

# *Understanding e-Government portal use in rural India: role of demographic and personality characteristics*

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**Abstract.** *Electronic government (e-Government) is one of the most important ways to bridge the digital divide in developing countries. We develop a model of e-Government portal use. We use various individual characteristics, namely demographics and personality, as predictors of e-Government portal use. Specifically, our predictors were (1) gender, age, income and education; (2) the Big Five personality characteristics, i.e. extraversion, neuroticism, conscientiousness, agreeableness and openness to experience; and (3) personal innovativeness with information technology. We conducted a field study in a village in India. We collected data from over 300 heads of household. We found support for our model, with most variables being significant and explaining 40% of the variance in e-Government portal use.*

**Keywords:** e-Government, digital divide, technology use, personality, demographics

## INTRODUCTION

The Organisation for Economic Co-operation and Development continues to hold that information and communication technologies (ICTs)<sup>1</sup> are critical to uplifting developing and less developed countries (United Nations, 2009; 2011a). The ability to leverage the benefits available due to ICT use is one indicator of socio-economic status among countries today. The percentage of the population that has access to and uses ICTs has been shown to be correlated with a country's overall development (Ono & Zavodny, 2007). The phrase *digital divide* has been used to describe the gulf that exists between those who have access to and use ICTs and those who do not have access and/or do not use ICTs (Van Dijk & Hacker, 2003;

<sup>1</sup>The terms ICT, information technology (IT) and information systems (IS) are often used interchangeably in prior research. Although we primarily use the term ICT in this paper, in some cases (e.g. construct names), we use IT or IS to stay faithful to the original sources that we cite.

Dewan & Riggins, 2005; Pew Internet and American Life Project, 2012). Apart from the importance of the issue from an international development standpoint, the globalisation of economies and organisations makes it doubly important that we increase our understanding of the issues and factors that surround and influence the availability and use of ICTs throughout the world.

Of the many countries that are classified as either developing or less developed, India and China have become vital to the global economy. India has the second largest population and is one of the fastest growing economies in the world. Supporting this fast-growing economy is one of the fastest growing technology infrastructures (Vaidyanathan, 2007; United Nations, 2011a; 2011b). However, for all the rapid growth, economic gains and infrastructure creation (Srinivasan, 2006; Vaidyanathan, 2007), development has been uneven. Much of India is still an agrarian society, with about 68% of the population being rural farmers (Census of India, 2011). The literacy rate among these technology-have-nots is quite low, with the average educational attainment being less than the fifth-grade level (Census of India, 2011). Although the average income in India has increased in recent years, the majority of this increase is attributed to the urban centres, which is due in large part to the influx of multinational corporations. The average urban income in India is about 85% greater than the average income in rural areas (Indianfarmers.org, 2009). Very little growth or change has come to rural farming areas. There are several reasons for this – there is a lack of overall infrastructure in rural areas compared with urban centres, the level of education is much lower in rural areas compared with what is prevalent in cities, and the rate of information and innovation diffusion is vastly slower in rural areas partly due to the lack of infrastructure/technology and partly due to a traditional mindset that does not foster the broadening of individuals' experiences with technology. People in rural areas of India generally do not travel far from their home villages, and the focus of their daily lives is largely restricted to their farm. Seldom are they aware of broader opportunities and issues even within their own state or region (Rao, 2008). Such conditions lead to numerous problems. For example, mortality rates from disease are higher in rural areas than they are in urban areas. Two reasons for this are a high rate of illiteracy and a lack of mobility (Munshi & Rosenzweig, 2005). Village medical programs have been making measles inoculations available to villagers at no cost for several years due to many local and global charities, yet India still has a high rate of child mortality associated with the disease – 67% of childhood deaths due to measles in 2007 were in India (UNICEF, 2008).

Seeking solutions to such problems is of vital importance to the health and continued development of India's economy. One possible solution is to make available more and better information – such as better health and medical information, modern farming practices, current and comparative prices of agricultural products in the markets and more accurate weather forecasts. Such information could make a significant difference to farmers in rural India. One way this can be achieved is to bring relevant technologies to villages. Electronic government (e-Government) portals are a potential means of providing access to such information that can benefit villagers.

