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Adedapo Ojo  
*Multimedia University Malaysia, ojo.adedapo@mmu.edu.my*

Murali Raman  
*Multimedia University Malaysia, murali.raman@mmu.edu.my*

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# **Modelling the underlying behavioural antecedents of the digital divide from the ability, motivation and opportunity framework**

## **Adedapo Oluwaseyi Ojo**

Faculty of Management  
Multimedia University  
Cyberjaya, Malaysia  
Email: ojo.adedapo@mmu.edu.my

## **Murali Raman**

Faculty of Management  
Multimedia University  
Cyberjaya, Malaysia  
Email: murali.raman@mmu.edu.my

## **Abstract**

This paper proposes a model to explain the underlying behavioural antecedents of the digital divide in terms of the usage of digital technology. The increasing accessibility to digital technology has triggered major changes to users' behaviour. Some users have leveraged the technologies in enhancing productivities, while others have recorded little or negative impact. Thus, by integrating the social cognitive theory with the ability, motivation and opportunity (AMO) framework we posit an encompassing determinant of individual's engagement with digital technology. Specifically, we identify ability and motivation as the determinants of individual's usage of digital technology and suggest technology accessibility in terms of opportunity, as the moderator of the relationships. The proposed theoretical model will be tested using data to be collected from the Bottom 40 segments in Malaysia.

**Keywords** digital divide, user's engagement, usage of digital technology, behaviour, individual differences

## 1 Introduction

Discourse on the digital divide has evolved from the binary notion of material access and lack of access to individual's capability to engage with the digital technology (van Deursen and van Dijk, 2015). This is partly due to the advent of low cost smart phone, micropayment data services and community based ICT projects in most developing economies, which have enabled increasing accessibility to digital technology (Naik et al., 2012). However, despite the increasing accessibility, the divide still persists most especially in terms of skills and usage (van Deursen and van Dijk, 2015; Helsper et al. 2015). At the individual level, advancement in digital technology has widened the gap between the skilled and unskilled. While the latter are struggling to catch-up with the relentless pace of innovation, the former are better equipped to access, adopt and use the new technology, thereby deepening the disproportionate gain. This growing gap can be described as the digital divide.

Studies have started to investigate the determinants and outcomes of the digital divide at the individual level (van Dijk and van Deursen, 2014; Agarwal et al., 2009), yet limited attempts have been made to clarify the underlying mechanisms shaping the digital divide (van Deursen and van Dijk, 2015; Ghobadi and Ghobadi, 2015). Specifically, studies have mostly examined the implications of demographic variables like income, education, gender, ethnicity, etc., on individual's access to ICTs (Livingstone and Helsper, 2007). In addition, recent attempts at exploring the underlying mechanisms have associated digital inequality with different types of access gaps including motivational, material, skills and usage (van Deursen and van Dijk 2011; Hargittai 2010). Although, studies have demonstrated the interactions among such gaps and digital access (Ghobadi and Ghobadi, 2015) yet, the underlying behavioural antecedents have not been fully explicated. Not surprisingly, the relationship between increasing accessibility and digital inclusion has been determined to be inconclusive (Naik et al., 2012; Hargittai, 2010; Araque et al, 2013). According to Araque et al. (2013) further to technological accessibility, studies will need to clarify the underlying behavioural antecedents for individual's engagement with digital technology.

The accessibility notion on the digital divide assumes the reproductionist perspective, which associates individual's usage of digital technology with sociodemographic profile (Mossberger et al., 2008). Specifically, the social exclusion of those with low income and socio-economic status limit them from using digital technology, which in turn extends to digital exclusion (Selwyn, 2006). Therefore, policies aimed at facilitating the inclusion of the disadvantaged were introduced to ensure that they gain access to the digital technology (Harambam et al. 2013). Such perspective on digital divide assumes that individuals are homogenous to the society and are likely to share similar information needs. Thus, the need to be connected is generally shared by all individuals, but some are just not able to because of their low socio-economic status. However, as Selwyn (2006: 275) noted, people are not just 'end users with no role to play beyond accepting ready-made technological artefacts'. Perhaps, technology usage is an outcome of the choice made by the users, because individuals have the right to decide whether they would use or not use the technology.

