



# Approaching digital equity: is wifi the new leveler?

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## Abstract

**Purpose** – Recent reports suggest the shape and size of the digital divide may be changing. This exploratory study aims to examine the relationships between demographic and situational variables and small and medium-sized enterprise (SME) owners' intentions to adopt and use free public wifi technology.

**Design/methodology/approach** – A survey study of 158 SME owners in the urban renewal community (RC) of a large Southwestern metroplex investigated the influence of known digital divisors – gender, ethnicity, age, education, and experience – on the adoption and use of wi-fi technologies. Partial least squares was used to test the hypotheses.

**Findings** – Contrary to previous research, gender, age, education, and experience were not related to the intention to adopt wifi technology. Ethnicity was significantly related to intent to adopt, but the relationship was small. Ethnicity and age were found to be somewhat related to wifi usage. In marked contrast from earlier research, education, gender, and experience were not significant predictors of usage.

**Practical implications** – The findings suggest that access to high-speed wifi has the potential to reduce and/or eliminate the digital divide. The projected changes in the digital divide can be expected to make a significant impact on SME productivity and performance.

**Originality/value** – This study is one of the first to examine the influence of the adoption and use of public wi-fi technologies by SME owners on the digital divide.

**Keywords** Communication technologies, Small to medium-sized enterprises, Wireless, Innovation, User studies, United States of America

**Paper type** Research paper

The “digital divide” is a term coined to address the inequalities of computer ownership and internet access and use (Mossberger *et al.*, 2003; Servon, 2002). The size of the digital divide, or the inclination to adopt and use new technologies, has varied widely over the last 25 years. For instance, it took 18 years for 50 percent of Americans to adopt the personal computer (Bauer *et al.*, 2002). In contrast, it took only nine years before 50 percent of Americans were using high-speed internet in their homes. The high demand for wifi access has increased largely because of the growth in sales of laptops and personal mobility products (Burness *et al.*, 2003). Internet access via wireless computers increased to their highest levels in 2008 (Center for the Digital Future, 2008). This is not surprising when one considers the exponential growth of satellite and wireless lines from 65,615 in 2000 to 11,872,309 in 2006 (Federal Communications Commission, 2007). The National Telecommunications and Information Administration (1997) study predicted that where wifi access existed, it would close the digital divide among and between diverse populations. Dr Juliet V. Garcia, President of the University of Texas – Brownsville, agreed, stating “Digital access is a great leveler” (Committee on Commerce, Science, and Transportation, 2002, p. 58).



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Previous research has suggested that demographic variables (e.g. gender, ethnicity, age, and education) and situational variables (e.g., experience with technology) are significantly related to the size of the digital divide (Karahanna *et al.*, 2002; Lu *et al.*, 2003). For example, being a female, a minority, an older citizen, or having little education have all been found to be negatively related to computer ownership and internet use. Those who have prior technological experience are more likely to use computers and the internet than those who have little or no experience.

There is continuing concern that those who lag in the adoption and use of the internet will fall behind in high-speed access and use of wifi technology (Fox and Livingston, 2007). Previous research has shown a strong correlation exists between the two distinctly different constructs of behavioral intention to use and the actual system use (Schepers and Wetzels, 2007; Sheppard *et al.*, 1988). This exploratory study seeks to examine whether the intention to adopt and use wifi technology by small and medium-sized enterprises (SMEs) reduces the digital divide among users who exhibit differences in gender, race, age, education, and experience. We begin with a review of the literature from which we extrapolate a series of hypotheses. The methodology is described, followed by a discussion of the results and implications. We conclude with suggestions for future research.

## Review of the literature

### *The digital divide*

Internet usage rates generally follow the same patterns across countries as computer usage rates (Chinn and Fairlie, 2007). Inequality of access to computers and the internet that created a digital divide within and across countries was recognized as early as the 1990s (Guillen and Suarez, 2005). Findings of the 1997 NTIA study suggested that, despite significant user growth rates, a widening gap existed between Whites and other ethnic groups in terms of telephone penetration, PC-ownership, and online access (National Telecommunications and Information Administration, 1997). Whites were more than twice as likely to own PCs and nearly three times as likely to have online access. Households with family members below the age of 15 and female-headed households also lagged significantly behind US averages and were among the “least connected”. The global digital gender gap measured in these early years ranged from a high of 20.2 percent to a low of 1.6 percent (Lebo, 2004). Finally, those with college degrees were more likely to own a PC and have online access than those with a high-school degree or those without a high school degree (Microsoft, 2007).

