Bridging the Digital Divide: Use of Public Internet Kiosks in Mauritius

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ABSTRACT
Subsidized ICT access is often provided in less-developed regions of the world to bridge the digital divide. While such efforts can be helpful, their effectiveness depends on targeted users' willingness to utilize the ICT provided. To better understand the phenomenon from users' perspective, this study examines the factors influencing individual's intention and behavior of using public internet kiosks in Mauritius. Having witnessed rapid growth in ICT recently, Mauritius is an appropriate context for this study. Findings indicate that self efficacy, perceived ease of use, perceived usefulness, subjective norm, and perceived behavioral control are significant in explaining ICT use. Although these factors have been studied in the developed world, their perception and assessment in the developing world differ and deserve more attention. This study adds to the limited empirical research in this part of the world. Implications for research and suggestions for encouraging ICT use in such regions are discussed.

Keywords: Digital Divide, Technology Use, Public Internet Kiosk, Mauritius

INTRODUCTION
Driven by the success of the World Wide Web, information and communications technology (ICT) has been integrated into virtually every aspects of life, redefining the political, economical, social, and work environments. It is widely believed that universal access to ICT will promote economic development, global interaction, and learning that can in turn enhance standards of living and improve social welfare (Dewan & Riggins, 2005). However, a large gap still exists between ICT "haves" and "have-nots" in many parts of the world. "ICT haves" refer to those who can access ICT while "ICT have-nots" are socially disadvantaged individuals who have less opportunity to access and use ICT (Lam & Lee, 2006). The gap between these two groups is commonly termed the "digital divide" and often develops due to historical, geographical, socioeconomic, educational, or behavioral reasons. Digital divide was first acknowledged by the United States (U.S.) Department of Commerce's National Telecommunications and Information Administration in a study that quantified ICT use by various socioeconomic groups (United States Department of Commerce, 1995). It has been an important topic of interest

among researchers and practitioners in information system (IS), public administration, and sociology fields (e.g., Lam & Lee, 2006; Sipior et al., 2003), with studies spanning different levels of analysis (i.e., individual, organizational, national), subjects, and methodologies (e.g., case study, survey) (Dewan & Riggins, 2005).

To bridge the digital divide, many researchers and practitioners have recommended the use of internet kiosks known variously as telecenters, information kiosks, internet access points, community technology centers, and cybercafés (Schware, 2007) to provide subsidized or free ICT access to underserved populations. Internet kiosks allow public to access information and services on the internet and they have been set up in various countries. For example, in Nigeria, the Owerri Digital Village was launched in 2001 to provide youths with technology tools and resources for learning (Ugwuegbu, 2003). In India, the Prime Minister's Office initiated the Warana Wired Village Project to increase efficiency of cooperative societies by providing agricultural, medical, and educational information to 70 villages (Das & Narayanan, 2005). In the developed world as well, the government of Denmark sponsored several public policy projects to increase internet use among the elderly population (Jaeger, 2004). In North America, Canadian libraries provide public internet access that served as the main access point for about 8% of Canadians (Umbach, 2004). Despite substantial investments in internet kiosks around the world, users' perceptions about them remain unknown and empirical studies that provide more generalizable understanding are few. It is important to study internet kiosks in its own right because unlike personal computers, they are installed at public locations and shared among rather than owned by individual users. Issues such as convenience of location and cost of access are likely to be more prevalent and findings related to personal computers may not always be directly relevant.

This study investigates the individual and situational determinants of individuals' use of public internet kiosks. Although providing ICT access through internet kiosks is an important and necessary first step to narrow the digital divide, it is not sufficient to alleviate the problem as the benefits of ICT can only be reaped when it is accepted and utilized by targeted users. In addition, initiatives to provide ICT access can only be economically viable and sustainable in the long term if demand is able to generate sufficient revenue to cover the costs of providing the service. Existing individual-level studies in the digital divide context have tended to focus on examining the demographic characteristics of users such as gender, income, and level of education on technology use (e.g., Rice & Katz, 2003). Other studies have investigated the topic less directly by analyzing patterns of use (e.g., Akhter, 2003) and identifying benefits of using ICT (e.g., Locke, 2005). This study expands this body of knowledge by examining the determinants of individuals' ICT use based on technology acceptance theories and social cognitive theory.

While ICT use has been widely studied in the developed world (e.g., King & He, 2006), the phenomenon is relatively unexplored in developing countries (Dwivedi et al., 2008; Mbarika et al., 2005). Developing countries like Mauritius are likely to face different constraints in ICT use compared to developed countries. For example, poverty, lack of infrastructure, and low information technology (IT) literacy have been found to be significant limitations that hinder the adoption and use of ICT in developing countries

(Goodman & Green, 1992). These conditions are less prominent in developed countries and research findings and interventions designed in the developed world may therefore be less directly applicable to developing countries. To better understand ICT use in the developing world, this study examines individuals' use of public internet kiosks in Mauritius. The kiosks were set up by the Mauritian government with the aim of bridging the digital divide in the country. Determinants related to individuals' attitudinal and normative beliefs and situational factors related to the use of internet kiosks are modeled and their relative importance is assessed through a survey. Specificities of Mauritian population's ICT use compared to issues in developed countries are also highlighted.

In sum, this study seeks to contribute to research and practice in several ways. First, a model based on existing theories is developed to explain the relationships between individual and situational factors in ICT use. Second, recognizing that constructs from existing technology acceptance theories have mostly been studied in developed countries and may be perceived differently in digital divide contexts, we develop construct measures that are more relevant to ICT users in less-developed countries. Third, we collect data from the general Mauritian public who are the actual targeted users of public internet kiosks rather than from surrogates such as employees in business organizations and university students. Fourth, by conducting an empirical study in Mauritius, a developing country that has not been investigated in previous ICT use research, this study can potentially add to the limited research in less-developed contexts, which has mostly been anecdotal in the form of case studies (e.g., Rangaswamy, 2007).

The rest of this paper is organized as follows: the next section describes the development of ICT and the initiative to set up public internet kiosks in Mauritius. This is followed by a review of existing literature on technology use and their applicability to the digital divide context. The proposed research model and hypotheses are then described, followed by details about data collection and analysis. The findings and implications for research and practice are also discussed.

INFORMATION AND COMMUNICATIONS TECHNOLOGY IN MAURITIUS
Mauritius is a small island nation in Sub-Saharan Africa with a population of about 1.2 million, constituted by descendants of original immigrants from India, Europe, Madagascar, Africa, and China. As of 2007, about 70% of her population is aged between 15 to 64 years old and about 88% are literate. Although English is the official language, it is spoken by less than 1% of the population and the majority (80%) of the Mauritian population speaks Creole (United States Central Intelligence Agency, 2007). Mauritius is a middle-income developing country that depends largely on manufacturing, sugar exports, tourism, and financial services. About 50% of the country's population live in rural areas and only about 24% are internet users (InternetWorldStats.com, 2008).