Although the benefits of e-Government portals are numerous, there are significant challenges associated with developing and implementing them in developing countries such as

India. Several reports from international organisations such as the United Nations (2011a; 2011b) and the World Bank (2008) have indicated that a high percentage of e-Government portal efforts in developing countries have been failing at an alarming rate (Institute for Development Policy and Management, 2008). Research on e-Government, in general, has begun on or about 2000. It is only recently that researchers have increasingly examined e-Government in its own right, separate from other commonly researched technologies (see Belanger & Carter, 2012). A large majority of these studies describe specific e-Government initiatives and/or report the status of a specific e-Government portal (e.g. Saxena, 2005) or the rate of success or failure of these initiatives (e.g. Heeks, 2003). However, these studies have largely been inattentive to the specific reasons that contribute to successes (or failures) or their broader impacts. Furthermore, except for a few studies (e.g. Heeks, 1999; Kumar & Best, 2006; Heeks & Stanforth, 2007), much of the research does not specifically focus on developing countries. The few studies that do focus on e-Government adoption in developing countries are, unfortunately, narrow in scope and similar to the general e-Government studies. There have been studies in sociology that have examined the role of individual characteristics, especially demographic characteristics, and their importance in the prediction of the use of technologies in a digital divide context (see Venkatesh & Sykes, in press). Hence, we still do not have a rich understanding of what drives e-Government portal adoption and the extent of use of such portals (Heeks, 2002; Norris, 2003; Kumar & Best, 2006; Belanger & Carter, 2012).

Similarly, prior research, both within and outside developing countries, on the digital divide has focused primarily on illustrating specific technology initiatives and illuminating their success or failure (Heeks, 2002; Keniston, 2002; Keniston & Kumar, 2004; Ahmed, 2007) or examining the demographic characteristics of privileged and underprivileged classes (e.g. Lenhart, 2002; Hsieh *et al.*, 2008). Past studies on ICT adoption in developing countries have argued that, in general, a majority of ICT implementation efforts fail, regardless of the type of application (Avgerou & Walsham, 2000; Heeks, 2002; Avgerou, 2003). The challenges surrounding technologies in developing countries are significant to more than just e-Government portals and pertain to ICTs as a whole (Avgerou, 2003). Some studies have shown that successful implementation of e-Government portals can be a major challenge even in developed countries (e.g. USA and UK), where the political, economic and social systems are significantly more advanced when compared with those found in developing countries (Huang, 2007; Carter & Weerakkody, 2008). The problems associated with the political, economic and social conditions in developing countries can be significant impediments to e-Government initiatives (Cecchini & Raina, 2004; Gronlund *et al.*, 2006; Kumar & Best, 2006). When examining e-Government initiatives in rural south India, Kumar & Best (2006) found that a program that was successful in its first year of implementation failed miserably immediately thereafter. They speculated that political, economic, social and cultural factors caused the failure. Similar studies in other parts of India (e.g. Heeks, 1999; Cecchini & Raina, 2004) and in other developing countries, such as South Africa (Benjamin, 2001), also found similar results.

Although e-Government adoption research is in its infancy, general ICT adoption research has been around for almost three decades. ICT adoption and use is considered to be one of

the most mature streams of research in our field (see Venkatesh *et al.*, 2003; 2007). This literature stream offers an extensive understanding of the factors, such as beliefs regarding the technology, situational impediments, individual differences, intrinsic motivation and social influences, that impact individual adoption and use of ICTs both in the workplace (e.g. Thong *et al.*, 2002; 2006; Venkatesh *et al.*, 2003; 2007; 2010; Venkatesh & Bala, 2008; Sykes *et al.*, 2009) and homes (Venkatesh & Brown, 2001; Brown & Venkatesh, 2005). Furthermore, the ICT adoption and use models have been replicated numerous times to confirm the findings from previous studies (Lee *et al.*, 2003). Despite the advancement in the ICT adoption and use research, the literature focusing on developing countries is relatively sparse (see Walsham *et al.*, 2007). However, the recent increase in studies on developing countries (Avgerou & Walsham, 2000; Avgerou, 2003; Puri, 2007; Walsham *et al.*, 2007) and the introduction of new journals devoted to the topic (e.g. *The Journal of Information Technology for Development* and *The Electronic Journal of Information Systems in Developing Countries*) are indications that this topic is gaining attention among researchers. However, none of the aforementioned work is primarily focused on e-Government or the digital divide in developing countries.

In sum, although there has been some research on the digital divide and e-Government portals, we are still lacking in our understanding of the factors contributing to the use of such portals and the extent of the use of these portals. Similarly, although ICT adoption research has started to increasingly focus on developing nations, we do not yet know what the unique aspects of developing countries are with regard to ICT adoption and use. We attempt to address these gaps in this paper. Specifically, we examine various individual difference variables as predictors of e-Government portal adoption and use. Using individual difference variables, such as traits like gender and personality, to predict ICT adoption and use is consistent with much research in this stream (e.g. Gefen & Straub, 1997; Venkatesh *et al.*, 2003; McElroy *et al.*, 2007; Devaraj *et al.*, 2008; Venkatesh & Bala, 2008).