Subsequent studies implied the digital divide was beginning to close (United States Department of Commerce, 2000, 2002; United States Department of Labor Statistics, 2004). Some have speculated that wifi adoption and use may be playing a key role in reducing or eliminating the digital divide (Donner, 2008; BizEd, 2006). A rapid convergence in internet users per 100 inhabitants has occurred between developed and developing countries in the ten years between 1994 and 2004 (International Telecommunications Union, 2006). Internet usage rates per capita are now growing at faster rates in poor countries than in rich countries (Fink and Kenny, 2003). Low-cost computers and internet access has become a recognized strategy for combating an urban underclass[1]. In addition, several social shifts in the USA (e.g. increased immigration, rising birthrates, the “minority majority”, a growing global economic

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connectedness) hint that the shape and size of the digital divide may be changing (Edmondson, 2006, Roberts, 2008).

One unique setting in which both demographic and situational variables known to influence the digital divide can be examined is that of small and medium-sized enterprises (SMEs). There is some research that suggests minority-owned SMEs do not utilize computers in their businesses as often as non-minority SME owners (Microsoft, 2004). Nonetheless, research has shown that productivity and profitability are enhanced when internet and communication tools (ICTs) are utilized for operational and strategic purposes in minority-owned SMEs (Lerman *et al.*, 2004). Recent research suggests there are a significant number of SMEs who presently have little or no intention of adopting and using the latest digital technology (Pearson and Grandon, 2005). The failure of SMEs to adopt and use new technologies is a particular worry as SMEs are considered to be the building blocks of economic development and growth (Lee *et al.*, 2009; Qureshi and York, 2008).

There is a dearth of research that examines the influence of information technology on SMEs (Bharati and Chaudhury, 2009). Previous research has primarily focused on implementation issues. One exception is Coleman's (2005) study, which used 1998 data to study the digital divide in SMEs. Her research suggested the digital divide was predicted by demographic variables (e.g. ethnicity, owner age, owner education level) and organizational variables (e.g. firm size, firm age, organizational status). There has been limited research into the effects of demographic and situational variables on SME owners' intention to adopt and use new technology over the past decade (Qureshi and York, 2008). To our knowledge, there is no research that specifically looks at SME intention to adopt and use wifi technology and its potential to influence the digital divide. Based on information emerging from adoption studies using samples of US citizens and households, we re-examine the relationships between demographic and situational variables and wifi adoption and use by SME owners to ascertain any changes in the digital divide.

#### *Gender and the digital divide*

Initial research suggested that gendered differences and stereotypes concerning computer use could be found as early as grade school. Studies found that girls and women were less likely to adopt and use computers and new computer tools at all levels of education (Ahuja and Thatcher, 2005; Zarret and Malanchuk, 2005). Gendered production of technology, for example aggressive, male-oriented computer game formats and the prevalence of pornography access, favored male users and supported the gendered stereotypes (Dholakia, 2006). Gender continued to serve as a significant predictor of individual technology adoption and sustained usage in the workplace, such that men were more likely than women to say they were technically oriented. Males reported higher levels of self-efficacy and lower levels of stress and anxiety when learning and using a new technology (Venkatesh and Morris, 2000, Venkatesh *et al.*, 2000).

Current research suggests the gender digital divide is experiencing change. Recent studies have found that the percentage of women going online is now higher than the percentage of men (Horrigan, 2007a; Center for the Digital Future, 2007). Women were more likely to use the internet than men (54 percent to 46 percent, respectively). Martin and Robinson (2007) confirmed these results in a study that found women have caught up and surpassed men in their use of the internet. In contrast, men are more likely than women to

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have access to a broadband connection (Fallows, 2005). Thus, it is not surprising that men (56 percent) were more likely than women (46 percent) to use a wireless high-speed connection to the internet (Flamm and Chaudhuri, 2007; Horrigan, 2007a).