The Government of Mauritius recognizes the potential of ICT in stimulating national development and has implemented various initiatives to develop the country's ICT capabilities. These efforts have been acknowledged in the e-government readiness ranking by United Nations, with Mauritius leading the eastern African region in their application of ICT to deliver services and improve interaction with citizens and businesses (United Nations, 2008). To further stimulate the development and application

of ICT, the government proposed a five-year National ICT Strategic Plan in 2007. The plan aims to transform Mauritius into a preferred centre of ICT skills, expertise, and employment in the region (Mauritius National Computer Board, 2007). It identified a set of social targets to be achieved by the year 2011. These include increasing personal computer ownership by at least 20,000 in households and 12,000 in primary schools, increasing broadband internet penetration by at least 250,000, and establishing 150 public internet kiosks across the island.

Even prior to the national plan in 2007, the Information and Communication Technologies Authority (ICTA) and Mauritius Post Limited had established public internet kiosks in 93 post offices since 2005 to facilitate the uptake of ICT (Mauritius Government Information Service, 2005). Through these kiosks, computer and internet access are provided to those who otherwise would not be able to afford or be willing to buy personal computers. These kiosks offer a range of facilities such as word processing, communication, and access to government and commercial information and services. To ensure their sustainability, communities are encouraged to self manage the kiosks and generate locally relevant content. Computer courses are also conducted regularly to train potential users.

This initiative is a suitable context for our study because the internet kiosks are provided with the aim of bridging the digital divide in Mauritius. Mauritius has been witnessing rapid ICT growth in recent years since its participation in the United Nations Development Program (United Nations, 2007). The role of ICT in bridging the digital divide may therefore be more discernible here, allowing the identification of issues that may be relevant to other endeavors of bridging digital divide. The initiative is also interesting in that it provides an opportunity for us to understand individuals' perceptions with respect to ICT use in a developing Sub-Saharan Africa country, which is a rarely studied population in IS research (Mbarika et al., 2005). This permits us to assess the applicability of technology acceptance theories (which has mostly been proposed and validated in developed countries) in a less-developed context and understand how ICT users' perceptions differ between developing and developed countries.

CONCEPTUAL BACKGROUND
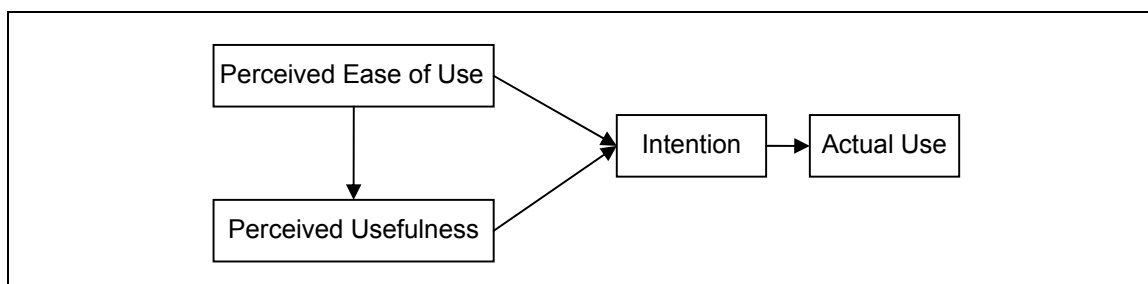### Technology Acceptance Theories
Individuals' use of technology has been studied from multiple theoretical perspectives, notably the theory of reasoned action (TRA), theory of planned behavior (TPB), and technology acceptance model (TAM) (Agarwal, 2000). TRA and TPB seek to explain a broad range of human behavior, including technology use. Both theories posit that behavior is affected by an individual's intention to perform it. *Intention* indicates how hard an individual is willing to try and how much effort the individual is planning to exert to perform a behavior. It is a function of individuals' attitude towards the behavior and subjective norm about the behavior. *Attitude* is defined as the general feeling of favorableness towards the behavior, while *subjective norm* (SN) refers to the perceived extent to which important social referents would desire the performance of the behavior (Fishbein & Ajzen, 1975). TPB extends TRA by considering perceived behavioral control as a predictor of intention in addition to attitude and subjective norm (see Figure 1). *Perceived behavioral control* (PBC) refers to one's perception of control over

performing a behavior and recognizes the need to consider situational obstacles in predicting behavior (Ajzen, 1991).
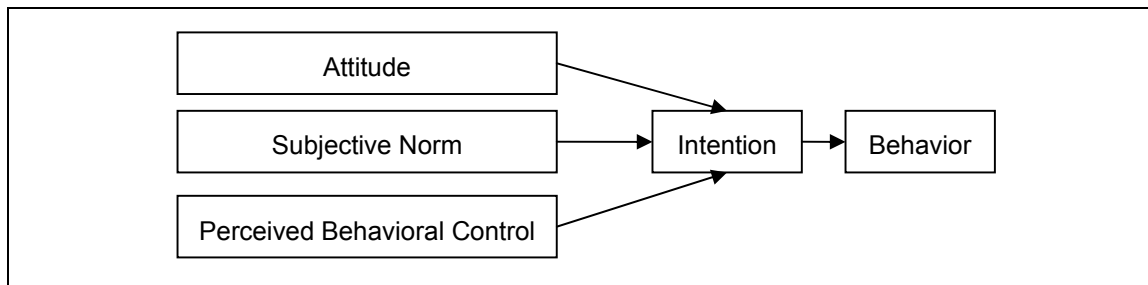
Figure 1. Theory of Planned Behavior (Ajzen, 1991)

Drawing upon TRA, Davis (1989) proposed TAM to explain and predict individuals' use of technology (see Figure 2). TAM posits that perceived usefulness and perceived ease of use predict one's intention to use technology, which in turn predicts the actual use behavior. *Perceived usefulness* (PU) is the degree to which one believes that using a particular technology would enhance performance, while *perceived ease of use* (PEOU) refers to the degree to which one believes that using the technology would be free of effort (Davis, 1989). In addition to its direct effect on technology use intention, perceived ease of use is also expected to have an indirect effect on intention via perceived usefulness.

Figure 2. Technology Acceptance Model (Davis, 1989)

Although TAM is a parsimonious and robust model that has been shown to be useful in explaining and predicting technology use behavior, the model clearly overlooks the social and situational contexts in which a technology is used (Venkatesh et al., 2003). This places a ceiling on the variance accountable by the theory and limits the variety of practical interventions available to policy makers in encouraging technology use. To address this gap, we extend the model to include subjective norm and perceived behavioral control, as proposed in TRA and TPB, to study the use of public internet kiosk in Mauritius.

Other than TRA, TPB, and TAM, IS researchers have also gained additional insights into technology use through the Social Cognitive Theory (SCT). SCT is a rich and complex theory which posits that individuals' behavior results from complex interactions between

their personal characteristics and situational factors (Bandura, 2001). Among the concepts proposed in the theory, self efficacy is commonly studied in IS research (Marakas et al., 1998). Computer *self efficacy* refers to the perception of effectiveness in performing general computing tasks (Marakas et al., 1998). It can influence one's decision about what behavior to undertake and the amount of effort and persistence put forth when faced with obstacles. In view of its relevance, the effect of self efficacy will be included in the proposed model.