Consequently, we argue that bridging the digital divide requires deepening understanding of the underlying behavioural antecedents of individual's usage of digital technology. This aligns with Bandura's (2001) social cognitive theory on human agency. Specifically, the increasing accessibility to digital technology has triggered major changes to users' behaviour in terms of engagement with the technology. Some users have leveraged the technologies in enhancing productivities, while others have recorded little or negative impacts. In attempt to explicate the underlying cause, we posit that an individual's usage of digital technology is determined by her ability, motivation and the opportunity, which can be expressed in terms of the facilitating conditions for technology usage. Our proposition is further discussed in the following theoretical framework.

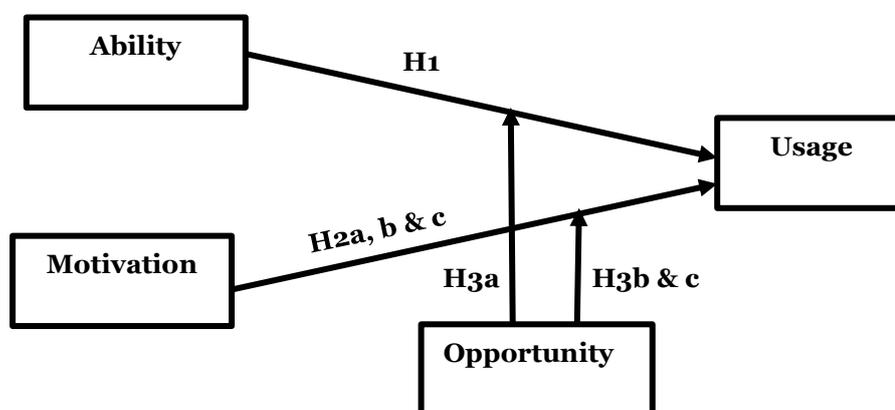
## 2 THEORETICAL FRAMEWORK

Digital technologies broadly consist of the array of ICT devices that are used to handle information and facilitate unrestricted communication. The increasing accessibility to ICTs has necessitated the need to relate individual's level of technology engagement with digital inclusion. For instance, the usage of ICTs by the disadvantaged (i.e. poor, less educated, rural dwellers) have been determined to influence specific dimensions of inclusive growth like empowerment and connectedness in the disadvantaged communities, mostly in the emerging economies (Baron and Gomez, 2013; May and Diga, 2015). Following this trend, one of the most cited barriers to individual usage of technology is ability, which has been expressed in terms of skill proficiency or educational level. Also, the low income and social status of the poor have hindered their abilities to afford and effectively use technology (Hasan et al., 2009).

According to Gurstein (2003) the effective use of digital technology requires “the capacity and opportunity to successfully integrate ICTs into the accomplishment of self or collaboratively identified goals”. While the capacity relates to the internal factors within individual’s control, the opportunity entails the external or situational factors that could influence usage. Social cognitive theory corroborates the significance of the internal and external factors on individual’s behaviour (Bandura, 2001). Through human agency individual exhibits her power of choice over outcome and leverage on awareness to continually regulate her behaviour in tandem with the desired outcome (Bandura, 2001). This regulatory influence is called self-efficacy, which is enacted through the belief in one’s capability to successfully control actions or outcomes. According to Wood and Bandura (1989) these beliefs are based on the awareness that one possesses the requisite cognitive ability, motivation and resources to complete the task. While the significance of ability on usage behaviour has been widely acknowledged in digital divide, yet the implications of the other factors have not been fully investigated (van Deursen and van Dijk 2015; Helsper et al. 2015). Consequently, in attempt to explicate the underlying behaviour antecedents we posit that the usage of digital technology is determined by the individual’s ability, motivation and opportunity (AMO). The AMO framework was originally posited to explain consumer’s response to advertisement, but, its emphasis on both the internal and external factors underlying information processing has made it appropriate in different contexts (Bigne et al., 2015; Hughes, 2007). Specifically, AMO is a meta-theory, which posit a high-level generalization / abstraction about the antecedents of human behaviour (Hughes, 2007; Gregor, 2006). Therefore, the nature of the relationships among the AMO variables is subject to the context of investigation.

Drawing insights from the above, we argue that the increasing accessibility to digital technology provides opportunity for the less privileged to use the technology, but the effective use cannot be separated from the behavioural disposition underlying individual’s action. Earlier studies on the Internet adoption have suggested individual’s holistic experience as the underlying determinants of usage behaviour (Agarwal et al., 2000; Lin 2009). In essence, individuals’ are expected to interact differently with technology based on their beliefs as well as perception of needs and relevance. Although, the acceptance of technology has been shown to result in behavioural changes, however, few studies have simultaneously examined the underlying factors for such change. Therefore, given the complexity of factors associated with technology acceptance, the need to clarify the underlying cognitive, affective and contextual aspects has become salient to future research (Straub 2009).