The gender gap is further reduced when the intersection of gender and age is examined. For example, significantly more girls (35 percent) than boys (20 percent) are blogging, or creating and working on their own web pages (32 percent and 22 percent, respectively) (Lenhart *et al.*, 2007; Rosenbloom, 2008). Some have argued that the wider availability of wifi and internet access has contributed to the further reduction and even the reversal of the gender digital divide (Dholakia, 2006; Korupp and Szydluk, 2005). This discussion suggests our first hypotheses:

- H1a.* No significant gender differences will be exhibited by SME owners in the intention to adopt wifi technology in the workplace.
- H1b.* No significant gender differences will be exhibited by SME owners in the intention to use wifi technology in the workplace.

### *Ethnicity and the digital divide*

The demand for IT workers from different ethnic backgrounds has never been greater. Yet studies have found that race impacts the decision and ability to pursue work in the information technology (IT) field (Johnson *et al.*, 2008; Martin, 2007; Zarret and Malanchuk, 2005). The United States Department of Labor (1999) ascertained that 15,000 Latinos and 30,000 African-American IT workers would be needed each year over the next several years in order to maintain current ethnic group participation levels in the IT industry.

Yet conflicting views of an ethnic digital divide persist in the literature. Few studies have addressed ethnicity as a significant predictor effecting the adoption and use of technology (Kim *et al.*, 2007). Those that have looked at the effects of ethnicity found that Blacks and Hispanics are less likely to own computers or to be online when compared to other racial categories (Chaudhuri *et al.*, 2005; Flamm and Chaudhuri, 2007). One recent study found Hispanic SME owners not only failed to adopt a full range of ICTs, they were less likely to use ICTs for external and internal environmental analyses (Middleton and Byus, 2009). Non-Hispanic SME owners were much more likely to adopt a wider range of ICTs, and to use them for both administrative and analytical purposes. Another study suggested that ethnicity not only had a unique influence on the rate of internet access, but also on how Whites, Asians, African-Americans, and Hispanics used the internet (Kim *et al.*, 2007). For example, 72 percent of African-Americans versus 54 percent of non-Hispanic Whites have used the internet for school or training. In total, 67 percent have looked for employment online, compared to only 39 percent of Whites.

A more recent internet survey found that 34 percent of internet users have used a wireless connection to log on to the internet (Horrigan, 2007a). Fully 67 percent of the wireless users were White (not Hispanic), while only 12 percent were Black (not Hispanic) and 14 percent were Hispanic (English-speaking). The ethnic differences were also evident in the internet users who accessed the internet through a wireless connection: 79 percent White (not Hispanic), 7 percent Black (not Hispanic), and 8 percent Hispanic (English-speaking). These studies imply that an ethnic and racial

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digital divide continues to exist in the general population among internet users (Martin and Robinson, 2007).

Still other information suggests that the ethnic digital divide may actually be diminishing. Currently, 71 percent of Non-Hispanic Whites go online, while 60 percent of Blacks and 56 percent of Latinos do so (Fox and Livingston, 2007). The number of Hispanic internet users is forecast to grow 33 percent, and reach 20.9 million by the year 2010 (Ahorre.com, 2005; Hispanic PR Wire, 2007a). Hispanics also exhibit a clear preference for high-speed connections to the internet (Macias and Temkin, 2005). Interestingly, Hispanics who are already online are adopting and using new media and technology at a higher rate than the general population (Hispanic PR Wire, 2007b). Similarly, Blacks have adopted broadband technology at an astonishing rate, almost twice as fast as the general population over the past two years, and are quickly increasing their use of the internet (Crockett and Ante, 2007; Marriott, 2006).

The rapid adoption and use of broadband technology and the use of the internet by differing ethnic groups suggests our next hypotheses:

- H2a.* No significant ethnic differences will be exhibited by SME owners in the intention to adopt wifi technology in the workplace.
- H2b.* No significant ethnic differences will be exhibited by SME owners in the intention to use wifi technology in the workplace.