Application of Technology Acceptance Theories in Developing Country Context
TRA, TPB, TAM, and SCT have been consistently validated by numerous studies in IS research involving a broad range of technologies and user populations. However, their application in developing countries is relatively limited compared to developed countries. In our review of major IS journals (e.g., Management Information Systems Quarterly, Information Systems Research, Journal of Management Information Systems, Communications of the AIS, Journal of the AIS) and journals dedicated to global IS research (e.g., Journal of Global Information Management, Journal of Global Information Technology Management, and Electronic Journal of Information Systems in Developing Countries), only eight empirical studies were found to have applied these theories in less-developed countries (see Table 1). Although it was not an all-inclusive review, it reflected the extent to which mainstream technology acceptance research had focused on this part of the world to date.

Table 1. Empirical Studies Applying TRA, TPB, TAM, and SCT in Less-Developed Countries

Source	Theory	Independent Variable	Dependent Variable	Finding	Methodology and Subject
Agbonlahor, 2006	- TAM - Diffusion of innovation (DOI)	- Access to IT - Image - Level of IT use - PEOU - PU - Result demonstrability - Training of IT - Visibility	- Number of applications used - Frequency of computer use	- Access to IT → number of applications used - Image → frequency of computer use - PEOU → frequency of computer use - PU → number of applications used - Result demonstrability → number of applications used - Training of IT → number of applications used	Survey of 780 lecturers from ten universities in Nigeria
Anandarajan et al., 2002	- TRA - TAM	- Computer skills - Organizational support - Organizational usage - PEOU - Perceived enjoyment - PU - Social pressure	- Micro computer usage - Job satisfaction	- Organizational support → perceived enjoyment - Organizational support → social pressure - Organizational usage → social pressure - PEOU → perceived enjoyment - PEOU → micro computer usage - Perceived enjoyment → job satisfaction - PU → job satisfaction - Social pressure → micro computer usage - System usage → job satisfaction	Survey of 143 individuals from nine organizations in Nigeria
Brown, 2002	- TAM - SCT	- Computer anxiety - Ease of finding (navigation) - Ease of understanding - PU - Self efficacy	- PEOU - Usage	- Computer anxiety → PEOU - Ease of finding (navigation) → PEOU - Ease of understanding → PEOU - PEOU → PU - PEOU → usage - Self efficacy → PEOU	Survey of 78 students using web-based learning technology in a South African University
Elbeltagi et al., 2005	TAM	- Cultural characteristics - Decision maker characteristics - Decision support system (DSS) characteristics - Environmental characteristics - External support - Internal support - Organizational characteristics - PEOU - PU - Task characteristics - Top management	- DSS usage	- PEOU → DSS usage - PU → DSS usage - Top management → PEOU	Survey of 294 chief executive officers and DSS unit managers within Egyptian governorates (administrative division of a country)

Table 1. Empirical Studies Applying TRA, TPB, TAM, and SCT in Less-Developed Countries (Continued)

| Source	Theory	Independent Variable	Dependent Variable	Finding	Methodology and Subject
Fusilier & Durlabhji, 2005	- TAM - TPB	- Attitude - Experience - PBC - PEOU - PU - SN	- Intention to use - Internet usage behavior	- Experience X PU* → intention to use internet - Experience X SN → intention to use internet - PBC → intention to use internet - PBC → internet use - PEOU → intention to use internet - PU → intention to use internet - SN → intention to use internet	Survey of 245 college students in Northwestern India
Ifinedo, 2006	- TAM - SCT	- Computer anxiety - Ease of finding - Ease of understanding - PEOU - PU - Self efficacy	- Usage - Continuance intention	- Computer anxiety → PEOU - Computer anxiety → PU - Ease of finding → PEOU - Ease of finding → PU - Ease of understanding → PEOU - Ease of understanding → PU - PEOU → PU - PU → continuance intention - Self efficacy → PEOU - Self efficacy → PU - Usage → continuance intention	Survey of 72 students from four tertiary institutions in Estonia
Meso et al., 2005	TAM	- Accessibility of mobile ICTs - Age - Cultural influences - Gender - Level of education - PEOU - Perceived technology reliability - PU	- Socializing use of mobile ICTs - Business use of mobile ICTs	- Accessibility of mobile ICTs → business use of mobile ICTs - Accessibility of mobile ICTs → PEOU - Accessibility of mobile ICTs → PU - Cultural influences → PEOU - PEOU → PU - Perceived technology reliability → business use of mobile ICTs - Perceived technology reliability → PU - Perceived technology reliability → socializing use of mobile ICTs	Survey of 198 employees from universities, polytechnic institutes, and government ministries in Nigeria and Kenya
Uzoka et al., 2007	TPB	- Facilitating conditions - Internet accessibility - Internet and technological complexity - Management support - Perceived advantage of ecommerce - Perceived disadvantages of ecommerce	- Adoption of ecommerce	- Internet accessibility → adoption of ecommerce - Internet and technological complexity → adoption of ecommerce - Management support → adoption of ecommerce	Survey of 120 individuals from public and private organizations in Botswana

* X represents interaction effect between two variables

It could be observed from the review that all eight studies were conducted in organizational contexts (i.e., university, government institution, private organization) where respondents tended to be better educated and use of technology was often affected by organizational mandate. Technology use in other contexts such as the use of public internet kiosks by general public has been largely overlooked in previous research and this provides an additional impetus for our study.

RESEARCH MODEL AND HYPOTHESES

Following our review of technology use literature, an extended research model based on TAM is proposed (see Figure 3). Specifically, the model posits that individuals' ICT use behavior is predicted by intention, which is in turn determined by perceived ease of use and perceived usefulness as proposed in TAM. The model is extended by including subjective norm and perceived behavioral control as proposed in TPB. In addition, self efficacy from SCT is proposed to affect perceived ease of use. The rationale for hypothesizing each relationship in the use of public internet kiosks will be discussed in the following sections. Where applicable, specificities of the Mauritius context that may affect construct conceptualization and the hypotheses are also highlighted.