## MODEL DEVELOPMENT

We examined both surface- and deep-level traits as determinants of e-Government portal use. The demographic characteristics of age, gender, income and education are the four surface-level traits that are proposed to have an effect on e-Government portal use. The Big Five personality characteristics (see Costa & McCrae, 1992) – i.e. extraversion, neuroticism, conscientiousness, agreeableness and openness to experience – and personal innovativeness with IT (PIIT) are the six deep-level traits that are proposed to have an effect on e-Government portal use. Thus, our model is represented by the equation:

Use =  $f$  (age, gender, income, education, extraversion, neuroticism, conscientiousness, agreeableness, openness to experience and PIIT).

### Demographic characteristics

Gender has been shown to play a major role in the use of technologies (e.g. Venkatesh & Morris, 2000). Venkatesh & Morris (2000) found that men, more than women, are likely to use

ICTs (see also Gefen & Straub, 1997; Venkatesh *et al.*, 2003). It has also been shown that the perceptions of technology attributes can differ between men and women (e.g. Gefen & Straub, 1997; Venkatesh *et al.*, 2003). For example, men often learn to use a technology faster than women do (Gefen & Straub, 1997). Furthermore, this can severely inhibit women's continued use of technology (Venkatesh & Morris, 2000). Although these findings pertain to technology use in the workplace, the same patterns were largely consistent in the context of technology use at home (Venkatesh & Brown, 2001; Brown & Venkatesh, 2005).

In developing countries such as India, people in rural communities largely depend on men, as heads of households, to provide the basic necessities for living (Census of India, 2011; United Nations, 2011b). Due to cultural norms, men in India are required to assume the role of breadwinner, with women being expected to focus on feeding, clothing and sheltering the children (Landsberg-Lewis, 1998; Census of India, 2011). Furthermore, these cultural norms encourage women to not initiate communication with people outside their extended family, such as agents of the government (Census of India, 2011). Studies regarding ICT use in developing countries have also found that women tend to use technologies lesser than men do (Avgerou & Walsham, 2000). The recent United Nations' Human Development Report (United Nations, 2011a) indicated that, in developing countries, very few women participate in activities that include interacting with the local, state and federal government for necessary services. Therefore, we hypothesise

H1a: Men, more than women, will use e-Government portals.

Age differences have also been extensively studied in prior IS research (e.g. Igbaria & Parasuraman, 1989; Morris & Venkatesh, 2000). Igbaria & Parasuraman (1989) argued that older people have limited computer knowledge and less training and, therefore, maintain more unfavourable perceptions regarding computers in general. Prior research has shown that as people become physically weak with age, their ability to handle complex information-processing tasks also decline (e.g. Birren *et al.*, 1980; Morris & Venkatesh, 2000). Furthermore, it has been shown in prior studies that older people generally resist changes in their work-related or personal environments and are likely to avoid tasks that are unfamiliar to them (Myers & Conner, 1992; Sharit & Czaja, 1994). A recent poll by Pew America (Pew Internet and American Life Project, 2012) found that teenagers and younger adults constitute more than 66% of ICT users in the USA. Studies regarding ICT use in developing countries have also found that younger adults are more likely to use ICT than older adults do (Avgerou & Walsham, 2000).

Unlike in urban areas, computers have only recently started to penetrate rural India. People in these rural areas generally have 'computer fear' as they have not been exposed to computers previously. Computer fear is a significant mental barrier largely experienced by older adults (Van Dijk, 1999). Van Dijk (1999) argued that older adults in backward communities often think computers are too difficult to use or their initial experience with computers is often not a pleasant one, thus serving only to reinforce the fear. Older adults who are illiterate generally delegate tasks that require a fair amount of learning and cognitive processing to

younger members in the family. In rural India, about 78% of adults over the age of 50 are illiterate (Census of India, 2011). Therefore, we hypothesise

H1b: Age will negatively influence e-Government portal use.

Prior IS studies have consistently demonstrated that income and education significantly affect technology use such that individuals with higher income and education use computers more than those with lower income and education levels (Brown & Venkatesh, 2005). This pattern has been found in more recent research as well – a recent survey by the Pew Internet and American Life Project (2012) has also indicated that there are huge differences in internet access among individuals with higher education and income compared with individuals with lower education and income.

Studies on the digital divide in developing countries have shown that income and education are important reasons for access and use of computers in this context (e.g. Van Dijk, 1999; Van Dijk & Hacker, 2003). Van Dijk (1999) argued that access to computers was visibly higher in high-income areas and among educated people when compared with low-income areas and people with little or no education. In developing countries such as India, computer fear arises due to illiteracy and the lack of knowledge about computers and what computers can do (Van Dijk & Hacker, 2003). People in rural communities generally think that computers are a luxury and are only reserved for the rich people with a strong educational background and often deny themselves access to computers (United Nations, 2009). As indicated previously, in rural India, about 80% of adults over the age of 50 are illiterate (United Nations, 2011a; 2011b). Therefore, we hypothesise

H1c: Income will positively influence e-Government portal use.

H1d: Education will positively influence e-Government portal use.

