Government Information Quarterly xxx (2017) xxx–xxx

Contents lists available at ScienceDirect

Government Information Quarterly

journal homepage: www.elsevier.com/locate/govinf

The multi-dimensional digital divide: Perspectives from an e-government portal in Nigeria

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ARTICLE INFO

Article history:
Received 12 April 2016
Received in revised form 20 December 2016
Accepted 6 February 2017
Available online xxxx

Keywords:
E-government
Digital divide
Gender
Developing countries
Immigration services
Education

ABSTRACT

There is a widespread recognition that a digital divide exists between countries and individuals, and that understanding and addressing that divide is pivotal to the empowerment of citizens. Furthermore, although governments have often seen e-government services as one means of eroding the digital divide, prior research into the digital divide in the e-government context is limited. Hence, this research seeks to contribute to understanding of the nature of the digital divide as it affects Nigerian citizens, specifically users of the Nigeria Immigration Service (NIS) web portal. The NIS portal is a rich context in which to study the digital divide: it is the most well-developed e-government service in Nigeria; its use is compulsory for citizens seeking to travel outside of Nigeria; and, its users reside within both Nigeria (a developing country) and in more developed countries, such as the US and the UK. Using an online survey, and snowball sampling, 351 completed questionnaires were collected and analysed using *t*-tests and Anova. The digital divide was represented in terms of the three dimensions: previous Internet experience, access to computing facilities, and previous e-government experience. Analysis demonstrated a multi-dimensional digital divide with demographic, social-economic, and locational factors affecting e-government users' Internet experience, their access to computing facilities and their e-government experience. Overall, this research offers insights into the complexity of the digital divide.

1. Introduction

The digital divide has been recognised as relating to inconsistencies between individuals, households, businesses and geographical locations with regard to their access to resources and computing facilities, and to their use of information and communication tools, including the Internet (Organisation for Economic Co-operation and Development [OECD], 2001; Wanasika, 2003; Prahalad, 2004; Norris, 2006; Po-An Hsieh, Rai, & Keil, 2008; Tayo, Thompson, & Thompson, 2015). It also refers to a discrepancy between those having the skills, knowledge and capabilities to utilise technologies and those who do not (Jurich, 2000; Cullen, 2001; Sitawa-Ogutu & Rege, 2010; Hall & Owens, 2011). The extent of the digital divide can be affected by various demographic, socio-economic and locational variables, including gender, age, education, employment, income and location. Whilst there is a widespread recognition that the digital divide can exist within countries, with, for example, in developed countries, older or less well-educated groups having a lower level of access to computing technologies and the Internet as well as a lower level of skills (e.g. Bertot, 2003; Sitawa-Ogutu & Rege, 2010; Hall & Owens, 2011), one of the most explored research areas relates to the digital divide between countries. This focus represents an acknowledgement that numerous developing nations, including Nigeria, as well as China, Russia and Brazil, are lagging behind in their efforts to reduce the digital-divide with low levels of Internet utilization and restricted development of e-commerce (Bertot, 2003; Akanbi & Akanbi, 2012; Forum for East Asia-Latin America Cooperation [FEALAC], 2014). In particular, many developing countries have significant challenges in developing their information and communication technology infrastructure (Vu, 2011; Gomez & Pather, 2012). However, on the other hand, such technologies are seen as having the potential to provide opportunities, support economic growth and increase democracy in such countries (Shirazi, Ngwenyama, & Morawczynski, 2010).

Given both the challenges and opportunities associated with a strong information and communications infrastructure, some developing countries have invested in innovation concerned with e-government services not only as an opportunity to streamline and improve access to government information, services, and political and policy making processes, but also as a means of investing in technology infrastructure and developing the computer and Internet skills of their populations (Chinn & Fairlie, 2006; Belanger & Carter, 2009; Vicente & Lopez, 2011). As these are viewed as important initiatives, there is a growing body of research reporting on e-government projects in developing countries. Some of these studies comment on the digital divide, but a number of authors have called for further study of the nature of

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http://dx.doi.org/10.1016/j.giq.2017.02.002
0740-624X/

the digital divide in the context of e-government, suggesting that there is a specific need for such research in developing countries and specifically, Africa. (Chatfield & Alhujran, 2009; Yonazi, Sol, & Albert, 2010; Al-Shboul, Rababah, Al-Shboul, Ghnemat, & Al-Saqqa, 2014). Accordingly, there is scope for further research into the nature of the digital divide in different countries and across a range of e-government initiatives.

More specifically, the limited studies on the digital divide in Africa, demonstrate that Africa faces a high level of inequality, a weak IT communication system, particularly in rural areas, and a lack of willingness to invest in ICT with a view to address related issues on the part of governments (Thompson & Walsham, 2010). Nkwe (2012) and Nkohkwo and Islam (2013) suggest that this low level of Internet penetration and inadequate telecommunication and technological infrastructure in Africa contributes to a digital divide regarding e-government services implementation. This is especially important as the digital divide is interrelated with social, political, educational and economic issues and can potentially reproduce existing social disparities. Hence, this research is based on an e-government portal provided in one of the larger African countries, Nigeria. Nigeria has been chosen as the context for this study because not only is it a large developing country, with considerable wealth, but also has considerable challenges in both developing IT infrastructure and in educating its very large population. The e-government service that is used as the basis of the study is the Nigeria Immigration Service (NIS) portal. This is the most well-developed e-government service in Nigeria, and its use is compulsory for citizens seeking to travel outside of Nigeria. Also, given its focus on immigration, it is possible to compare the profiles and views of Nigerian citizens who are resident inside and outside of Nigeria. The opportunity to make this comparison is a unique aspect of this study. The aim of this study is, then, to explore the effect of demographic, socio-economic, and locational factors on the dimensions of the digital divide: access to computing facilities, previous Internet experience, and previous e-government experience. On this basis, the Multi-Dimensional Digital Divide Model (MDDDM) is proposed and recommendations are offered for further research and practice.