#### *Age and the digital divide*

Age has been found to be a significant predictor of technology adoption and usage (Morris and Venkatesh, 2000; Yi *et al.*, 2005/2006). Non-internet users are likely to be older, with a median age of 59 (Horrigan, 2007b). Older generations are less likely to have an internet connection and lag behind the younger generation in access speeds as well (Fox, 2005). Those who are 50-64 or 65 + are less likely to use the internet (29 percent and 11 percent) or access the internet through a wireless connection (19 percent and 3 percent) (Horrigan, 2007a). Only 22 percent of adults who are 70 years or older use the internet.

On the other hand, large numbers of early technology adopters are between the ages of 15 and 34 (Target Group Index Europa, 2000). Those who are 18-29 or 30-49 are much more likely to use the internet (19 percent and 42 percent, respectively), and to access the internet via wifi (30 percent and 49 percent, respectively). Young Americans are also leading all age groups in the USA in the adoption and use of wireless technologies (Horrigan, 2007a). A unisex pattern of adoption and usage has emerged based on similarities in technology use and adoption by young people of both genders (Morris *et al.*, 2005). Despite an aging Baby Boomer population, an increasing birthrate has created a boom in the number of young people in the USA (Nasser and Overberg, 2007). The rising fertility rate suggests that young people will have a positive influence on the reduction of the digital divide based on age. This discussion suggests our third set of hypotheses:

- H3a.* No significant age differences will be exhibited by SME owners in the intention to adopt wifi technology in the workplace.
- H3b.* No significant age differences will be exhibited by SME owners in the intention to use wifi technology in the workplace.

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*Education and the digital divide*

Recent research has found a widening gap between Whites, Blacks, Hispanics and Asians who are seeking tertiary degrees (Eckholm, 2008; United States Census Bureau, 2008). However, education remains an important indicator of comfort with computer technology and the use of the Internet (Madden, 2006; Martin and Robinson, 2007). Ninety-one percent of those with at least a college degree go online, while 84 percent with some college education also go online. The percentages continue to drop for users with less education. Sixty-four percent of those who have a high-school degree go online, while only 40 percent of adults with less than a high-school degree do so (Fox, 2005). Lowered perceptions of technology advantages have been found to be significantly related to fear of oral presentations and written papers, communication skills often emphasized in tertiary education (Karahanna *et al.*, 2002). Nsengiyumva and Stork (2005) suggest that effective internet users require a certain level of literacy. Internet competencies require oral and written skills, computer literacy, and technical competence (James, 2008). Thus, it is not surprising that the disparities in education have negative implications for the reduction of the educational digital divide.

On the other hand, there is some evidence that the educational digital divide may be contracting. The gap in access to hardware, software, and internet connectivity in grades K-12 may be narrowing across schools in the USA, thanks to state and federal initiatives (IBM Hispanic Digital Divide Task Force, 2002). In 1998, 51 percent of K-12 schools had internet connections. The number had risen to 94 percent by 2005 (National Center for Education Statistics, 2007). The number of post-secondary students taking a course online nearly doubled between 2002 and 2006 (Allen and Seaman, 2007). They now represent almost 20 percent of the total enrollment in higher education. Finally, sustained investment in e-learning in the workplace is boosting development budgets in organizations of all sizes (Paradise, 2007; HRFocus, 2008). Technology-based instructional hours have grown from 22 percent to 40 percent of total instructional hours. The increasing focus on technology education at school and work leads us to our next hypotheses:

- H4a.* No significant educational differences will be exhibited by SME owners in the intention to adopt wifi technology in the workplace.
- H4b.* No significant educational differences will be exhibited by SME owners in the intention to use wifi technology in the workplace.

*Experience and the digital divide*

Fully one-quarter of US adults frequently have had to ask for help solving communication technology problems or obtaining useful information on the Internet (Horrigan, 2007b). Forty-three percent of them state that access to information and communication technology has not improved their personal productivity. Research has found that the more computer experience a user has, the less s/he may be inclined to use a new technology on a regular basis (Yi *et al.*, 2005/2006). Nevertheless, prior experience with technology in general has been positively linked to the adoption and use of similar technologies (Agarwal and Prasad, 1999; Taylor *et al.*, 1995; Thompson *et al.*, 1994).

