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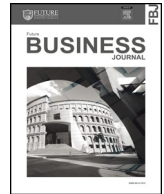


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A conceptual framework for technology-enabled and technology-dependent user behavior toward device mesh and mesh app

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ABSTRACT

The device mesh and mesh app revealed by Gartner as the future strategic technology trend are able to predict people's need from their historic data, then provides the needed services or service innovation to support their activity engagement. However, many theories have identified that it is the motivation, rather than technology, that drives people to engage in activities or tasks. For this reason, this study builds a conceptual framework by integrating the extant logic and theories to explore how future technology would generate benefits for people. It integrates task-technology fit (TTF) model and motivation theory (mainly expectancy-value theory) to explain such technology user behavior. It also points out the difference between technology-enabled and technology-dependent user behavior and concludes that too much emphasis on the role of technology with too little attention on motivation would distort technology user behavior, and the role of technology as well.

1. Introduction

Technology is constantly evolving and maturing. In the article introducing Gartner's top 10 strategic technology trends for 2017, Panetta (2016) notes that intelligent, digital, and mesh are the three themes that form the basis for these technologies which will have substantial disruptive potential across industries. The mesh, referring to the dynamic connection of people, processes, things and services supporting intelligent digital ecosystems (Panetta, 2016), are especially connected to people's daily life. For example, conversational systems enable people and machines to use multiple modalities (e.g., sight, sound, tactile, etc.) to communicate across the digital device mesh (e.g., sensors, appliances, IoT systems) (Cearley, 2016).

The world is becoming an intelligent, digitally enabled mesh of people, devices, content and services (Cearley, 2016). New devices can learn and adapt to people's needs based on specific situations, location and context of use (Smyk, 2016), and become context-aware so that they can predict users' needs in different contexts, always staying a step ahead of them and eventually making user interfaces superfluous (Pscheid, 2016). These technologies are expected to create the foundation for ambient user experience in the background where new devices respond to the data they collect automatically to shape users' environment and experience. People can accomplish each task of their daily activities in such a nature way that they do not need to consciously interact with the technology and will even not notice the technology surrounding them. Google Now is a typical example of such an application in creating ambient user experience. It can discover patterns in users' life by detecting historic data, their search history for example, from their mobile phone. Google Now knows when people typically leave work to drive home and can automatically alert them to unusual traffic based on where they are (Pscheid, 2016).

Such new devices and mesh will surely lead people to a different life in the future. However, it is still in doubt whether such a life

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is what people really want or not. Specifically, the future technology such as device mesh and mesh app predicts people's need from their historic data, then provides the needed services or service innovation to support their activity engagement without considering the motivation behind it. Many theories; e.g., intrinsic motivation theory, attribution theory, and expectancy-value theory, however, have pointed out that it is the beliefs, values, and goals that motivate people to have need for activities and thus produces actual behavior. If we neglect the motivation behind, then such technology trends will possibly lead human life to a more technology-dependent lifestyle which may abate the actual benefits generated from their activity engagement.

Gardner and Davis (2013) use 'app-enabled' and 'app-dependent' to describe two different types of digital technology use behavior of the 'app generation' users. App-enabled users know how to make use of apps to pursue new possibilities and to lead a richer life. In contrast, app-dependent users allow apps to restrict or determine their procedures, choices, and goals and hence possibly limit their potential. Now that the mesh age is coming, it is also worth exploring whether such a future technology enables users to accomplish tasks and have a better life by gaining more benefits from their activity engagement, or drive people to be more dependent on it instead.

Past studies have made great effort to investigate the values, benefits or performance information technology generates for users, especially in the context of mobile technology and mobile services; e.g., Chen (2017), Hsu and Lin (2015), Ozturk, Bilgihan, Nusair, and Okumus (2016), and Xu, Peak, and Prybutok (2015). Many models such as technology acceptance model (TAM), task-technology fit (TTF), and information system (IS) success model, have also been developed for this. However, the device mesh and mesh app are very different from the technology that was ever used before. Such future technology is so smart that it tends to lead people to a more IT-dependent life. If so, it is worth exploring how and to what extent they can bring benefits for users.