### **Personality characteristics**

Personality is defined as a pattern of behaviours that is characteristic of an individual that affects his or her cognitive, affective and behavioural reactions (e.g. Levy, 1970; John & Srivastava, 1999). A vast body of research in psychology and sociology has examined the role of personality that can psychologically distinguish individuals from one another and personality's effect on a variety of human behaviours. There are a variety of lenses through which we can understand personality – one of the most widely used is the Big Five personality inventory (Terraciano & Costa, 2004). The Big Five, which is termed as such due to the five broad traits that together represent personality, comprises extraversion, neuroticism, conscientiousness, agreeableness and openness to experience (Costa & McCrae, 1992). The Big Five personality traits have been used extensively in organisational research to understand outcomes such as workplace violence, job performance, job satisfaction and leadership (Funder, 2001), and recently, IS scholars have begun to focus on personality-related issues in ICT use (McElroy *et al.*, 2007; Devaraj *et al.*, 2008).

Extraversion is the tendency to actively engage with the social world and is generally characterised by many activities such as sociability, exuberance, energy and positive emotion. Extroverts typically prefer face-to-face, rather than media-based, interactions and generally tend to avoid interactions with physical objects for communication purposes (Landers & Lounsbury, 2006). However, extroverts also actively seek information to share with others, and they are action-oriented individuals who are more than willing to try exciting opportunities (John & Srivastava, 1999; Funder, 2001; McElroy *et al.*, 2007). In the context of e-Government portal use, particularly in rural communities of a developing country such as India, where the oral tradition of information sharing is quite common, extroverts are likely to enthusiastically seek to use the portals to try out the innovation, as it will give them an opportunity to share information about their experiences with others. Therefore, we hypothesise

H2a: Extraversion will positively influence e-Government portal use.

Neuroticism is the tendency to be emotionally unstable and experience constant negative feelings. Neuroticism is generally characterised by various activities such as stress, nervousness, anxiety, hopelessness, paranoia and depression. Neurotic individuals have been shown to distrust the government and strongly resist any new changes in a government's services or delivery of services (e.g. Roberts & Robins, 2000). Such individuals also have general negative feelings towards things, such as computers, to which they have not been exposed before (Landers & Lounsbury, 2006). Innovation diffusion theory (Rogers, 1995) argues that, where innovators are eager to adopt new technologies, people who are risk-averse, cautious and sceptical are more likely to be laggards, in terms of adopting technology, rather than innovators. In rural communities in developing countries such as India, there is generally a high level of mistrust with local government agencies (United Nations, 2011a; 2011b), likely causing individuals to approach e-Government portals with both caution and scepticism. A citizen's confidence and trust in the government and the technology are necessary for the success of any e-Government initiative (Belanger & Carter, 2008). Such confidence and trust are likely to be absent among the neurotic in a rural developing country context. Furthermore, neurotic individuals might find computers threatening and will try to avoid using e-Government portals. Therefore, we hypothesise

H2b: Neuroticism will negatively influence e-Government portal use.

Conscientiousness is the tendency to actively plan ahead and be goal oriented with a strong sense of purpose. Conscientiousness is generally characterised by various activities such as being well organised, structured, dutiful and persistent. Prior studies that have examined personality and internet use have found that conscientious people are more likely to use the internet for productive, rather than unproductive, purposes (e.g. Landers & Lounsbury, 2006; McElroy *et al.*, 2007). Landers & Lounsbury (2006) argued that conscientious individuals spend less time in leisurely activities on the internet and spend more time in work-related activities. It has been shown previously that people who are achievement oriented, enduring and dedicated are more likely to try new technologies that are productive and useful (Howell & Higgins, 1990; Rogers, 1995). In a rural context in a developing country such as India,

conscientious individuals are likely to embrace and use the e-Government portal, as it will afford them an opportunity to improve their productivity and their income, because the portal can provide useful information about farming practices and current weather. As the e-Government portals aid individuals in being more productive and efficient, we can expect conscientious people to use the portals more. Therefore, we hypothesise

H2c: Conscientiousness will positively influence e-Government portal use.

Agreeableness is the tendency to be cooperative with others and to have a strong need for social harmony. Agreeableness is generally characterised by various activities such as being trustworthy, altruistic, optimistic, reliable, generous and forgiving. Agreeable people generally show a high level of compliance with operational and procedural processes (Higgins, 1996) and are characterised by a high level of trust towards authority (Higgins, 1996). Prior research on e-Government adoption found that trust plays a major role in the adoption and continued use of e-Government services (Warkentin *et al.*, 2002; Welch *et al.*, 2005; Belanger & Carter, 2008). As opposed to neuroticism, it can be expected that people who trust the government and abide by the rules and procedures of the government would be more willing to try e-Government portals. As such individuals would likely be more altruistic and reliable, they will be more likely to share with their friends and family members. In other contexts, agreeable individuals have been found to help others by voluntarily finding information for them (others), even if they are less inclined to do so for themselves. In rural communities in developing countries such as India, where, as noted earlier, the oral tradition of information sharing is quite common, agreeable individuals will be willing to use the e-Government portals as it gives them an opportunity to help others. Therefore, we hypothesise

H2d: Agreeableness will positively influence e-Government portal use.

