment for interview. After the participants agree to take part, the interview will be conducted either by face to face or by phone communication based on the location and time that are convenient to the participants. If the participants cannot make it to the appointment, another time and place can be arranged by either the investigator or the participant.

The process of interview can be divided into three parts: first is to segment the consumer groups by personal information such as age, gender, and occupation. Second is to ask the consumers the types of mobile phone handset and service plan selected. Third is to identify the influential factors from the review of individual practices when using a mobile phone for personal information management (PIM), e-mail, entertainment, and commerce. Therefore, during the personal interviews, interviewees will be asked the questions as "To what extent will you use your mobile phone for PIM, e-mail, entertainment, and commerce?" Next, a follow up question will be asked to the interviewees about why they use or not use their mobile phone for specific purposes. By doing so, it will be easier to identify the factors that influence individual's decision to use a mobile phone for a variety way rather than merely for voice communication.

The descriptions from the interviewees will be collected by taking notes from the investigator and will be transcribed into the computer database. Qualitative analytic software such as Nvivo 7 will be adopted to transcribe, code, and categorise the interview data. Some personal and demographic background, such as gender, age, occupation, device type, and service plan will be descriptive analysed by the statistics software such as SPSS15.0. The result is expected to create an empirical model that justified by the supporting literature and interview data and helps to form a better understanding of consumer behaviour in the context of technology convergence, which is using a mobile phone as a converged device.

## Data Analysis and Results

Among the interviews of 50 mobile phone users, 32 are male and 18 are female. The age groups of participants are among 21 to 50 years old. The percentage of interviewees' occupation is 62% employed and 38% unemployed. The individuals' selection of device type can be divided by the level of functions such as basic handset (voice and SMS), advanced handset (camera, mp3, and limited data access capability), and 3G – compatible handset (full data service capability). The selected service plan by consumers can be categorised by voice and SMS, 2G with limited data capacity (i.e. GPRS and WAP), and 3G with fast connection (See Table 2).

Table 2: Personal Information from 50 Interviewees

| Gender | Male 32 (64%) | Female 18 (36%) | |
|---|---|---|---|
| Age | 21~30 (24%) | 31~40 (64%) | 41~50 (12%) |
| Profession | Non-employed (38%) | Employed (62%) | |
| Device Type | Basic (24%) | Advanced (38%) | 3G compatible (38%) |
| Service Plan | Voice (26%) | 2G (42%) | 3G (32%) |

According to the descriptive analysis, consumers who use a mobile phone for e-mail and commercial transaction are outweighed by using it for PIM and entertainment (See Table 3). It can imply the functions embedded will have more chances to use by consumers than the services that might incur a charge.

Table 3: Frequency on using a mobile phone for PIM, e-mail, entertainment and commerce

| PIM | Yes (82%) | No (18%) |
|---|---|---|
| E-mail | Yes (16%) | No (84%) |
| Entertainment | Yes (46%) | No (54%) |
| Commercial Transaction | Yes (14%) | No (86%) |

It is easier to observe the behavioural differences by comparing the device choice and the service plan with consumers who use a mobile phone for PIM, e-mail, entertainment, and commercial transactions in a matrix. As noted in the matrix, consumers who own the multifunctional devices will have more chance to use PIM when compared with low usage on higher service plan subscribed. Besides, the consumers' choices of device type and service plan have basically similar patterns on their decisions to use a mobile phone for different purposes, except for the comparison of using a mobile phone for entertainment where the number of subscribers on advanced plan has less usage intention than the consumers who own a mobile handset with advanced functions. Therefore, device choice and service plan can be implied as equally affects the consumers' uses of a mobile phone for different purposes (See Table 4).

Table 4: Cross Matrix between Device Choice/Service Plan and Consumers' Utilities on a Mobile Phone

| | | PIM | E-mail | Entertainment | Commercial Transaction |
|---|---|---|---|---|---|
| Basic | Yes | 10 | 1 | 2 | 0 |
| | No | 2 | 11 | 10 | 12 |
| Advanced | Yes | 14 | 0 | 11 | 3 |
| | No | 5 | 19 | 8 | 16 |
| Multifunctional | Yes | 17 | 7 | 10 | 4 |
| | No | 2 | 12 | 9 | 15 |
| Voice+SMS | Yes | 10 | 0 | 6 | 0 |
| | No | 3 | 3 | 7 | 13 |
| 2G | Yes | 16 | 1 | 7 | 3 |
| | No | 5 | 20 | 14 | 18 |
| 3G | Yes | 1 | 7 | 10 | 4 |
| | No | 15 | 9 | 6 | 12 |