Studies suggest previous experience with similar technologies is likely to increase favorable attitudes and adoption of new technologies (Agarwal and Prasad, 1999; Lu

*et al.*, 2003). For example, the regular use of computers is strongly influenced by prior computing experience (Lakhanpal, 1994). Users with previous experience are more likely to perceive they have better control of new technology and exhibit a stronger intent to use it in the future (Taylor *et al.*, 1995). Experience with other technologies has been found to be positively related to the utilization of the internet (Jiang *et al.*, 2000; McCloskey, 2004). Thus, it is not surprising that the number of hours spent using online technology is strongly related to perceptions of ease of use and utilization of the internet (Lerman *et al.*, 2004; McCloskey, 2004).

Worldwide, the online audience continues to grow rapidly (comScore.com, 2007). Current surveys indicate that Americans are still in the lead in the number of hours spent surfing the internet per month (comScore.com, 2008; Nielson, 2008). Americans average 28 and a half hours online, nearly twice that of citizens from France and Spain, countries in the second and third positions. Internet users spend almost half of their time online viewing news or entertainment content (Li, 2007). Much of that online time is spent watching videos, an activity that continues to grow as the number of videos the average viewer watches is increasing (Mindlin, 2008). The rapid growth in the number of experienced users suggests our final hypotheses:

- H5a. No significant experience differences will be exhibited by SME owners in the intention to adopt wifi technology in the workplace.
- H5b. No significant experience differences will be exhibited by SME owners in the intention to use wifi technology in the workplace.

## Methods

### Sample

The sample was drawn from an urban renewal area in the Southwest with a large Hispanic population (United States Census Bureau, 2007). The Department of Housing and Urban Development (HUD) designated 40 Urban Renewal Communities (URC) and 30 Urban Empowerment Zones (UEZ) in cities across the USA (United States Department of Housing and Urban Development, 2009). URCs differ from Empowerment Zones in terms of the incentives provided by the government to SMEs. A primary goal of the URC program is to reduce local unemployment by encouraging SMEs to open new businesses and expand existing ones. Fully 69 percent of the businesses in the metropolitan statistical area where the sample URC is located are classified as SMEs (cctex.com, 2007). Seventy-five percent of the URC residents live in poverty, and the unemployment rate is 19 percent (United States Department of Housing and Urban Development, 2002). The Southwestern URC was one of the first in the USA to gain free public municipal wifi access (Aguilar, 2007). The goal of the free public wifi project was to align city departments and reduce the costs of municipal government, while reaching out to the private sector to encourage greater participation in the broadband economy (Titch, 2008). High-speed access and use of wifi technology have been shown to have a positive impact on organizational growth and development (Lee *et al.*, 2009; Li *et al.*, 2009). Consequently, data were gathered from SME owners in five of ten urban renewal census tracts comprising the highest numbers of SMEs.

Undergraduate students enrolled in the leadership class of a regional Southwestern university gathered the data, one of two Service Learning Project options required as partial fulfillment of the class. Students who selected the technology adoption survey

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project (TAS) were assigned to seven survey teams at random. The teams underwent one hour of training in data collection methods before being randomly assigned to the selected tracts to interview SME owners.

### *The survey*

The survey was part of a larger study concerning technology applications in the urban renewal area. The current paper includes only the results of the technology adoption and use survey. Items in the survey measured demographic and situational variables as well as individual intentions to adopt and use the new wifi technology.

### *Demographic and situational variables*

Subjects completed a demographic questionnaire that asked respondents' gender (1 = female, 0 = male); age (where 1 = 18-24, 2 = 25-34, 3 = 35-44, 4 = 45-54, 5 = 55-64, and 6 = 65 or above); education level (where 1 = less than high school, 2 = high school graduate, including GED, 3 = vocational/technical school, 4 = associates degree, 5 = four-year college degree, and 6 = graduate school); and race/ethnicity (where 1 = Asian-American, 2 = Black/African American, 3 = Hispanic, 4 = White Non-Hispanic, and 5 = Other).

The respondents' technological experience was determined by the following question: "Please describe how long you have been using a computer". Possible responses were: 1 = one year or less, 2 = 2-3 years, 3 = 4-5 years, 4 = 5-7 years, and 5 = eight or more years.