The purpose of this study, therefore, is to investigate how the future technology such as device mesh and mesh app can be used to generate benefits for users. This study tries to build a conceptual framework by applying some extant theories and models to discuss the role of the future technology. The remainder of this paper is organized as follows. In the next section, it discusses the device mesh and mesh app which was revealed as one of Gartner's top 10 strategic technology trends for 2017. In section three, it discusses the role of technology as a form of service innovation. In section four, it conducts a brief review about motivation theory and TTF model. In section five, it proposes a conceptual framework for future validation by combining motivation theory and TTF model. Finally, it gives a summary and draws the conclusion in section six.

2. A strategic technology trend: Device mesh and mesh app

The device mesh refers to an expanding set of endpoints with broader connectivity in services and the digital mesh, enabling people to access applications and information. Simply put, the device mesh is a combination of devices, including mobile devices, wearable devices, consumer and home electronic devices, automotive devices and environmental devices, which are connected with each other through network, the Internet of Things (IoT) in particular. People expose themselves to this mesh with instantaneous connection and response through time and space and obtain seamless user experience. As Fig. 1 shows, all devices such as cars, cameras, appliances, and more are connected in an expanding set of endpoints wherever people are at home, working in the office, with a customer, shopping in a retail store, eating at a restaurant, watching the game or driving in the car.

The IoT has played an instrumental role in providing seamless connectivity between users and devices. The rise of IoT is making the devices go from the mesh connections to fully connected network in which every device is connected to every other device. Before IoT, apps operate on command only; that is, users need to open the app whenever they want to use it. In the new device mesh environment, all the apps, possibly on different devices, would work together and run as a service in the background, even without users noticing, to create ambient user experience. The device mesh provides the foundations for such a new continuous and ambient user experience.



Fig. 1. The device mesh connected in an expanding set of endpoints.

Source: Gartner, 2015.

According to [Gartner \(2015\)](#), information has always existed everywhere but has often been found in an isolated, incomplete, and unintelligible form. In the future, the device mesh and IoT can make these interconnected devices more secure, intelligent, and responsive. Google Now, for example, recognizes repeated action performed by the user. It acts as an intelligent personal assistant with voice command which can organize users' daily routine without users having to do anything. In the future, people will be surrounded by these interconnected devices and things and will be constantly deriving information of services from that. Everyone will have their own personal device mesh surrounding them and serving them like personal assistants ([Patel, 2016](#)).

Such a device mesh is a certain type of connection among the devices which helps the devices connect and interact with each other. For the next 10 years, virtually every app will incorporate some level of artificial intelligence (AI) and will continually evolve and expand the application of AI and machine learning for apps and services ([Gartner, 2015](#)). The development of device mesh is propelling us to a new era, a post-mobile app era in which apps and mobile devices are so interactive that their operations will permeate every aspect of everyday life, based on the continuous and cohesive user experience ([OneNeck, 2016](#); [Murugan, 2017](#)).

In the near future, a large part of new mobile apps will be able to talk to IoT devices. The device mesh, with several mesh apps running around, provides front end experience while the service architecture gives back-end cloud scalability ([Kulkarni, 2017](#)). The mesh apps and service architecture (MASA), which refers to the apps that link into a broad mesh of back-end services to create seamless user experience, then ensures users to have a consistent experience as they switch between devices.

3. Technology as a form of service innovation

With the advancements in information technology (IT), new forms of intangible innovations, which are digital or digitally enabled with combinations of digital and physical components, emerge to create novel market offerings ([Yoo, Henfridsson & Lyytinen, 2010](#)). Mobile services or apps are a typical example which is combinations of mobile devices, mobile network, and digital contents. IT devices such as personal computers and mobile phone handsets have become important vehicles to deliver the services. As [Yoo \(2010\)](#) notes, today it is more meaningful to think about computing as a verb or a service than computers as a noun or a good (also see [Lusch and Nambisan \(2015\)](#)). Technology contributes to the value creation by enabling the sharing of information within and across service systems, and is one of the central constructs in the study of service and service science ([Akaka & Vargo, 2014](#)).

[Nambisan \(2013\)](#) notes that the extant studies on IT and product/service innovation have largely focused on the role of IT as an operand resource (natural resources, goods and money, for example), an enabler of innovation. However, IT can also be seen as an operand resource (competences, knowledge, skills and experiences, for example), a trigger or an initiator of innovation. [Akaka and Vargo \(2014\)](#) argues that the consideration of technology as an operand resource in service (eco)systems provides a more encompassing view for systematically studying the way in which technologies are integrated as resources, value is collaboratively created, and service is innovated. For these reasons, [Lusch and Nambisan \(2015\)](#) consider IT having the dual roles, as an operand resource and as an operand resource which may influence innovation process and innovation outcome.