Openness to experience is the tendency to actively seek new and unconventional ideas with a high degree of intellectual curiosity. Openness is characterised by various activities such as being curious, imaginative, inquisitive, artistic and engaging in problem-solving. Curiosity has been shown to influence individuals to try new behaviours in several contexts (e.g. Malone, 1981a; 1981b; Loewenstein, 1994; Kashdan *et al.*, 2004; Reiss, 2004). Individuals with high levels of curiosity have been shown to be intrinsically motivated to pursue and experience novel things (Deci, 1975; Deci & Ryan, 1992; Kashdan & Fincham, 2002). Prior IS research has consistently demonstrated that intrinsically motivated individuals often are more likely to use a new technology (Venkatesh, 1999; 2000; Venkatesh & Speier, 1999; Van der Heijden, 2004). Research on internet use has noted that people are often attracted to the internet to satisfy their curiosity and imagination and seek out novel experiences (Tuten & Bosnjak, 2001). Young (1998) argued that curious and inquisitive individuals are more likely to try the internet to experience the novelty and the appeal of the underlying activity. As computers and the internet are slowly being introduced in rural communities in India, they are most certainly a unique and novel experience for the citizens as they have likely not experienced or used computers before. Consequently, for individuals who are more open to experiences, using



e-Government portals for the sake of using a new widget and unearthing the world of information would be of substantial intrinsic interest. Therefore, we hypothesise

H2e: Openness to experience will positively influence e-Government portal use.

## PIIT

PIIT refers to the willingness of an individual to try out a new IT (Agarwal & Prasad, 1998; Thatcher & Perrewe, 2002). To some extent, it can be seen as a more contextual (IT-specific) version of openness to experience. PIIT is considered an inherent attribute of a risk-taking individual (Agarwal & Prasad, 1998). Such risk-taking orientation encourages an individual to seek new and innovative experiences (Thatcher & Perrewe, 2002). Highly innovative individuals have an inherent desire for knowing and more often pursue new and stimulating experiences (Kegerreis *et al.*, 1970; Hurt *et al.*, 1977; Venkatraman, 1991; Thatcher & Perrewe, 2002). Self-confidence and determination to try are also general attributes of innovative individuals (Kegerreis *et al.*, 1970). These individuals are generally considered impulsive and do not worry about the outcomes of their actions (Karahanna *et al.*, 2002). Individuals high on PIIT would consider the services delivered through the e-Government portal as innovative, and their risk-taking nature would fuel their desire to try the portal just to experience the novelty of the portal without any regard for the outcomes. Therefore, we hypothesise

H2f: PIIT will positively influence e-Government portal use.

## METHOD

### Setting

Our study was conducted in a rural village in India that was deploying an e-Government technology initiative that involved making available kiosks with access to an e-Government portal. A major part of the financial support for the initiative was from a large multinational corporation, and smaller portions were from the state and local governments. Most families in the village pursued farming and related occupations. The goal of the program was to give villagers access to information on farming practices, weather patterns, market prices of agricultural products, and the time and locations of markets for the sale of agricultural produce. Ten kiosks were available 16 hours every day and were staffed by six assistants who could access the desired information for a user if necessary (e.g. if the user was not literate). Our study ran for the entire first year after the implementation of the initiative.

### Participants

We gathered data from 311 out of the 347 heads of household in the village (90% response rate). Heads of household were the primary breadwinners for their families. Consistent with

the 2011 Indian Census, about 80% of the heads of household were men. The average age of the participants was approximately 41, and most participants were married.

## Measures

Costa & McCrae's (1992) NEO Personality Inventory items were used to measure the Big Five personality traits of extraversion, neuroticism, conscientiousness, agreeableness and openness to experience. PIIT was measured using items from Agarwal & Prasad (1998). Direct and indirect e-Government portal use data were obtained from the kiosk logs that were maintained by the assistants and then aggregated for the year of the study. Income data were obtained from archival records kept by the local government office, which assesses the annual produce from each farmer, as well as from the heads of households. This allowed us to verify the information from both sources. Although only the heads of households' incomes were recorded, it should be noted that no other individual within a household contributed more than 10% to the household income. Following acceptable translation practices (Brislin *et al.*, 1973), the survey instrument was first translated from English to the local language and was then translated back to English by a second individual. Any discrepancies were discussed, and a resolution was reached.