When asking people why they choose to use mobile phones for personal information management (PIM) and the reasons they want to use, the majority of interviewees indicate that using their mobile phone for PIM can help them to recording or retrieving the important things, such as setting alarm clock and checking time and personal schedule. Besides, they also consider it is very convenient to use as it is not necessary for them to carry other devices. In fact, some functions such as PIM are often embedded as the basic functions to any of the handsets which is unique to other functions (e.g. mp3 playback and camera) and paid-services (e.g. Internet browsing and shopping) on a mobile phone. In contrast, the lack of knowledge and skills to operate a mobile phone is the most referrable answer from using a mobile phone for advanced functions and services (See Table 5).

Table 5: Top three reasons for consumers to use a mobile phone for PIM, e-mail, entertainment and commerce

| PIM | Remind me of important things | It's convenient | It is easy to use |
|---|---|---|---|
| E-mail | Contact with friends and save money on sending SMS | Contact with business partners for information | Read newsletter |
| Entertainment | When I feel bored | It is fun | It is easy |
| Commercial Transaction | Check personal balance from my service provider | Check the latest information | Download ring tone and theme |

In addition, consumers' access to other digital devices could be an inhibitor to consumers' intention to use a mobile phone for different purposes as the interviewees respond to using a personal computer at home or at office will make them unlikely to use a mobile phone for the same functions such as e-mail, entertainment and commercial transaction. This assumption is also consistent with the conclusions by Hung, Ku and Chang (2003) and Pagani (2004). Consumers' perception of usefulness is contingently drawn from the descriptions such as "convenient", "easy", "needless to carry other devices", "easy to access" and can be regarded as the main consumer utility on using a mobile phone. Also noted, nearly half of interviewees who use a mobile phone for entertainment purposes refer to the point of access when they are waiting for others or using it on the public transport. The reasons for using a mobile phone for entertainment are because consumers may feel bored and

want to kill time at a certain time period. In contrast with the utilitarian beliefs of perceived usefulness (PU) and perceived ease of use (PEOU), some empirical TAM studies refer to the individual's perception of enjoyment as one of the intrinsic motivations that influence one's decision to use an information system (Chin & Gopal 1995; Davis, Bagozzi & Warshaw 1992; Heijden 2004; Teo, Lim & Lai 1999). However, whether the construct of perceived enjoyment is valid in the context of using a mobile phone for entertainment or a mobile phone with entertainment features will influence people's intentions to user it for other purposes are required for a further justification in future research.

Lastly, consumers' existing choices of device and service plan may have a directly impact on their capability to use or not use a mobile phone for commercial transaction as it involves with the collaboration among third party services providers, telecommunication operators and device functionalities that are available to consumers. In addition, a list of conceivable factors such as high price, unstable connection and perceived risky on transaction can be found to explain why the interviewees do not think it is useful and secured enough to use a mobile phone for conducting commercial transactions. As noted, the individual's perception of risk has been regarded as an important indicator for individuals to conduct online transaction (Chan & Lu 2004) and to adopt WAP services (Teo & Pok 2003) (Table 6).

Table 6: Top three reasons for consumers not to use a mobile phone for PIM, e-mail, entertainment and commerce

| Not to use it for PIM | It's not easy to use | No need to use | I don't know how to use it |
|---|---|---|---|
| Not to use it for E-mail | Using computer at home and at office | No capacity in my device | I don't know how to use it |
| Not to use it for entertainment | Using computer at home and at office | It is not very interesting | I don't know how to use it |
| Not to use it for commercial transaction | It's not safe | It's not very useful | I use my computer to do that |