### *Intentions to adopt and use the new wifi technology*

Intent to adopt the wifi system was measured with one question: "I plan to use the city-provided wifi network connections". Possible answers ranged from: 1 = never; 2 = seldom; 3 = often; 4 = regularly; 5 = frequently; to 6 = everyday. A second question measured the use of the wifi system: "I use the city-provided wifi network connections". Potential answers to the question were similar to the intent to adopt question options: 1 = never; 2 = seldom; 3 = often; 4 = regularly; 5 = frequently; and 6 = everyday.

The respondents also designated how long the business had been in operation as 1 = less than one year; 2 = 1-5 years; 3 = 6-10 years; 4 = 11-15 years; 5 = 16-20 years; and 6 = longer than 20 years. They were asked to identify the number of employees in the firm as 1 = 5-10, 2 = 11-20, 3 = 21-30, 4 = 31-40, 5 = 41-50, 6 = 51-100, 7 = 100 or more. Finally, they indicated the range of the annual gross revenues of their firm as 1 = \$100,000-\$250,000, 2 = \$251,000-\$500,000, 3 = \$501,000-\$750,000, 4 = \$751,000-\$1 million, or 5 = over \$1 million.

### *Data analysis*

A partial least squares (PLS) approach was used to test the hypothesized relationships. PLS, a structural equation modeling technique that can be used to estimate a path model with latent variables, has been utilized extensively in research testing technology adoption and usage (e.g. Ahuja and Thatcher, 2005; Gefen and Straub, 1997; Venkatesh and Morris, 2000). A PLS is especially appropriate for testing predictive research models using a small sample size, as is the case in the present study

(Chin, 1998; Fornell and Bookstein, 1982). The results were bootstrapped to ensure goodness of fit.

## Results

### *Descriptive statistics*

Data were gathered from 158 SMEs in the five census tracts. Forty-two percent of those surveyed were women, while 58 percent were male. The mean ages of the sample ranged from 35 to 44. The respondents averaged five to seven years of computer experience. Fully 61 percent of the sample had attended school at the tertiary level. Educational levels ranged from 2 percent who had not completed high school, to 27 percent who graduated from high school or attained a GED, 11 percent who attended vocational or technical school, 25 percent who held associates degrees, 24 percent who held a four-year college degree, and 12 percent who attended graduate school.

Forty-two percent of the SMEs had been in business for longer than 20 years. The firms typically employed an average of 21-30 people. The average annual gross revenue of the sample was \$500,000-\$750,000. Table I shows respondents' gross receipts and weighted average incomes. Our sample indicates most SME owners were middle-class income earners, where average income ranges from a low of \$19,178 to a high of \$91,705 (Cashell, 2007). The SMEs in the sample are typical of firms who have survived over the long term in that they have an ample supply of capital, are large enough to have employees, and whose owners hold higher educational degrees (Knaup and Piazza, 2007).

### *Results of the partial least squares test*

Dummy variables were used to code ethnicity, where white was 1/0, Hispanic was 0/1 and non-White/Non-Hispanic was 0/0. All dummy variables were used in the PLS, but the power to distinguish significant differences in non-white/Non-Hispanic respondents was jeopardized by their low numbers. Thus, we report only the outcomes from the White and Hispanic ethnic data. The correlations among the latent constructs are shown in Table II. The path coefficients and variance explained by the PLS analysis are shown in Figure 1. Less than 1 percent of intent to use wifi and approximately 12 percent of actual usage is explained by demographic variables in this model. Further, all significant path sizes were small. The first significant paths are from ethnicity (White = 0.145 and Hispanic = 0.128) to intent. Chin (1998) recommends a significant path coefficient be greater than 0.20 in PLS, neither of which were reached by the two significant paths to intent to adopt the new wifi

Gross revenue (\$)	<i>n</i>	Weighted average net income <sup>a</sup> (\$)
100,000-250,000	38	39,719
251,000-500,000	18	57,772
501,000-1,000,000	18	82,063
Over 1,000,000	45	204,436
Weighted average total	119	80,753