[Swanson \(1994\)](#) suggests that information systems innovation can be categorized into three distinct types; i.e., innovations that occur: (1) within the information systems function (Type I), (2) at the individual user or work group level (Type II), and (3) at the organizational level (Type III). Based on [Swanson \(1994\)](#), [Lyytinen and Rose \(2003\)](#) identify three types of IT innovation: (1) changes in the base technology as defined by functionality, speed, reliability, architectural principle, or other features, (2) changes in IS development as defined by modeling and design principles or by coordination of related processes, and (3) changes in services as defined by changes in general service features.

To be more specific, services are the application of knowledge for mutual benefit between entities, which involves the deployment of knowledge, skills, and competencies that one person or organization does for the benefit of another ([de Grandbois, 2016](#)). Innovation refers to the new applications of knowledge, ideas, methods and skills that can generate better solutions to meet customer needs where a solution can be an offering that is not previously available ([Zhang, Zhao, Voss & Zhu, 2016](#)).

Today innovation is understood in a different way; it is a novel and better way for actors to create value through resource integration and is also a process between different actors exchanging various resources in new ways ([Koskela-Huotari, Edvardsson, Jonas, Sörhammar & Witell, 2016](#)).

Technology, on the other hand, is the practical application of knowledge enabling the sharing and integration of resources and knowledge, and thereby fostering service innovation ([Lusch & Nambisan, 2015](#)). Service innovation is technology (operand resource based), but it also often creates new operand resources. [den Hertog \(2000\)](#) present a four-dimensional model of service innovation which consists of the following dimensions: new service concepts, client interfaces, service delivery system and technology. IT has brought about new service innovation management challenges for service providers ([Wu, 2014](#)), and has offered numerous opportunities for low-cost innovations, sometimes called frugal innovation or grass-roots innovation, developed by users ([van der Boor, Oliveira & Veloso, 2014](#)).

4. Motivation theory and task-technology fit model

4.1. Expectancy-value theory (EVT)

Motivation is the driver; e.g., beliefs, values, and goals, of action. Though motivation theories have emerged from different intellectual traditions ([Weiner, 1992](#)), the expectancy-value models of behavior are those which have drawn much attention. According to [Eccles and Wigfield \(2002\)](#), expectancies refer to beliefs about how individuals will do on different tasks or activities, and values are about incentives or reasons for engaging in the activity.

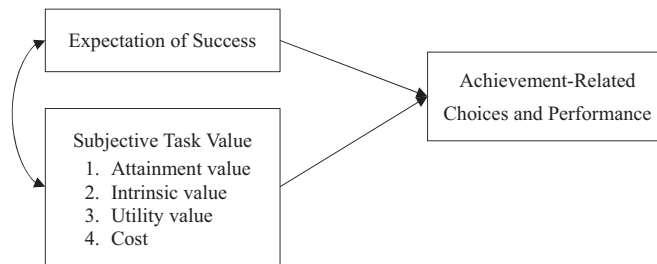


Fig. 2. A part of the Eccles et al. expectancy-value model of achievement motivation.
Source: Eccles et al. (1983).

Expectancy can be the beliefs that certain behavior will lead to certain outcomes (outcome expectation), and can also be the beliefs about whether one can effectively perform the behavior necessary to produce the outcome (efficacy expectation) (Bandura, 1997; Eccles & Wigfield, 2002). Theories like self-efficacy theory and control theory are those which focus on these expectancy beliefs. For example, self-efficacy refers to individuals' confidence in their ability to organize and execute a given course of action to solve a problem or accomplish a task (Bandura, 1997).

Values, on the other hand, focus on the reasons why individuals engage in different activities. Theories on values concern mostly about constructs such as achievement values, intrinsic and extrinsic motivation, interests, and goals (Eccles & Wigfield, 2002). Individuals with strong expectancy beliefs; e.g., outcome expectation or efficacy expectation, in engaging in the activity don't necessarily mean they have compelling reasons to do it. One of the well-known theories dealing with the reasons individuals have for engaging in different activities is the intrinsic motivation theory. This theory assumes that if individuals are intrinsically motivated, then they will engage in an activity because they are interested in the activity. Other theories such as self-determination theory (see Deci & Ryan, 1985) and flow theory (see Csikszentmihályi & Csikszentmihályi, 1988) are generally classified under this intrinsic motivation theory.