## Research Model

After justified from the supporting literature and interview descriptions, an empirical model is thus illustrated (See Figure 1).
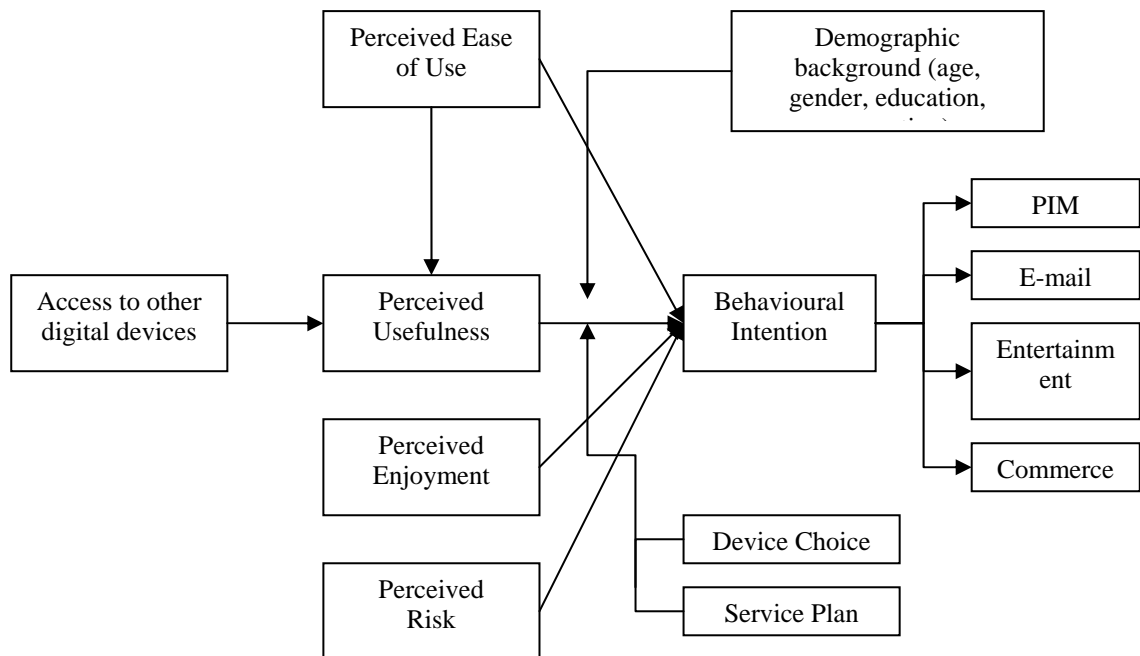


Figure 1: Research Model

## Discussion and Conclusion

Several studies have attributed to mobile Internet as a new information technology that combines the value of device capability and Internet accessibility (Chae & Kim 2003; Kim & Kim 2003; Kim et al. 2002; Pedersen 2005; Pedersen & Ling 2002), but researchers do not treat the adoption of mobile device and Internet services differently. In addition to using a combination of information and communication technologies as one dependent variable, research of mobile services adoption did not consider the choice of device as an indicator during the individual's decision to technology adoption (Nysveen, Pedersen & Thorbjornsen 2005; Pagani 2004; Teo & Pok 2003). In other words, individual's choices of device and service are often regarded as a control variable in the experiment of usability or perceived as a prerequisite across all user segmentations.

However, studies within the social communication of mobile phone are not efficiently to explain the individual behaviours of using other utilities across different consumer segmentations and usage patterns, such as using a mobile phone for information, e-mail, entertainment and commerce. Antecedent studies based on the individual's adoption of mobile services and devices have their limitations on validating the results of individual's behavioural intentions (BI) across different technologies and services. Some of them conclude their findings from the replication of TAM or verify from the modification of TAM in different contexts. The contingent TAM studies are not yet conducted based on the settings of converged device and consumer behaviour.

An empirical model is thus illustrated from the supporting literature and consumer interviews. To validate the empirical model, a large sample group and more rigorous statistics analysis such as factor analysis and structural equation modelling (SEM) are required in order to achieve both reliability and validity from the representative population.

Worth noting, the individual's perception of enjoyment and risk are often referred as the potential indicators supported by the empirical literature and they are considered as the facilitators or inhibitors of using an information system for enjoyment and commercial transaction. However, they have not been validated with the correlation of consumers' behaviour intentions for other purposes, such as PIM or e-mail communication.

Generally, a converged device affords consumers with more capability to across between virtual and physical contexts and allows them to become more interconnected with the other mobile networks and services regardless of time and space. On the other hand, the existing marketing strategy from telecommunication providers keep pushing individuals with more incentives to increase the numbers of functions and services that compete with other devices and services already used by individuals in different contexts (Constantiou, Damsgaard & Knutsen 2006). Another issue that can be brought to the discussion is whether TAM is still valid in the underlying context of convergence as different technological functions and services can be utilised by different groups of consumers from a mobile phone. Using TAM as a theoretical foundation for developing the empirical models are often inhibited by treating new information technology as single function or lose their parsimony by incorporating more variables into the research models. Therefore, it is essentially to improve the existing theoretical frameworks by bringing the research settings to the study of interrelationship between technological convergence and consumer behaviour.

Owing to the summary of knowledge from individual interviews, this research supports the empirical literature toward the understanding of consumer behaviour and dynamics of using a new information technology as a convergence. In addition, the result also complements the author's thesis and creates a significant step towards further research. More concepts and supports are further anticipated by conducting a consumer survey for model validation and statistically generalisation.

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