Figure 3. Proposed Extended ICT Use Model
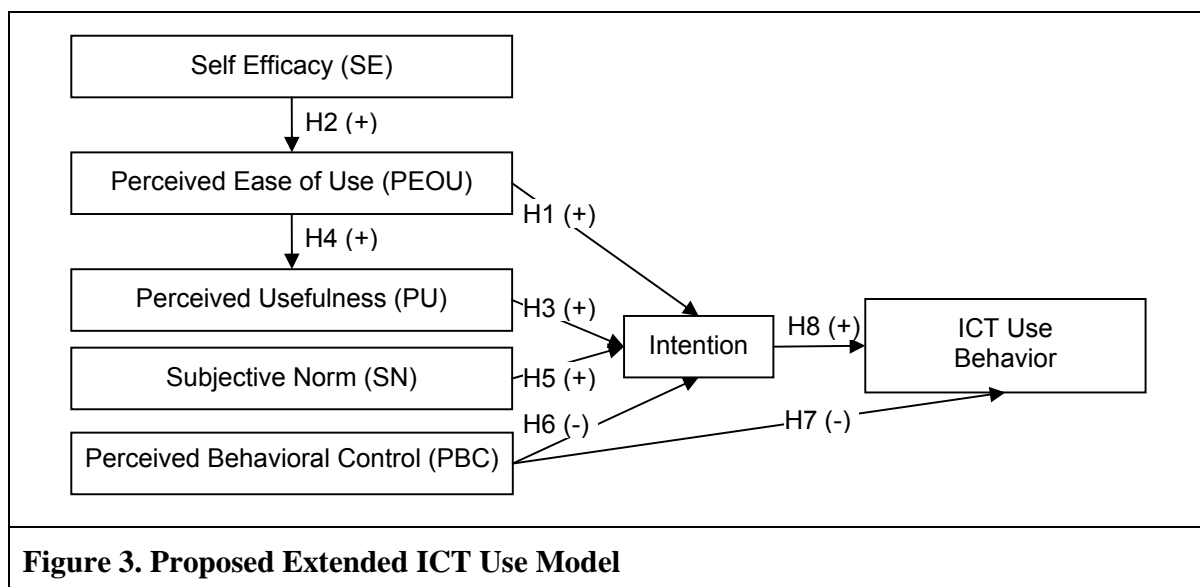
Perceived Ease of Use

Perceived ease of use refers to the degree to which an individual believes that using a particular technology would be free of effort (Davis, 1989). Compared to a technology that is skill demanding, individuals are naturally more willing to use a more user-friendly technology that can achieve the same performance. Extensive empirical evidence accumulated in previous IS research has shown that perceived ease of use is significantly related to ICT use intention (e.g., Legris et al., 2003; Venkatesh et al., 2003). In Mauritius, only 24% of the population are internet users (InternetWorldStats.com, 2008) and targeted internet kiosk users often live in geographically isolated areas underserved by telecommunications. As most users have little prior experience with ICT, perceived ease of use is likely to be an important aspect of consideration when it comes to the use of public internet kiosks. Therefore, we hypothesize that:

H1: Perceived ease of use is positively related to individuals' intention to use ICT.

Perceived ease of using technology may be affected by individuals' computer self efficacy (Venkatesh, 2000). Compared to those with little computer knowledge, individuals with higher computer proficiency are likely to view internet kiosks as easy to use. In Mauritius, targeted users of internet kiosks are generally less experienced with computers and the internet compared to users in developed countries. In judging the ease of using the kiosks, individuals may be more prone to form an early opinion based on their existing skills and past experience with technologies requiring similar skill set (e.g. typing with typewriter). Therefore, we hypothesize that:

H2: Individuals' self efficacy is positively related to perceived ease of using ICT.

Perceived Usefulness
Perceived usefulness refers to the degree to which an individual believes that using a particular technology would enhance performance (Davis, 1989). Outcome expectation is an important precursor to technology use behavior because individuals may be more likely to engage in behaviors that they expect to solve problems or result in favorable consequences. Indeed, empirical support for the effect of perceived usefulness on intention to use technology in IS research is strong (e.g., Taylor & Todd, 1995). In digital divide research, studies on sustainability of ICT have also emphasized the need to provide information and services that are relevant and valuable to attract users (Madon, 2005). In Mauritius, to ensure relevance of internet kiosks, a variety of services such as internet browsing, word processing, e-government, healthcare, email, and messaging are provided. Some services involve lower cost and are more efficient than their offline equivalents (e.g., email versus snail mail) and these benefits are likely to encourage the utilization of internet kiosks. Thus, we posit that:

H3: Perceived usefulness is positively related to individuals' intention to use ICT.

It is also proposed in TAM that perceived ease of use has an indirect effect on ICT use intention through perceived usefulness (Davis, 1989). When internet kiosks are perceived to be easy to use, one would be better able to fully utilize the functions available to achieve different purposes. This in turn may improve the perceived usefulness of internet kiosks. Therefore, we also put forth the following hypothesis:

H4: Perceived ease of use is positively related to perceived usefulness.

Subjective Norm
Subjective norm refers to an individual's perception of the extent to which important social referents would desire the performance of a behavior (Fishbein & Ajzen, 1975). When important referents encourage one to use a technology and one is willing to comply, he or she is likely to behave accordingly. This is similar to the value-expressive influence described by Deutsch and Harold (1955), which suggests that individuals will attempt to associate themselves with positively evaluated groups and distance themselves from negatively evaluated groups to maintain or enhance their self concept. IS research examining the effect of subjective norm on intention to use technology has generally supported the relationship (e.g., Taylor & Todd, 1995). In Mauritius, about 68% of the population are of Indian descent (United States Central

Intelligence Agency, 2008). This implies that the Mauritian population can be characterized as having a collective culture according to Hofstede's dimensions of culture (Hofstede, 1984), where family and authoritarian values guide individuals' behavior (Lee-Ross, 2005; Thanacoody et al., 2006). Subjective norm may therefore be more prevalent in determining Mauritian population's use of public internet kiosks compared to developed countries in the western world, which are often characterized as having individualistic cultures. For example, if a family member suggests that using public internet kiosks is beneficial and encourages one to use it, one is likely to believe that he or she should use it, and in turn form an intention to do so. Hence, we hypothesize that:

H5: Subjective norm is positively related to individuals' intention to use ICT.

Perceived Behavioral Control (PBC)
Perceived behavioral control refers to an individual's perception of control over performing a behavior and recognizes the need to consider situational obstacles in predicting behavior (Ajzen, 1991). The role of perceived behavioral control is not explicitly considered in TAM and subsequent research has yet to fully detail its role in the context of TAM (Venkatesh et al., 2003). According to TPB, perceived behavioral control directly affects intention. When one perceives that there exist significant situational hindrances in using a technology, one's confidence in successfully carrying out the behavior weakens and this reduces one's intention to engage in the behavior to avoid disappointment. In digital divide research, cost and geographical inaccessibility have been identified as significant impediments to ICT use (Foster et al., 2004). In Mauritius, 8% of the households are living below the relative poverty line (set at half median household income per adult, adjusted for household size, age composition, and economies of scale) (Mauritius Central Statistics Office, 2006/7). As the targeted users of public internet kiosks are mainly individuals who can not afford personal computers, cost is likely to be a significant consideration in the decision to use of internet kiosks. Also, as 50% of the Mauritian population live in rural areas that are isolated by the lack of transport (Enoch, 2003), the location of internet kiosks becomes a significant concern as geographical barriers can limit one's access to them. In view of these observations, perceived behavioral control is conceptualized in terms of cost and geographical distance in this study and we hypothesize that:

H6: Perceived behavioral control is negatively related to individuals' intention to use ICT

Other than influencing intention, perceived behavioral control may also directly affect actual behavior, to the extent that it accurately reflects the controls that actually exist (Ajzen, 2002). This notion is similar to that of facilitating conditions proposed in Triandis' Theory of Interpersonal Behavior (Triandis, 1977), which refers to the objective factors in individuals' environment that make a behavior difficult to perform. Hence, we also hypothesize that:

H7: Perceived behavioral control is negatively related to individuals' ICT use behavior.