Some other theories try to integrate expectancy and value constructs. Weiner (1985) developed the attribution theory, for example, by integrating beliefs about ability and expectancies for success, along with incentives for engaging in different activities, including valuing of achievement (see Graham & Taylor, 2001). Contemporary expectancy-value theories are another examples which assumes that expectancies and values directly influence performance, persistence, and task choice, and are influenced by task-specific beliefs such as ability beliefs, perceived difficulty of different tasks, and individuals' goals, self-schema, and affective memories (Wigfield & Eccles, 2000; Eccles & Wigfield, 2002).

A part of the Eccles et al. (1983) expectancy-value model of achievement motivation is illustrated in Fig. 2. In Fig. 2, expectancies for success are about individuals' beliefs in their ability or competence; i.e., how well they will do on upcoming tasks, which are about personal or efficacy expectations, not outcome expectations. Task value includes attainment value, intrinsic value, utility value, and cost (Eccles & Wigfield, 2002), where:

- (1) Attainment value: the personal importance of doing well on the task.
- (2) Intrinsic value: the enjoyment the individual gets from performing the activity or the subjective interest the individual has in the subject.
- (3) Utility value: how well a task relates to current and future goals.
- (4) Cost: the negative aspects of engaging in the task, such as perceived effort, loss of valued alternatives, and the psychological cost of failure (Flake, Barron, Hulleman, McCoach & Welsh, 2015).

There may exist some overlapping elements among these four task values. For example, utility value and attainment value are often considered being overlapping because perceiving a task to generate utility value assumes that people recognize the importance of doing well on the task (attainment value) (Johnson & Sinatra, 2013).

Contemporary expectancy-value theories give elaboration of how expectancies and values relate to choices and performance, and has become the foundation of a series of behavioral theories such as the theory of reasoned action and the uses and gratifications theory (Sun, Fang & Lim, 2012). They can be criticized, however, for emphasizing the logical, rational decision-making processes of determining expectancies and values; sometimes people prefer simpler, but more fallible and optimistic, decision-making strategies (see Eccles and Wigfield, 2002).

4.2. Task-technology fit (TTF) model

The task-technology fit (TTF) model was developed by Goodhue and Thompson (1995) by which they evaluate how information technology leads to performance, assess usage impacts, and judge the match between the task and technology characteristics (Wu & Chen, 2017). TTF asserts that information technology should be a good fit with the tasks it supports in order to be utilized and to positively affect user performance (El Said, 2015). In other words, both task characteristics and technology characteristics can affect the task-technology fit, which in turn determines users' utilization of technology and their task performance, as depicted in Fig. 3.

There are five key constructs in the TTF model: task characteristics, technology characteristics, task-technology fit, utilization,

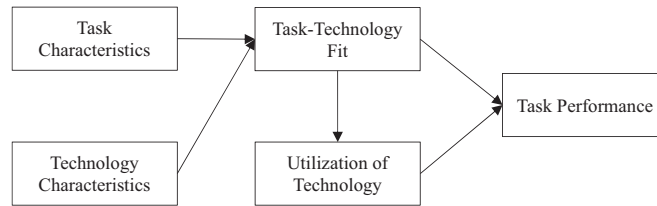


Fig. 3. The task-technology fit (TTF) model.

Source: Goodhue and Thompson (1995).

and performance impact. According to Goodhue and Thompson (1995), each construct can be defined as follows.

- (1) Technology: tools used by individuals in carrying out their tasks. In the context of information systems research, technology refers to computer systems and user support services provided to assist users in their tasks.
- (2) Tasks: the actions carried out by individuals in turning inputs into outputs.
- (3) Task-technology fit: the degree to which a technology assists an individual in performing his or her portfolio of tasks.
- (4) Utilization: the behavior of employing the technology in completing tasks. Measures such as the frequency of use or the diversity of applications employed have been used.
- (5) Performance: the accomplishment of a portfolio of tasks by an individual. Higher performance implies some mix of improved efficiency, improved effectiveness, and/or higher quality.