Accordingly, further to the extant conceptualization of ability has the underlying factor of technology usage, we posit an encompassing determinants in terms of individual’s engagement. In addition to ability, i.e., skills and training, variation in individual’s engagement in a given task can also be explained by the motivational and opportunity components (MacInnis and Jaworski, 1989). Motivation relates to individual’s willingness, drive and desire to behave in a certain way. Drawing on self-determination theory of motivation (Deci and Ryan, 2002), technology usage is expected to vary between intrinsically and extrinsically motivated individuals. While opportunity is an essential factor, which captures one’s awareness of the possible adverse effect that the lack of opportunity has on the completion of a given task. For example, an individual with the requisite digital skills might not be able to engage with digital technology, due to impediments like poor Internet access, unreliable or lack of devices as well as other information infrastructure. On the hand, the presence of opportunity might encourage an unwilling individual to engage with digital technology. Our proposition is depicted in the conceptual model (see Figure 1).



**Figure 1. Conceptual Model**

## 2.1 Ability and Usage

Ability can be expressed in terms of the technical skills and competency underlying the usage of digital technology. Therefore, digital skills entail the “set of skills that users need to operate computers and their networks, to search and select information, and the ability to use them for the fulfilment of one’s goals” (Van Dijk, 2005:73). The relationship between digital skills and frequency of usage has attracted significant scholarly discourse. According to Hargittai (2004) the completion of online task is dependent on the intensity of one’s usage of the Internet. In addition, multimodal perspective on usage reveals that the modes of activities a user engages in is determined by her frequency of usage (Wei, 2012). While these studies have identified Internet usage has the determinants of digital skills, the reverse relationship is equally plausible. A recent longitudinal study on the relationship between digital skills and frequency of usage concluded that individual with the requisite computing skills tend to engage more with the Internet, as compared to those with weak skills (Matzat and Sadowski, 2012). Consequently, we suggest the following hypothesis to describe the relationship between digital skills and usage.

*H1: There is a positive relationship between digital skills and the usage of digital technology.*

## 2.2 Motivation and Usage

Individual’s engagement in a given task can be explained by the underlying motive, which can be further delineated into intrinsic and extrinsic components (Vallerand, 1997). An intrinsically motivated individual derives internal satisfaction from performing a given task, while an extrinsically motivated individual is driven by the result associated with the performance of the task (Deci and Ryan, 2002). The former has been operationalized as perceived ease of use in information system research to capture individual’s willingness to commit the necessary effort into using technology. While the latter has been operationalized as perceived usefulness to capture individual’s perception of the extent to which the usage of technology will enable her to achieve better outcome (Davis, 1989). Nevertheless, the implications of intrinsic motivation has been oversimplified, while the role of extrinsic motivation has been overemphasized (Venkatesh et al., 2003; Hong et al., 2006). As noted by Thomas and Velthouse (1990) studies on the role of intrinsic motivation in technology usage should be focused on clarifying the implication of the hedonic attribute. This because, individuals are likely to associate their usage of technology with instrument attributes, which are extrinsic in nature. Nevertheless, technology usage could also be driven by hedonic values like meaningfulness, satisfaction and fulfilment, which are intrinsic nature. However, perceived ease of use does not capture the richness of these hedonic attributes (Li et al., 2013).

Recent attempts at explaining the implication of intrinsic motivation on technology usage have drawn on Deci and Ryan’s (2002) self-determination theory (SDT). The SDT acknowledges individual autonomy has been associated with behaviour in various contexts (Chen and Jang, 2010). Intrinsically motivated individuals are expected to use digital technology because they consider it to be enjoyable or challenging. While extrinsically motivated individuals are outcome oriented and will consider using digital technology because of the benefit. Since studies on the role of motivation in the general usage of Internet are just emerging, we draw on findings from online learning context. For example, students’ engagement in electronic learning activities have been linked to the SDT. As compared to the extrinsically motivated students, the intrinsically motivated ones were found to be more engaged in completing online task (Martens et al., 2004) and contributing to online discussion (Rienties et al., 2009).

Given the above, the following hypotheses are suggested.