ICT Use Intention and Behavior
Intention is an indication of how hard one is willing to try and how much effort one is planning to exert in order to perform a behavior. It is the subjective probability of performing a behavior. Intention has been found to be an accurate predictor of actual behavior in many IS and human behavior studies (Legris et al., 2003) and similar relationship is expected between individuals'

intention and behavior of using public internet kiosks. Specifically, we posit the following:

H8: Intention is positively related to individuals' ICT use behavior.

RESEARCH METHODOLOGY

To assess the proposed model, a field survey was conducted to collect data from users of public internet kiosks in Mauritius. Development of the survey instrument to suit current study's context is detailed below.

Construct Operationalization

Guidelines recommended by Churchill (1979) were adopted to develop the survey instrument. The first step involved specifying the domain of each construct by reviewing existing literature to establish a clear definition for each construct as discussed in the preceding sections. Suitable measurement items that could represent each construct were then gathered and selected from previously validated scales. Constructs in this study were categorized as either of fixed or variable content (Fishbein et al., 2001). For constructs with fixed content, the primary question is not what to measure, but how to measure. Among the constructs in this study, self efficacy, perceived ease of use, perceived usefulness, intention, and ICT use behavior are constructs whose main content does not vary across the context of study. In contrast, operationalization of constructs with variable content depends on the type of behavior and population being examined. In this study, the content of subjective norm and perceived behavioral control are context specific as they need to be measured in terms of social referents and behavioral controls that are relevant to Mauritian internet kiosk users.

Specifically, the self efficacy scale was adapted from Taylor and Todd (1995). Items measuring perceived ease of use and perceived usefulness were adapted from Moore and Benbasat (1991). ICT use intention and behavior were assessed with items adapted from Davis et al. (1989). To determine the content of subjective norm and perceived behavioral control, we consulted existing literature on digital divide and interviewed public internet kiosk managers and users to identify salient referents and behavioral controls that were relevant to Mauritian users. In particular, subjective norm was measured in terms of influence of family members, friends, government, staff of public internet kiosks, and media sources. Perceived behavioral control was assessed in terms of individuals' geographical access to and costs involved in using public internet kiosks. Items measuring each construct are listed in the Appendix.

DATA ANALYSIS AND RESULTS

The proposed model was analyzed with Partial Least Squares (PLS), a structural equation modeling tool. PLS analysis concurrently tests the psychometric properties of each scale used to measure the constructs (measurement model) and analyzes the strength and direction of the relationships among the constructs (structural model). It is also able to handle both formative and reflective manifest variables that jointly occur in a single model (Chin, 1998). In our study, all constructs are reflective except subjective norm and perceived behavioral control as items of these constructs jointly define the construct and exclusion of an item could alter their conceptual meaning.

About 150 individuals at different internet kiosks were contacted for the survey. Out of these, 78 completed responses were collected yielding a response rate of about 52%. Although this is not a

large sample, it exceeds the requirements suggested by Chin et al. (2003) for PLS analysis, which should be equal to the larger of the following: (1) ten times the number of indicators in the largest formative construct, or (2) ten times the largest number of structural paths directed at a particular construct in the structural model. In our study, the largest formative constructs are subjective norm and perceived behavioral control and the intention construct has most paths directed to it. Subjective norm and perceived behavioral control are measured with five indicators each and the intention construct has four paths directed to it. This indicates that the minimum required sample size is 50 and our sample size is therefore considered sufficient for PLS analysis. Power analysis also indicated that the statistical power was 95%, which exceeded the recommended 80% threshold.

Respondents' demographic profile is shown in Table 2. As can be seen from the table, the majority of respondents were young (15-25 years old) and had little experience with computers (0-6 months). Most of them had little training in computers (0-6 months) and were educated till secondary school level. The monthly income was low with 85% of respondents earning below USD690. The majority of respondents were male (67.9%). Gender equity issues have also been identified to be important in the digital divide (Cooper & Weaver, 2003).

Table 2. Demographic Profile					
Characteristic	Frequency	Percentage	Characteristic	Frequency	Percentage
Age			*Education*		
15-25	42	53.8%	Primary School or Below	5	6.4%
26-35	19	24.4%	Secondary School	41	52.6%
36-45	13	16.7%	Diploma	10	12.8%
>45	4	5.1%	Degree or Higher	22	28.2%
Experience with Computers (Months)			*Monthly Income*		
0-6	47	59.7%	<RS5,000 (~USD170)*	26	33.3%
			RS5,000 - RS9,999 (~USD340)	22	28.2%
7-12	25	32.5%	RS10,000 - RS19,999 (~USD690)	18	23.1%
>12	6	7.8%	RS20,000 - RS29,999 (~USD1,030)	3	3.8%
Training in Computers (Months)			>RS30,000 (~USD1,030)	6	7.7%
			Undisclosed	3	3.8%
0-6	56	71.8%	*Gender*		
7-12	21	26.9%	Male	53	67.9%
>12	1	1.3%	Female	25	32.1%
*RS: Rupee; USD: United States Dollar					

Tests of Measurement Model
The measurement model was assessed by evaluating measurement scales' internal consistency, convergent validity, and discriminant validity. Reflective and formative constructs needed to be treated differently during analysis because unlike reflective constructs, different dimensions of formative constructs were not expected to demonstrate internal consistency and correlations (Chin, 1998). To assess the relevance and level of contribution of each item to the formative constructs, the items weights were examined instead.

For reflective constructs, internal consistency was measured with Cronbach's alpha reliability coefficient. As shown in Table 3, all reflective constructs in our model have scores above the recommended level of 0.70 (Nunnally, 1978). Convergent validity was assessed using three tests: a) item reliability, b) composite reliability, and c) average variance extracted (AVE). Table 3 shows that all reliabilities, item and composite, are above the recommended level of 0.70 (Nunnally, 1978) and all AVEs are above the recommended level of 0.50 (Chin, 1998).