The TTF model suggests that users will give higher evaluations based not only on technology characteristics, but also on the extent to which that technology meets users' task needs and their individual abilities (i.e., task-technology fit) (Goodhue, 1995). Therefore, even the same technology can get different evaluations from users with different task needs and abilities (Goodhue, 1995).

Consistent with IS success model developed by DeLone and McLean (1992), the TTF model also posits that both utilization and user attitudes toward the technology lead to individual performance impact. Different from the TAM developed by Davis (1989), which addresses the beliefs and attitude toward technology and replaces many of TRA's (Theory of Reasoned Action) attitude measures with perceived usefulness (PU) and perceived ease of use (PEOU), the TTF model focuses on the fit between task characteristics and technology characteristics (Lu and Yang, 2014). Even so, Mathieson and Keil (1998) confirm that the PEOU is also a function of TTF. Some combined models of technology acceptance and the task-technology fit have then been developed in the literature to improve their model fit (Pagani, 2006; Yen, Wu, Cheng & Huang, 2010; Zhou, Lu & Wang, 2010; Wu & Chen, 2017).

According to Dishaw and Strong (1999), TTF models assume that users choose to use IT that improves their job performance, and lacks a consideration of their attitude toward the IT. Actually users regularly utilize IT that they do not like because it improves their job performance. This means that user attitude in TAM still play an important role in predicting IT use behavior. For this reason, Dishaw and Strong (1999) integrate TTF with TAM by considering TTF a predictor variable of PEOU and PU, both of which then predict user attitude towards IT. In their earlier work, Mathieson and Keil (1998) also argue that TTF affects PEOU. By following this idea, many studies have provided empirical evidence verifying the effect of TTF on the PEOU and PU in the context of online auction (Chang, 2010a, 2010b), hotel information systems (Kim, Suh, Lee & Choi, 2010), and massive open online courses (MOOCs) (Wu & Chen, 2017).

In addition to integrating TTF with TAM, some other studies incorporate the effect of users' motivation to use IT on the PEOU and/or PU; the effects of confirmation (Larsen, Sørøbø & Sørøbø, 2009), users' self-efficacy (Kim et al., 2010; Dishaw, Strong & Bandy, 2002), and social motivations (Wu & Chen, 2017), for example. In other words, in these studies users' motivation such as confirmation and self-efficacy is seen as a predictor variable of PEOU and/or PU apart from TTF. Lin and Huang (2008) propose a different thought by considering users' self-efficacy having direct effect on TTF in the context of knowledge management system usage.

Lu and Yang (2014) note that the TTF model still needs further studies to obtain more insights into its validation across different contexts. TTF does not only predict current performance and utilization intensity but also help in predicting future utilization (Aljukhadar, Senecal & Nantel, 2014). TTF has been applied mainly at the organizational rather than the end user level (Iyer, Germain & Claycomb, 2009). Researchers however indicate the potential implications of TTF at the individual level (Aljukhadar et al., 2014); e.g., college students who use a virtual learning platform (Lin, 2012), college teachers who use e-learning tool (Larsen et al., 2009), consumers who use online auction (Chang, 2010a, 2010b), learners who use Massive Open Online Courses (MOOCs) (Wu & Chen, 2017), and social networking sites (SNS) users (Lu & Yang, 2014).

5. A conceptual framework for technology-enabled and technology-dependent user behavior

5.1. The role of future technology in supporting users

The role of technology is becoming more and more important in human life. It is especially noting when Gartner (2015) revealed its new list of the top 10 strategic technology trends for 2016, which is expected to make an even greater impact on people's future life. Future technology such as device mesh and mesh app is able to detect users' actual behavior, predict their need for activities,

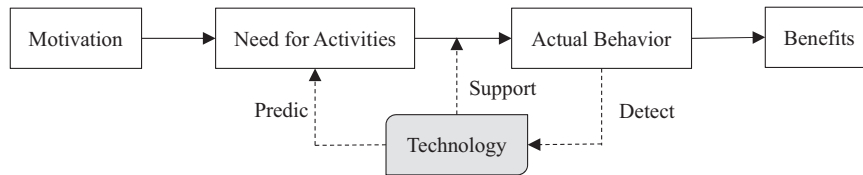


Fig. 4. A technology-driven user behavior.

provide the needed information or services to support it, and finally generate benefits, or task performance in TTF model, for users, as shown conceptually in Fig. 4. However, such technology is not able to detect the motivation behind the activity engagement, and to respond to the benefits generated either. To users, it can be risky for a prediction to be done without being based on the benefits gained, and without knowing the motivation that drives the activity engagement. Specifically, if we overlook the motivation behind, then it is likely that the future technology would lead human life to a more technology-driven lifestyle. If this is the case, it will abate the benefits generated from their activity engagement.