The remainder of this article is structured as follows. The following section presents the theoretical background for proposing a multi-dimensional digital divide model, with two distinct facets, the components of the divide, and the factors that impact on those factors, and undertakes hypothesis development. In Section 3, the research approach for empirically testing the hypotheses is presented. Next, the findings from the research, based on both descriptive statistics and hypothesis testing, are presented and discussed. Finally, conclusions and recommendations for further research and practice are presented.

Table 1
Hypotheses.

Hypothesis	Variable	Path Coefficient
H1	Location	Location (rural/urban) affects access to computing facilities
H2		Location (rural/urban) affects Internet experience
H3		Location (rural/urban) affects e-government experience
H4		Location (inter-country) affects access to computing facilities
H5		Location (inter-country) affects Internet experience
H6		Location (inter-country) affects e-government experience
H7	Gender	Gender affects access to computing facilities
H8		Gender affects Internet experience
H9		Gender affects e-government experience
H10	Age	Age affects access to computing facilities
H11		Age affects Internet experience
H12		Age affects e-government experience
H13	Education	Education affects access to computing facilities
H14		Education affects Internet experience
H15		Education affects e-government experience
H16	Employment	Employment affects access to computing facilities
H17		Employment affects Internet experience
H18		Employment affects e-government experience
H19	Income	Income affects access to computing facilities
H20		Income affects Internet experience
H21		Income affects e-government experience

2. Theoretical background and hypotheses

2.1. Defining the digital divide

This study focuses on the digital divide in the use of e-government services. According to Norris (2000), Cullen (2001) and Hall and Owens (2011), the digital divide is the technology gap between individuals with access to computerised technology and those with constrained, or no means of access, although Brandtzæg, Heim, and Karahasanović (2011) offer a slightly broader definition suggesting that the digital divide can be characterised as unequal access to computing facilities. Other authors have recognised that the digital divide also has a dimension that is associated with the skills to make use of computing technology (Min, 2010; Van Deursen & Van Dijk, 2010). Yet other authors refer to the digital divide in terms of the demographic variables that, may for example, influence the level of access to computing facilities or technology skills, focusing for instance on gender (Antonio & Tuffley, 2014), income (Servon & Nelson, 2001) or broader concepts such as socio-economical advantage and disadvantage (Po-An Hsieh et al., 2008). Indeed, one of the difficulties in building a coherent body of knowledge regarding the digital divide is the inclusion of both access and skills and the demographics that might influence access and skills (Sylvester & McGlynn, 2010). This research incorporates both types of variables into the proposed Multi-Dimensional Digital Divide Model (MDDDM) and explores some of the relationships between them. More specifically, it includes previous Internet experience, and previous e-government experience as pseudo-indicates of level of skill, along with access to computing facilities. In terms of demographic variables it includes: location, gender, age, education, employment and income.

2.2. Demographic factors influencing the extent of the digital divide

Previous research indicates that location, demographic factors (gender, age), and socio-economic factors (education, employment and income) contribute to the digital divide.

Location, specifically with regard to the differences between urban and rural areas has long been recognised to contribute to the digital divide (Hindman, 2000; Norris, 2000). Recent research shows that there is a persistent digital divide between those living in rural and urban areas with higher level of Internet usages amongst urban communities (Sitawa-Ogutu & Rege, 2010; Warschauer, 2012; White, 2012; Banihashemi & Rejaei, 2015; Park & Kim, 2015). Furuholt and Kristiansen (2007) argue that there is more public Internet access points in urban areas compared to the rural areas; this forms the basis for a digital divide based on location. One reason for this may be the concentration of Internet Service Providers (ISPs) in urban centres. Another strand of research on location considers the gap between developed and developing countries, both in terms of technology infrastructure and in terms of computing and Internet skills, with affordability of Internet connection for users in developing countries with a low standard of living (Guillen & Suarez, 2005; White, 2012; Banihashemi & Rejaei, 2015; Park & Kim, 2015). Guillen and Suarez (2005) in their study found factors such as cost of Internet, regulations, political and social issues have effect on Internet growth in both developed and developing countries which results in different level of Internet use between developed and developing countries. White (2012) argued that not everyone has easy access to Internet connectivity and that there is a wide gap between cities and rural areas, race, rich and poor when it comes to access to computer or Internet. Banihashemi and Rejaei (2015) argued that third world countries and most especially Muslim countries affected by the digital divide. Park & Kim, 2015 examined rural digital exclusion

Please cite this article as: Okunola, O.M., et al., The multi-dimensional digital divide: Perspectives from an e-government portal in Nigeria, *Government Information Quarterly* (2017), http://dx.doi.org/10.1016/j.giq.2017.02.002