Table 3. Psychometric Properties of Reflective and Formative Constructs

Reflective Constructs	Items	Item Loading	Formative Constructs	Items	Item Weight
Self Efficacy α = 0.73 CR = 0.88 AVE = 0.79	SE1 SE2	0.90*** 0.88***	*Subjective Norm*	SN1 SN2 SN3 SN4 SN5	0.25 0.87* 0.84 0.85* 0.19
Perceived Ease of Use α = 0.84 CR = 0.93 AVE = 0.86	PEOU1 PEOU2	0.93*** 0.93***			
Perceived Usefulness α = 0.77 CR = 0.77 AVE = 0.59	PU1 PU2	0.11* 0.71*	*Perceived Behavioral Control*	PBC1 PBC2 PBC3 PBC4 PBC5	0.13 0.21 0.52* 0.47* 0.33*
Intention α = 0.78 CR = 0.89 AVE = 0.80	INT1 INT2	0.90*** 0.88***			
ICT Use Behavior α = 0.74 CR = 0.80 AVE = 0.67	USE1 USE2	0.64*** 0.97***			
α: Cronbach's Alpha; CR: Composite Reliability; AVE: Average Variance Extracted *Significant at p<0.05; **Significant at p<0.01; ***Significant at p<0.001					

Discriminant validity was assessed using two tests: a) factor analysis with varimax rotation and b) item correlations. Results of factor analysis presented in Table 4 show that five factors corresponding to the five reflective constructs in the proposed model are extracted and Kaiser-Meyer-Olkin (which assesses whether the partial correlations among variables are small) measures 0.60, which is above the recommended value of 0.50. All item loadings on stipulated constructs are greater than the required 0.50 (Hair et al., 1998) and all eigenvalues are greater than one. The item correlation matrix shown in Table 5 indicates that all the non-diagonal entries (item correlation) do not exceed the diagonal entries (square root of AVE) for all constructs, indicating that measures of each construct correlate more highly with their own items than with items measuring other constructs in the model. Based on these findings, we conclude that the discriminant validities of all scales are adequate.

Table 4. Factor Analysis of Reflective Constructs

| Construct Items	Components				
	1	2	3	4	5
Self Efficacy					
SE1	0.26	0.18	0.87	0.06	-0.03
SE2	0.29	0.28	0.63	0.12	0.37
Perceived Ease of Use					
PEOU1	0.88	-0.04	0.23	0.09	-0.06
PEOU2	0.87	0.06	0.17	0.13	0.06
Perceived Usefulness					
PU1	-0.04	-0.16	0.10	0.07	0.89
PU2	0.26	0.31	-0.39	-0.07	0.75
Intention					
INT1	0.03	0.82	0.13	0.20	-0.01
INT2	-0.02	0.87	0.23	-0.01	-0.16
ICT Use Behavior					
USE1	-0.03	0.14	0.16	0.82	0.08
USE2	0.23	0.02	-0.03	0.83	0.00
Eigenvalue	2.98	1.56	1.23	1.12	1.01
Variance (with Varimax rotation)	19.43	18.51	14.81	14.58	11.71
Cumulative Variance (%)	19.43	37.94	52.75	67.33	79.04
Variance (without rotation)	29.77	15.57	12.34	11.22	10.13

Table 5. Square Root of AVE vs. Correlation among Reflective Constructs

	Self Efficacy	Perceived Usefulness	Perceived Ease Of Use	Intention	ICT Use Behavior
Self Efficacy	**0.89**				
Perceived Usefulness	0.16	**0.77**			
Perceived Ease Of Use	0.42	0.33	**0.93**		
Intention	0.32	0.27	0.13	**0.89**	
ICT Use Behavior	0.23	0.08	0.25	0.17	**0.82**

Since a single data collection method was employed, the extent of common method bias was also examined with Harman's one-factor test. The test involves entering all constructs into an unrotated principal components factor analysis and examining the resultant variance (Podsakoff & Organ, 1986). As shown in Table 4, the first factor accounts for 29.77% of the variance while [the last factor accounts for 10.13%. There is no sign of the first factor significantly dominating the variance and we therefore conclude that common method bias is unlikely.

For formative constructs, absolutes values of item weights were examined to determine the relative contribution of items constituting each construct (Chin, 1998). Results in Table 3 indicate that friends and public internet kiosk staff are considered significant constituents of subjective norm while cost is the primary perceived behavioral control that affects individuals' ICT use.

Tests of Structural Model
Results of structural model analysis for the proposed model are presented in Figure 4. As shown in the diagram, perceived usefulness and subjective norm significantly affect individuals' intention to use ICT and explain 22% of variance in the construct, while intention and perceived behavioral control explain 23% of variance in ICT use behavior. Also, self efficacy is found to significantly affect perceived ease of use, which in turn affects perceived usefulness. Contrary to our hypotheses, perceived ease of use and perceived behavioral control have insignificant effect on intention. In other words, six out of eight hypotheses in the proposed model are supported. These results will be discussed in the next section.

Figure 4. Results of Structural Model Analysis
*Significant at p<0.05; **Significant at p<0.01
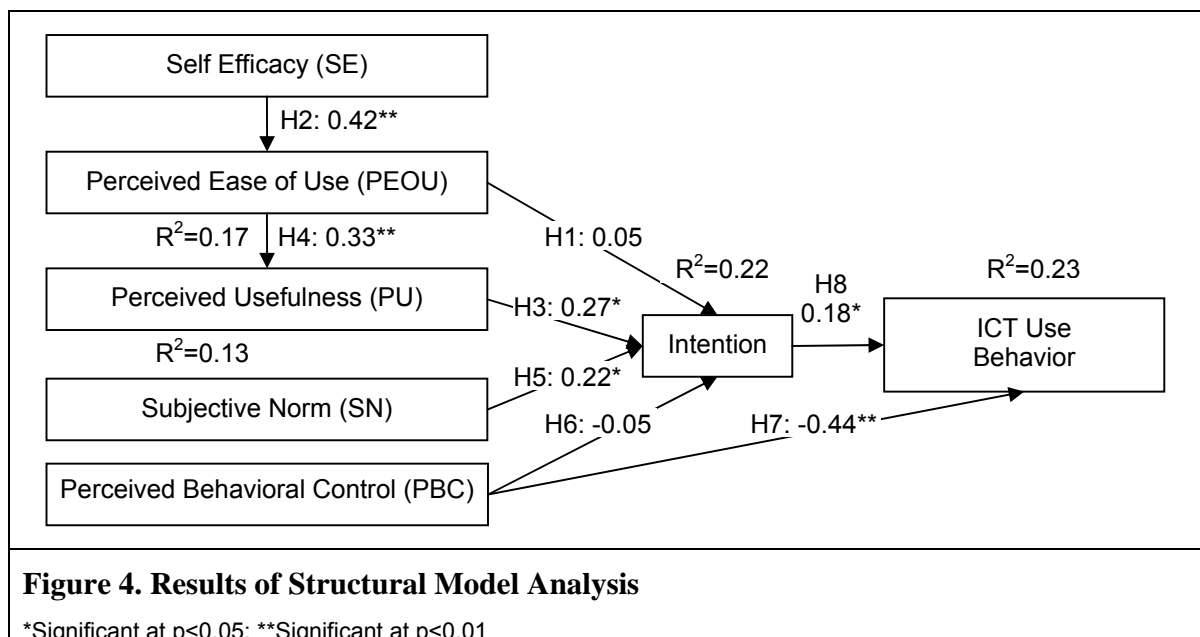
DISCUSSION AND IMPLICATIONS
This study has investigated the determinants affecting individuals' intention and behavior to use public internet kiosks in the context of Mauritius. Results show that when appropriately operationalized to account for contextual specificities, theories proposed to explain general technology use are also adequate in explaining individuals' ICT use in the digital divide context. In addition to factors proposed in TAM, self efficacy, subjective norm, and perceived behavioral control are also found to contribute toward our understanding of the phenomenon. Therefore, these factors should be considered in future studies of ICT use to increase explanatory power. Among the factors investigated, perceived behavioral control is found to be the most significant factor affecting ICT use. Implications of our findings to research and practice in the use of internet kiosks in Mauritius and other similar social welfare programs to bridge the digital divide are discussed next.