It is generally admitted that using technology inevitably causes some negative social side effects such as physical and mental health problems and putting privacy and safety at risk. In some cases, the negative effects of a particular technology have been reluctantly accepted as necessary in order to reap its benefits (Johnson & Wetmore, 2009). As Fig. 4 demonstrates, the device mesh and mesh apps seem to lead human life to a technology-driven lifestyle. If so, it would be an extreme aberration from the natural course of gradual human evolutionary adaptation process (You, 2015). The benefits reaped can abate as a result.

Gardner and Davis (2013) use ‘app-enabled’ and ‘app-dependent’ to describe two possible outcomes for a life immersed in digital technology in that app-enabled users know how to make use of apps to pursue new possibilities and to lead a richer life while app-dependent users allow apps to determine their choices and goals and thus will limit their potential. We hope that people will use the future technology in a wise way such that it can enable users to accomplish tasks and have a better life by gaining more benefits from their activity engagement or social exchange, instead of driving people to make improper use.

5.2. Technology-enabled vs. technology-dependent user behavior

Studies on the impact of technology on human behavior, from TAM to TTF model, has been widely discussed in the literature. However, it is believed that it is the motivation, rather than technology, that drives people to engage in activities or tasks. Too much emphasis on the role of technology with too little attention on motivation would distort human behavior, and the role of technology as well. For this reason, this study tries to integrate TTF and EVT where EVT emphasizes the importance of motivation (expectation and subjective value) in activity and task engagement, and TTF emphasizes the fit between technology and task which can improve the task performance, to investigate how the task performance will change if the future technology is applied by ignoring the motivation.

Value has been a critical concept both for suppliers and customers, and has been at the heart of all human activity in which the worth of what is obtained from activity engagement for exchange is evaluated by the value gained (Kuzgun & Asugman, 2015). As Aitken and Paton (2016) cited, value is recognized as being multi-faceted and socially constructed and is taken to extend beyond the simple rationalization of utility. Edvardsson, Tronvoll, and Gruber (2011) argue that value itself must be understood as part of the collective social context which implies norms and values that exert a profound influence on both the service exchange and the value creation process.

EVT holds that human behavior is goal-oriented and uses expectations and subjective value to predict such behavior. Today when people perform tasks, even some daily activities, they inevitably rely on the technology. TTF holds that the technology is more likely to have a positive impact on task performance if the characteristics of the technology match those of the tasks that users perform. As mentioned earlier, the future technology will be very different from what we have seen today. The future technology such as device mesh and mesh app seems to lead people to a more technology-driven or technology-dependent lifestyle. If this is the case, it is worth exploring how the future technology will generate benefits (task performance) for the users.

By combining TTF and EVT, this study builds a conceptual framework to explore the role of technology in the benefit generating process, as that depicted in Fig. 5. Part (a) describes the technology-enabled decision-making process where people decide to conduct tasks based on their expectation and subjective task value (line A and B), which can be determined by their previous experience (Eccles & Wigfield, 2002). People then decide which technology to use in assistance with the task engagement (line C) according to their knowledge, skills and experience. After that, the task characteristics and technology characteristics determine the task-technology fit (line D and E), which in turn determines people's actual behavior (line F) and generate performance (line G). Such a performance generated then determines people's expectation and subjective task value for the next tasks (line H).

Part (b) in Fig. 5 describes the technology-dependent decision-making process where people depend on the services provided by the technology that constantly detects historic data on their actual behavior (line A). The technology then support the people's task engagement or even determine what tasks they should conduct (line B). As the technology and tasks are determined, both the task characteristics and technology characteristics then determine the task-technology fit (line C and D), which in turn determines people's actual behavior (line E).