*H2: There is a positive relationship between extrinsic motivation and the usage of digital technology.*

*H2b: There is a positive relationship between intrinsic motivation and the usage of digital technology.*

*H2c: Usage of digital technology will be significantly higher for intrinsically motivated user as compared to extrinsically motivated user.*

## 2.3 Opportunity and Usage

Opportunity can be expressed as the availability of time and favourable conditions, which enable a particular behaviour (MacInnis et al., 1991). Research on behavioural control (Ajzen, 1991) posited that the actual performance of a behaviour is moderated by individual’s access to resources and opportunities. In the context of one’s engagement with digital technology, opportunity can be considered from a positive view of availability or from a negative perspective of the obstacles or constraining factors

(MacInnis et al., 1991; Bigne et al., 2015). The lack of opportunity is evident when individual have the will to do something, but are not able to do so, due to external or internal conditions. Therefore, technology acceptance literature has acknowledged the role of facilitating conditions in removing the obstacles to use a system (Venkatesh et al., 2003). Nevertheless, individual's perception of such conditions might not accurately and realistically predict behaviour. This is most likely when the perceptions are based on incomplete information and/or there is uncertainty regarding the outcome (Venkatesh et al., 2008). Thus the opportunity to access digital technology is an essential, but insufficient condition for individual's engagement with the technology. This is because, opportunity can be associated with other technological and human factors including the Internet, devices and other information infrastructure that can facilitate access (Strader and Hendrickson, 1999).

Given the above, the presence of opportunity to access digital technology might not directly impact on individual's engagement with the technology. Nevertheless, opportunity could be a situational determinant of how one's competence and disposition relate to individual's engagement. Therefore, the effect that individual's ability or motivation has on her engagement with digital technology could be contingent on the opportunity to access the technology. For instance, individual with the requisite digital skills might not be able to engage with digital technology, due to impediments like poor Internet access, unreliable or lack of devices as well as other information infrastructure. On the hand, the presence of opportunity might encourage an unwilling individual to engage with digital technology. An individual might be driven to use digital technology because of the need to conform to group behaviour. When everyone around are using the technology, individual's might unwillingly engage with the technology in order to conform to group identity. Likewise, individual's willingness to engage with digital technology might be enhanced because of the support of those within her network, who using similar technology. Apparently, there has been an increasing accessibility to digital technology, even in emerging economies, where several community based ICT projects have emerged (Naik et al., 2012). While the increasing proliferation of ICT devices has offered Internet access to some of the less privilege, yet individuals are likely to face some restrictions in their usage of digital technology.

Thus, the following hypotheses are suggested.

*H3a: The relationship between digital skills and usage of digital technology is moderated by the opportunity to access digital technology.*

*H3b: The relationship between extrinsic motivation and usage of digital technology is moderated by the opportunity to access digital technology.*

*H3c: The relationship between intrinsic motivation and usage of digital technology is moderated by the opportunity to access digital technology.*

### **3 Methodology**

The present study will investigate the underlying behavioural antecedents for the digital divide based on the perspective of technology usage in the rural and underserved communities in Malaysia. Several initiatives aimed at enhancing digital inclusion have been introduced in Malaysia. For example, the Digital Malaysia is aimed at bridging the digital divide by facilitating access to, adoption and usage of digital technology by the Bottom 40 (i.e., B40) segment of the country's population living in the rural and underserved communities. Therefore, the unit of analysis for this study are the individuals within this segment. The B40 has been further categorized into three major segments of underemployed information technology (IT) literates, school leaver IT literates, and semi-skilled IT illiterates (Digital Malaysia, 2016). Thus, a random sample of 300 individuals across these segments will be selected as respondents. Each segment will constitute a strata. The numbers of respondents from each strata will be representative of the population distributions of the B40 across the segments. Furthermore, the variables will be measured based on the respondents' perceptions of questions that are developed from validated scales and literature. The measurements will be assessed using the Likert Seven-point interval scales. The data analysis will be done in two stages. At the first stage, the SPSS will be used in order to screen the data and obtain the univariate statistical analysis. The second stage will involve the use of SEM in conducting the confirmatory test. This will involve the evaluation of the hypothesized relationships among the variables (see Figure 1).

## 4 Conclusion

This study will contribute to knowledge on the digital divide. We conceptualized the digital divide from the perspective of individual's usage of digital technology and identified the underlying behavioural antecedents. Specifically, the increasing accessibility to digital technology has triggered major changes to users' behaviour in terms of engagement with the technology. Some users have leveraged the technologies in enhancing productivities, while others have recorded little or negative impacts. Thus, further to the possession of the requisite digital skills, usage of digital technology can also be explained by the underlying motives for individual's behaviour (i.e., extrinsic versus intrinsic). The proposed theoretical model will be tested with data to be collected from the individuals within the B40 group across Malaysia.

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