Implications for Research
Results show that perceived ease of use does not directly affect individuals' intention to use ICT as hypothesized in H1. However, it is observed that perceived ease of use indirectly affects intention through perceived usefulness (H3 and H4). This finding corroborates that of previous studies which found that perceived usefulness is a stronger and more stable predictor of

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technology use intention than perceived ease of use (e.g., Venkatesh et al., 2003). This finding may also be partly related to the Mauritian culture. It has been observed that Mauritians' attitude to education is largely utilitarian, where children are sent to school to obtain certificates that are necessary to secure employment (Day-Hookoomsing, 2000). To the extent that proficiency in ICT can improve chances of employment, respondents may hold a similar utilitarian view about the use of ICT. They are therefore still willing to use ICT if it is perceived as useful, even if it may not be easy to learn. More research is needed to understand how culture affects the relationship between perceived ease of use and perceived usefulness as well as other antecedents of ICT use.

Perceived behavioral control is also found to affect ICT use directly (H7) rather than through intention (H6). This suggests that in digital divide context, individuals are likely to be still willing to use ICT despite expected situational obstacles. This finding may also be attributable to our conceptualization of perceived behavioral control in terms of external environmental factors (i.e., geographical access and cost), which are more observable and therefore stronger predictors of actual behavior than intention (Ajzen, 2002). In the proposed model, internal situational factors are mainly measured through self efficacy, which is also found to affect intention through perceived ease of use. It may be fruitful to explore the differences between internal and external factors of perceived behavioral control in future technology acceptance research.

While the results of our study seem similar to the findings of technology use studies in developed countries (e.g., Hsu & Chiu, 2004), there are differences in the way constructs are perceived and assessed in the developing country contexts. Specifically, items for measuring subjective norm (e.g., influence of government and staff of public internet kiosks) in our context differ from those used in developed countries (e.g., influence of colleagues) which were mostly conducted within organizations (e.g., Hsu & Chiu, 2004). Content of perceived behavioral control is also different in our context (e.g., geographical access to and costs involved in using public internet kiosks) compared to that in developed countries (e.g., personal computer ownership, organizational support). In addition, perceived usefulness is also assessed differently in this study (e.g., reduces time required to perform tasks, improves quality of work/task outputs) from studies in organizational context (e.g., improves job performance, useful in job). More such studies are needed to understand the underlying differences in user acceptance antecedents between developing and developed worlds, and between personal and organizational use contexts.

Implications for Practice
The finding that perceived ease of use does not affect intention directly (H1) but rather through perceived usefulness (H3 and H4) suggests that in practice, ensuring that ICT content and services are relevant and valued by targeted users should take precedence over designing a friendly user interface. To improve relevance, needs of targeted users must be understood. In Mauritius, a bottom-up approach where users are encouraged to specify and build their own content is adopted. For example, university students are encouraged to contribute content to web portals accessible via public internet kiosk by means of awarding academic credits. There are also plans to publicly acknowledge significant content contributors through a system of annual rewards. Value of using ICT can be further publicized by emphasizing and demonstrating different functionalities available (e.g., locating information regarding education and employment, communicating with family and friends, and entertainment). Success stories of users can also be shared through media sources.

As posited, self efficacy is found to significantly affect individuals' perceived ease of using ICT (H2). This suggests that individuals are likely to judge the ease of using ICT with which they have little or no prior experience based on their existing knowledge and skills. In Mauritius, adult literacy rate is high at 84% (UNICEF, 2005). This indicates that the learning curve for using ICT may be fairly smooth for most Mauritian adults and providing computer training to improve their ICT literacy is likely to effectively increase their perceived ease of using ICT. In Mauritius, the government has been very active in improving its population's computer proficiency. For example, a Universal ICT Education Programme was introduced in 2006 to improve computer literacy of students, workers, and the population at large (Mauritius National Computer Board, 2006). Through the programme, basic computing skill courses are offered in 59 schools and training centers across Mauritius. Participants who successfully complete the course are awarded the Internet and Computing Core Certification (IC3), which is a globally accepted certification programme that recognizes one's knowledge level in using computer hardware, software, and the Internet. To further increase public awareness, IT-related programmes are broadcast through television. IT support personnel are also employed at youth centers, women centers, and internet kiosks to promote the use of ICT to the general public (Soyjaudah et al., 2002). Equipping individuals with these fundamental skills enables them to continuously learn and develop new computer skills as technology advances. Providing positive and timely feedback in the form of certification to learners also increases their confidence in using computers and alleviates their apprehension towards computing technology (Sipior et al., 2003). These initiatives are likely to improve targeted users' self efficacy of using public internet kiosks in particular and computers in general.

Subjective norm is also found to significantly affect individuals' intention to use ICT (H5). As discussed earlier, the Mauritian culture can be characterized as largely collective. In a collective culture, authoritarian values guide individuals' behavior (Hofstede, 1984). This suggests that social referents who have rational and legitimate authority related to the use of public internet kiosks are likely to have significant influence on individuals' use of ICT. Indeed, our results show that staff members managing public internet kiosks are deemed to be one of the most important social referents related to the use ICT. This suggests that practitioners can take advantage of peer influence to encourage use through initiatives such as "refer a friend" program. "Ambassadors" can also be assigned to promote use by actively suggesting different ways ICT can be used to accomplish different tasks.

Results also indicate that perceived behavioral control is the most significant factor determining ICT use (H7). The stable economic growth of Mauritius may shed light on this finding. Being a presidential democracy modeled on the British system of parliamentary democracy (Government of Mauritius, 2008), Mauritius has been proactive in providing a stable business environment that encourages economic development and foreign investment. With favorable economic conditions, the government has been able to invest in ICT infrastructure to provide access to ICT at affordable rates (Isaacs, 2007), which is a key behavioral control factor of ICT use. We also found that perceived behavioral control affects ICT use directly rather than through intention (H6). This suggests that Mauritians' intention to use public internet kiosks is unlikely to be weakened by the perceived existence of behavioral controls. They are likely to be still willing to try despite expected obstacles. Therefore, efforts should be focused on further eliminating barriers in ICT use. In particular, it is observed that cost is the most central concern. Currently, use of public internet kiosks is free and the main cost is incurred in traveling to where the kiosks

are located. Hence, internet kiosks should be installed at spots that are conveniently accessible. To further overcome geographical barriers, the Mauritian government has also begun to operate two Cyber Caravans to provide computer access to more isolated areas. When more users utilize the free kiosks regularly, the government can consider handing over the management of kiosks to private franchise owners who can charge fees for more value-adding services such as printing and CD burning, to ensure the continual sustainability of internet kiosks.

Limitations and Future Work
Findings of this study should be interpreted in view of several limitations that present opportunities for improvement in future studies. First, although the sample size of 78 meets the requirement of PLS analysis, a larger sample will further improve statistical power and is desirable in future studies.