## Data collection

Participants were offered an incentive of 200 Indian rupees, which amounts to approximately US\$5, to participate in our study. Given the average income of the area and cost of living, this was a significant amount. The data were collected through the use of 10 interviewers, as the low literacy rate precluded using traditional paper surveys. The 10 interviewers visited the various families and verbally administered the questionnaire in the local language. Non-respondents were those who could not be contacted (despite several follow-up attempts) or who had recently experienced a catastrophic event such as a death in the family. We collected data in two phases. During the first month of the study, we gathered basic demographic data. This was followed by a month-long training, which was conducted each evening for 2 hours, on the e-Government portal. These training sessions explained the benefits of the e-Government portal, the type of information that was available from the portal and the procedures related to direct and indirect use of the portal. Given the low literacy rate, the ability to indirectly use the portal – i.e. get information from the portal with the help of a kiosk attendant who would use the portal, retrieve information and share it with the villager – was vital to making the portal accessible. All training was conducted in the local language. Citizens were encouraged to attend multiple training sessions. During the course of the first year after the training, manual logs of portal use were maintained. At the end of the first year, we used the logs to create aggregate use data for each head of household.

## RESULTS

We used factor and regression analyses to analyse our data. The specific tool we used is SmartPLS (Ringle *et al.*, 2005). Reliability and validity were assessed for the variables that had multi-item scales, namely the personality variables. These constructs were found to be reliable, with Cronbach's alpha in all cases being equal to or greater than 0.70. These are shown in Table 1. Table 1 also shows the loadings and cross-loadings from a factor analysis with direct oblimin rotation to allow for correlated factors – all loadings were greater than 0.65, and cross-loadings were below 0.35 – thus supporting internal consistency and discriminant validity.

The descriptive statistics and correlations are shown in Table 2. The means and standard deviations were in the ranges expected. Only about a fourth of the heads of household had completed the equivalent of an eighth-grade education, and only one had completed high school. Less than 10% of all heads of household were English literate. The literacy statistics of our sample were largely consistent with what is found in villages in India.

**Table 1.** Reliabilities, loadings and cross-loadings

	1	2	3	4	5	6
Cronbach's alpha	<b>0.75</b>	<b>0.73</b>	<b>0.70</b>	<b>0.75</b>	<b>0.77</b>	<b>0.70</b>
Extraversion 1	<b>0.71</b>			0.22		
Extraversion 2	<b>0.70</b>			0.23		
Extraversion 3	<b>0.74</b>			0.20		
Extraversion 4	<b>0.67</b>					
Neuroticism 1		<b>0.71</b>				
Neuroticism 2		<b>0.73</b>			0.19	
Neuroticism 3		<b>0.73</b>				
Neuroticism 4		<b>0.71</b>				
Conscientiousness 1			<b>0.82</b>		0.21	
Conscientiousness 2			<b>0.80</b>	0.22	0.21	
Conscientiousness 3			<b>0.83</b>		0.24	
Conscientiousness 4			<b>0.70</b>		0.21	
Agreeableness 1	0.22	0.20		<b>0.71</b>		
Agreeableness 2		0.22	0.29	<b>0.69</b>		
Agreeableness 3	0.24		0.17	<b>0.70</b>		
Agreeableness 4		0.24		<b>0.74</b>		
Openness to experience 1	0.24			0.34	<b>0.70</b>	
Openness to experience 2	0.33	0.25		0.33	<b>0.75</b>	
Openness to experience 3	0.20			0.30	<b>0.68</b>	
Openness to experience 4	0.21			0.21	<b>0.71</b>	
PIIT 1			0.30		0.22	<b>0.70</b>
PIIT 2	0.30				0.24	<b>0.66</b>
PIIT 3			0.33		0.30	<b>0.75</b>
PIIT 4					0.21	<b>0.70</b>

Note: Loadings less than 0.20 are not shown.

PIIT, personal innovativeness with information technology.

Loadings on the factor of the construct are shown in bold.

**Table 2.** Descriptive statistics and correlations

	M	SD	1	2	3	4	5	6	7	8	9	10
1. Gender (0: men)	0.19	0.39										
2. Age	41.33	10.91	-0.20**									
3. Income	17,645	5,222	-0.22***	0.20**								
4. Education	0.24	0.44	-0.21***	-0.13*	0.25***							
5. Extraversion	4.58	0.87	0.13*	0.08	0.13*	0.13*						
6. Neuroticism	3.22	0.69	0.07	0.05	-0.04	-0.04	0.07					
7. Conscientiousness	4.99	0.91	0.04	0.25***	0.19***	0.19***	0.13*	-0.04				
8. Agreeableness	5.13	0.83	0.23***	0.17**	-0.15*	-0.15*	0.07	-0.08	0.13*			
9. Openness to experience	3.55	0.78	-0.13*	-0.20***	0.07	0.07	0.05	-0.10	0.09	-0.14*		
10. PIIT	3.69	1.20	-0.20***	-0.24***	0.16**	0.16**	0.08	-0.07	0.13*	0.05	0.20***	
11. e-Government portal use	2.35	3.55	-0.28***	-0.23***	0.23***	0.23***	0.23***	0.08	0.30***	0.06	0.36***	0.43***

\* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

M, mean; PIIT, personal innovativeness with information technology; SD, standard deviation.