In comparison with part (a), it is obvious that part (b) in Fig. 5 disregards the task performance generated, and people's expectation and subjective task value as well (those with dotted lines in part (b)) when it determines what services the technology will

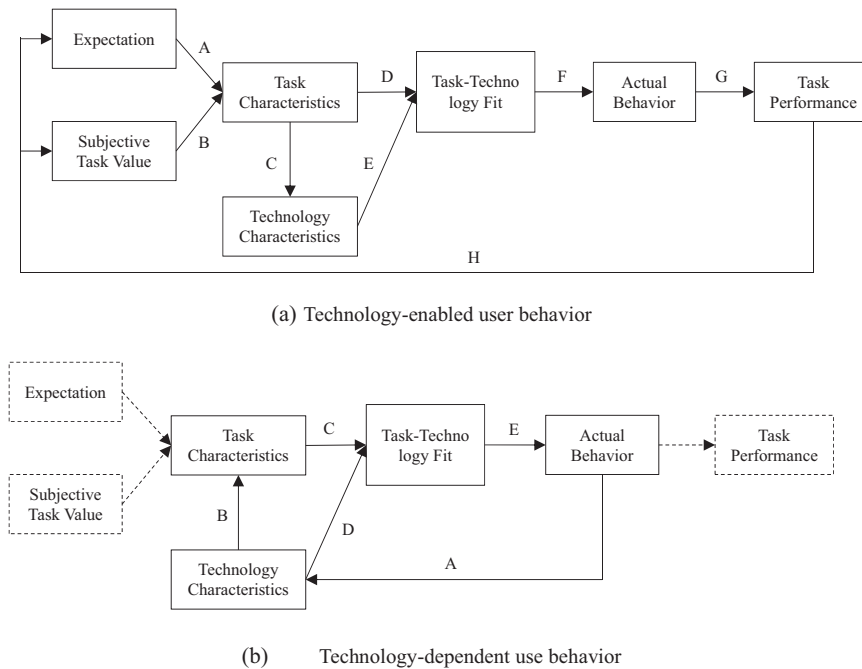


Fig. 5. A conceptual framework for technology-enabled and technology-dependent user behavior. (a) Technology-enabled user behavior. (b) Technology-dependent use behavior.

provide in assistance with the tasks. Such predictions of behavior without regard to the human's motivation that prompts them to act in a certain way seem to be a serious problem of the future technology. If this is the case, then it is possible that the task performance from (b) would be lower than that from (a). Big data analysis, another example of technological applications, uses a similar logic to perform prediction of outcome and behavior by observing and tracking large sets of historic data. All such predictions without understanding the motivation behind these outcome and behavior can as a result impair the performance generated.

6. Concluding remarks

Technology plays an increasingly important role in people's daily life. It is common today for people to employ technology, mobile devices and apps in particular, to help conduct daily activities. The current technology is smart, but still takes users' effort to choose suitable apps, download them, and switch between apps for different tasks. The future technology such as mesh apps revealed by Gartner (Panetta, 2016) is able to predict people needs in different contexts a step ahead of them by gathering contextual data on personal daily patterns, and then provide the information or services needed across boundaries of device mesh, time and space to create ambient user experience.

In the literature, authors have made great efforts to explore the role of technology in shaping new life for human beings. Theories such as TAM and TTF model are developed to explore the impact of technology on human behavior. However, it is believed that it is the motivation, rather than technology, that drives people to engage in activities and tasks. Too much emphasis on the role of technology with too little attention on motivation may distort human behavior, and the role of technology as well. This is especially important since the future technology such as device mesh and mesh app is so smart that it may lead people to a very different life. It is therefore necessary for researchers to reexamine its effect with more insightful thoughts. In this study, we integrate TTF and motivation theory (mainly expectancy-value theory) with an emphasis on the importance of expectation and subjective value in activity and task engagement, and build a conceptual framework to explore how future technology can create benefits for people. Such a framework successfully portrays the future technology as a supportive role in helping people complete activities and achieve performance, and is considered the major contribution in this study.

The conceptual framework remains to be further validated by empirical studies. Especially it is worth examining how the task performance generated will change if the future technology is applied without considering the motivation of people's activity engagement. Advances in technology, IT in particular, has substantially transformed service systems and has extended the boundaries of service interactions (Breidbach & Maglio, 2016). Benefits brought by technology for firms and customers has been well documented in the literature. Nevertheless, some negative effects, such as physical and mental health problems and putting personal privacy and information security at risk, also receive wide discussion. Improper technology use irresponsible to personal need or motivation can be another form of these negative effects which may impair the value created for users. All these remain to be further examined.

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