Second, data was collected in a cross-sectional survey and hence did not allow us to draw conclusive evidence of causality, despite strong theoretical arguments and empirical support from past studies. Longitudinal studies will provide a stronger causal understanding of technology use behavior and increase the theoretical validity of the proposed model. Research over a longer period of time also allows us to better appreciate the full effects of initiatives to bridge the digital divide.

Third, respondents self reported their actual ICT use. Biases such as social desirability and self-presentation bias associated with self-reported data might be present. For example, respondents might over report their usage to uphold their image. To avoid these biases, future research may consider using unobtrusive observations of ICT use via access log. However, limitations of access log should also be considered. For example, it may be difficult to accurately identify individual users from the log (Kurth, 1993). Even if users are required to register and log in to use public internet kiosks, they may share their account with other users, introducing errors in access log. Further, other concerns such as ethical issues involving informed consent and invasion of privacy may be difficult to overcome.

Fourth, as one of the first empirical studies applying TAM, TPB, and SCT to study the use of public internet kiosks in a developing country, the proposed model explained some of the variance in ICT use intention (22%) and behavior (23%). The range of variance explained in previous studies conducted in developing countries reviewed in Table 1 is 10% to 59%. Although our study is within this range, the explanatory power can be further improved in future studies by considering factors related to institutional context, personality traits, and characteristics of technology. Individuals' intention to use ICT may be reinforced by the institutionally enriched and supportive contexts in which they find themselves in (e.g., workplace, school, community, and home). Those who are members of institutions where ICT is an important functional element are likely to have more opportunities to learn about and explore different uses of ICT. This is particularly important among those who are disadvantaged by their socioeconomic status, as their institutional contexts provide them with opportunities to encounter ICT and see their personal relevance (Rogers, 1995). Indeed, some studies have found initial evidence that institutional context influences individuals' personal use of ICT. For example, a study of technology diffusion in rural communities showed that employment by a company that adopts a particular ICT is an important predictor of an individual's use of that technology beyond the workplace environment (Hollifield & Donnermeyer, 2003). This suggests that our proposed

model may be further enriched by including variables related to individuals' involvement in institutions that have adopted ICT.

Personality traits reflect the cognitive and affective structures maintained by individuals to facilitate adjustments to situations encountered and hence may also play a role in explaining individuals' ICT use in the digital divide context. Researchers have suggested that traits such as personal innovativeness (Agarwal & Prasad, 1998) and risk-taking propensity (Kishore et al., 2001) may affect individuals' use of technology. Although these factors are difficult and sometimes impossible to manipulate directly, understanding their effects can help to identify enthusiastic users who may serve as champions to promote the use of ICT to other potential users.

In addition, characteristics of technology such as compatibility, trialability (Rogers, 1995), result demonstrability, and image (Moore & Benbasat, 1991) may offer additional insights into individuals' ICT use. It has been found that users are better able to accept ICT that matches their habits and practices and those that can be tried before paying for the services. ICT with benefits and utility that are easily observable and technology that bestows its users with added prestige in their relevant community are also likely to attract more usage (Plouffe et al., 2001). These may apply to users in the developing country context as well.

CONCLUSION
TAM, TPB, and SCT have been shown to be important theories in explaining and predicting technology use in IS research. Despite numerous applications, the context of assessment has been largely restricted to technologically-advanced environments in developed countries and educated samples in developing countries. Our study had demonstrated the applicability of a model based on these theories in Mauritius, an understudied context. Collecting data from the general Mauritian public who are the actual targeted users of public internet kiosks rather than from surrogates also improves the validity and relevance of our findings for policy makers in developing strategies for encouraging ICT use in Mauritius as well as other areas marginalized by the digital divide.

We also highlighted the importance of considering contextual specificity when studying ICT use. In our study, constructs were operationalized with measures that were more relevant to users in less-developed countries. We hope this encourages future research to explore the robustness of technology acceptance theories in more novel contexts to fill the existing gaps in knowledge. Findings of this study were also discussed in light of Mauritian institutional and cultural environment and specific suggestions on how ICT use can be promoted among the population were provided. This has important implications for Mauritius and other less-developed countries as encouraging ICT use is an important step towards nurturing a more IT-literate workforce to advance the economy and attract foreign investment.

This study also recognized an important limitation related to technology determinism in existing efforts to bridge the digital divide: merely providing ICT tools without understanding the social and situational contexts of targeted users cannot adequately narrow the gap between ICT haves and have-nots. It is necessary to move beyond the overly simplistic notion of technology as a quick fix and look into users' social and situational contexts. This study had attempted to address this limitation by suggesting useful social and situational interventions for increasing ICT use among the less-privileged population.

APPENDIX: CONSTRUCT OPERATIONALIZATION

Construct	Items	Source
Self Efficacy (SE)	SE1: I am very comfortable with using public internet kiosk on my own. SE2: Overall, I am able to use public internet kiosk even if there is no help.	Adapted from Taylor and Todd (1995)
Perceived Ease of Use (PEOU)	PEOU1: Using public internet kiosk is easy for me. PEOU2: Overall, public internet kiosk is easy to use.	Adapted from Moore and Benbasat (1991)
Perceived Usefulness (PU)	PU1: Using public internet kiosk significantly reduces time required to perform tasks. PU2: Using public internet kiosk significantly improves the quality of my work/task outputs.	
Subjective Norm (SN) Product of likelihood that specific salient referents think one should perform the behavior (LSN) and the individuals' motivation to comply (CSN).	*LSN Scale* SN1a: My family members and relatives strongly suggest that I should use public internet kiosks. SN2a: My friends strongly suggest that I should use public internet kiosks. SN3a: The Government strongly suggests that we should use public internet kiosks to learn computer. SN4a: The staff of public internet kiosks staff strongly suggests that I should use public internet kiosks. SN5a: Public media strongly suggests that I should use public internet kiosks. *CSN Scale* SN1b: I am very willing to comply with my family members' and relatives' suggestions. SN2b: I am very willing to comply with my friends' suggestions. SN3b: I am strongly influenced by the Government's suggestions. SN4b: I am strongly influenced by the suggestions of public internet kiosk staff. SN5b: I am strongly influenced by public media (e.g., newspaper, magazine, television).	Developed based on Taylor and Todd (1995)
Perceived Behavioral Control (PBC)	*Geographical Access* PBC1: The location of public internet kiosk is very close to my workplace. PBC2: The location of public internet kiosk is very close to my home. *Cost* PBC3: It is very affordable to use public internet kiosk. PBC4: Using public internet kiosk involves very little cost. PBC5: It is very expensive for me to travel to use public internet kiosks (all items reverse coded).	
Intention (INT)	INT1: I intend to continue using public internet kiosk in future. INT2: I intend to use public internet kiosk more frequently.	Adapted from Davis et al. (1989)
ICT Use Behavior (USE)	USE1: I use public internet kiosks *(very rarely - sometimes - very frequently)*. USE2: I use public internet kiosks for *(very few - some - many)* tasks.	

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