**Table 3.** Predicting e-Government portal use

R <sup>2</sup>	0.40
<i>Demographic characteristics</i>	
Gender (0: men)	-0.13*
Age	-0.07
Education	0.14*
Income	0.35***
<i>Personality characteristics</i>	
Extraversion	0.21***
Neuroticism	0.03
Conscientiousness	0.22***
Agreeableness	0.06
Openness to experience	0.23***
PIIT	0.21***

\* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

Table 3 shows the results of the model testing. e-Government portal use is well predicted by the various demographic characteristics and personality variables. All of the demographic variables, except for age, predict e-Government portal use. Hypotheses 1a, 1c and 1d were thus supported. Three of the Big Five personality variables, namely conscientiousness, extraversion and openness to experience, and PIIT were found to predict e-Government portal use, thus supporting Hypotheses 2a, 2c, 2e and 2f. The reason neuroticism was non-significant was likely due to the limited variance (0.69). Of all the predictors, income was the strongest predictor of use. Overall, the model explained 40% of the variance in e-Government portal use.

## DISCUSSION

We extended prior research on e-Government adoption and use (e.g. Choudrie & Dwivedi, 2005; Dwivedi *et al.*, 2006; Grimsley & Meehan, 2007; Heeks & Stanforth, 2007; Irani *et al.*, 2007; see Belanger & Carter, 2012) by focusing on individual differences. We also extend prior research on ICT adoption and use in developing countries (e.g. Avgerou & Walsham, 2000; Walsham *et al.*, 2007; Dwivedi *et al.*, 2007; Dwivedi & Weerakkody, 2007). Prior research on e-Government has primarily focused on the type of e-Government initiatives (e.g. Ciborra, 2005; Fagan, 2006), the success and failure of such initiatives (e.g. Heeks, 2003; Daniel & Ward, 2006) and specific public policy issues (e.g. Becker *et al.*, 2006; Klischewski, 2006), all while paying little attention to the factors related to a citizen's use of such initiatives. Recent papers in this area have suggested that individual differences might be a major factor in the adoption and use of e-Government technologies (Warkentin *et al.*, 2002; Belanger & Carter, 2008). Furthermore, a majority of the e-Government studies have focused on developed countries (see Belanger & Carter, 2012).

As the United Nations, World Bank and other international organisations are considering digital equality in developing nations as one of their primary goals, there is an increasing push

by the governments in these developing nations to provide access to all citizens, thereby resulting in e-Government portals. However, reports have consistently shown that a majority of these initiatives fail (Heeks, 2003; Institute for Development Policy and Management, 2008). It is, therefore, important to understand the adoption and use decisions from a citizen's perspective. In addition to extending knowledge in this area, our study is one of the first to provide a comprehensive model regarding the effects of individual differences on e-Government portal use. We theorised and found support for our model that demographic characteristics and personality variables predict e-Government portal use. The variance explained in portal use was 40%. The significance of the predictors and amount of variance explained suggests that our model provides a good explanation of e-Government portal use.

### Contributions and implications

There are several areas of research to which our work contributes. First, e-Government is seen as an important way to break barriers and bring government help to one and all, which is one of the United Nations' Millennium Development Goals. We contribute to research in this area by exploring the factors that contribute to the use of e-Government portals. Specifically, we examined individual characteristics as predictors of the use of such a portal in a village in India. Our focus on a rural setting showcases findings that could potentially speak to the issue of the digital divide in developing countries such as India. Due to the general lack of education levels combined with low-income jobs, people in rural communities often cannot properly assess the benefits of technology-enabled initiatives. Thus, early experiences and use, driven strongly by demographic and personality characteristics, are crucial in fostering the success of digital divide initiatives.

Second, we contribute to the general body of ICT adoption research. Although research in this area has been abundant, only recently have studies begun to specifically focus on e-Government (see Belanger & Carter, 2012). It is generally understood that patterns of use and impacts of government-deployed ICT is largely different from organisational ICT initiatives. By examining e-Government, we extend general ICT adoption research to a relatively understudied context. Third, as noted earlier, research on the digital divide has received a great deal of attention in recent years, with a particular emphasis on demographic and personality characteristics (see Venkatesh & Sykes, in press). We extended this work to the context of developing countries and found the oft-studied variables to be fairly predictive even in the new context.

Fourth, our research has important implications for public policy. Although previous studies have enumerated the failures of e-Government, we still do not know why such initiatives fail. Our research suggests that personality differences can potentially affect the use of e-Government portals. Government initiatives can include different training programs targeted towards different demographic segments and potentially different personality profiles. For example, e-Government portal training can be designed to emphasise different ways to share critical information in order to motivate altruistic and agreeable individuals, although a different design can emphasise hedonic aspects of the portal in order to motivate individuals with a high

level of curiosity and openness to new experiences. Similarly, different training programs can be implemented for men vs. women and older vs. younger individuals. This, in turn, is likely to directly contribute to more women participating in disseminating information and contributing to economic development, which is one of the United Nations' Millennium Development Goals.

Given our focus on e-Government portals and the pattern of findings observed here, there are several important future research directions that should be pursued in order to further our understanding of e-Government and its impacts. Such future work will also likely have significant practical implications. First, various impacts of e-Government should be examined. One of the main goals of e-Government in developing nations is to promote economic development in rural communities. There is extensive economic and social disparity between urban and rural areas in developing countries. Such government initiatives are often motivated by the desire to alleviate poverty, enhance socio-economic status and empower rural men and women. Hence, it is important to understand whether or not the income and economic disparities are, in fact, reduced due to e-Government. Examining the introduction and use of mobile phones in a poor community in Kenya, a recent study has concluded that incomes of Kenyan households in that community have increased by 5–30% (The Economist, 2009). Based on a similar study, the World Bank had estimated that for every 10 mobile phones per 100 people in a developing country, the gross domestic product (GDP) grows by 0.8%, and for every 10% increase in internet connectivity, the GDP grows by 1.3% (World Bank, 2008). It has been noted that such technology initiatives 'compensate for inadequate infrastructure such as bad roads and slow postal services, allowing information to move more freely, making markets more efficient and unleashing entrepreneurship' (The Economist, 2009).

Second, in developing countries, digital divide initiatives aim at achieving much more. For example, future research and practice should examine the impact of such initiatives on health outcomes. Third, our time frame of 1 year is a key strength of the research design, but digital divide initiatives may take much longer to come to fruition. For instance, it is possible that the portal use that we observed in 1 year may dissipate. Only studies of longer durations, e.g. 3–5 years, will help understand the complete nature of use patterns. Fourth, our dependent variable was e-Government portal use. However, the real underlying variable of interest in this context is getting and using the relevant information from e-Government portals. In our study, we had no practical way of gathering this information, and we foresee great difficulty in gathering such data in a survey study. However, we envision research that is more engaged in the context – e.g. ethnographic studies – with smaller samples that can shed further light on the phenomenon.

Last, we have used a particular theoretical lens, based on demography and personality, to study e-Government portal use. Future work should consider alternative theoretical lenses. For instance, other models, such as the technology acceptance model, the unified theory of acceptance and use of technology (UTAUT), the diffusion of innovations theory and the model of adoption of technology in the household (see Venkatesh *et al.*, 2003; 2012; Brown & Venkatesh, 2005), have been used in prior research to study technology use. More recent models, such as the model of acceptance with peer supports (Sykes *et al.*, 2009), that emphasise interpersonal interactions using a social network lens could yield insights in a

context where literacy is low and collectivism is high, such as the case in India and particularly in rural India. The generalisability and/or potential modifications needed to suit this new context could be of value from the perspective of e-Government research and from the perspective of the particular theories/models themselves. These other models may thus provide additional insights to researchers and practitioners alike about drivers of success and failure of digital divide initiatives.

Although psychology, sociology and organisational behaviour researchers have long studied the impact of demographic and personality characteristics on various behaviours, such investigations have been far more limited in IS research. By bringing this well-established theoretical perspective to the e-Government context, we demonstrate the usefulness and generalisability of the theory. Nevertheless, we may only have scratched the surface as we used the Big Five and one ICT-related personality variable. There are several other general personality variables, e.g. locus of control and goal orientation, and ICT-related personality variables, e.g. computer playfulness and computer self-efficacy, that may play a role in this context. Furthermore, due to the nascent state of research using this theoretical lens in the e-Government context, we did not theorise or explore moderating effects. As noted earlier, UTAUT/UTAUT2 in conjunction with the demographic and personality variables could very well be helpful in furthering our understanding of the phenomenon.

## CONCLUSIONS

The goal of this research was to understand the factors that contribute to e-Government portal use in a developing country. Specifically, we hypothesised demographic and personality factors as predictors of e-Government portal use. Our study in a village in India largely supported our model. Our work advances knowledge regarding the specific factors that are related to e-Government portal use. As our study focuses on a developing country, i.e. India, this research not only contributes to and extends previous research on e-Government but also has significant implications for research about the digital divide and ICT use in developing countries. As many governments, especially in developing countries, around the world are increasingly implementing ICT-based initiatives, our study is timely and provides insights that could drive the success of ongoing initiatives to bridge the digital divide.

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