**Table I.**  
Gross revenue and  
weighted average net  
income for respondents

**Note:** *n* = 119

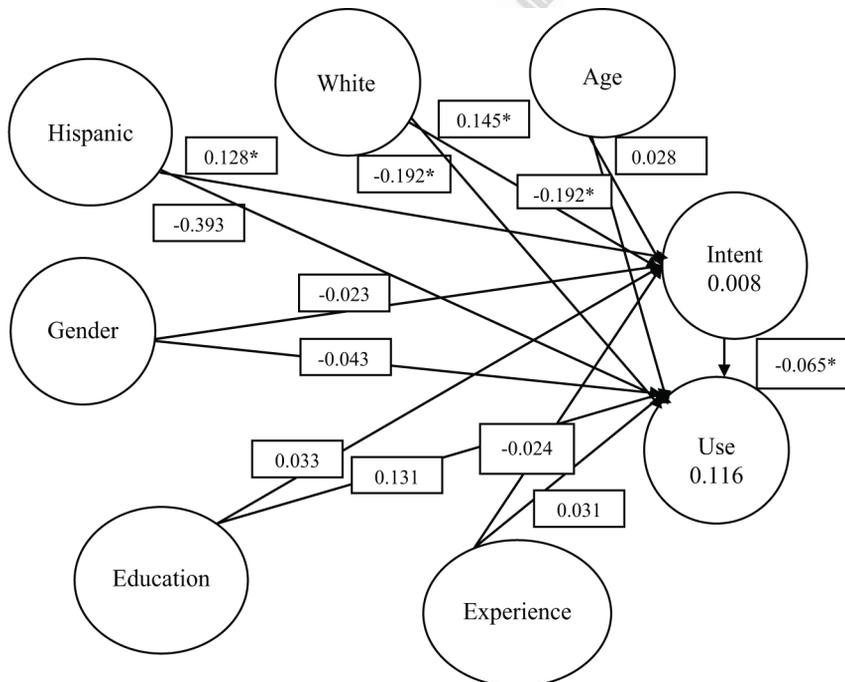
**Source:** <sup>a</sup>Adapted from Small Business Administration (2009)

technology. A further examination of the data indicated that fewer Hispanics intend to adopt the wifi than do Non-Hispanic Whites. The path sizes and explanatory power of this variable are weak, giving only partial support to *H2a*. Only one path to usage was significant at the  $p \leq 0.05$  level. Whites were significantly more likely to use the new wifi system after adoption. Removing the link between ethnicity and intent did not change the actual usage explained to two decimal places. The path size from Whites to use is approaching 0.20, suggesting that ethnic differences still exist in the use of the free public wifi system. These findings give no support to *H2b*, which suggested that no ethnic differences would exist in use of wifi technology.

	Use	Intent	Experience	Gender	White	Hispanic	Age	Education
Use	1.000							
Intent	-0.064	1.000						
Experience	0.020	0.035	1.000					
Gender	-0.040	-0.019	0.047	1.000				
White	0.194	0.042	0.084	0.084	1.000			
Hispanic	-0.243	-0.017	-0.084	-0.077	-0.904	1.000		
Age	-0.124	0.029	-0.049	0.051	0.169	-0.198	1.000	
Education	0.155	0.045	0.142	-0.035	0.214	-0.220	0.134	1.000

Note:  $n = 158$

**Table II.**  
Correlations among the constructs



Note: \*  $p < 0.05$

**Figure 1.**  
Test of hypothesized relationships

The path from age to intent to adopt was not significant, giving support to *H3a*, which suggested no age differences would be found among SME owners and intent to adopt the wifi technology. The path from age to usage was significant, but fairly small in size. The amount of usage explained falls by 3.4 percent to 8.2 percent when this link is removed from the model, giving limited support to *H3b*. Gender and education were not significantly related to either intent to use or usage, fully supporting *H1a* and *H1b*, and *H4a* and *H4b*, respectively. Experience was not a significant predictor of either intent to use or usage, giving full support to *H5a* and *H5b*.

The findings of our exploratory research suggest that access to the internet via high-speed wifi has the potential to reduce and/or eliminate the digital divide among and between diverse populations of SMEs. Full support was found for *H1*, *H4* and *H5*, such that no significant gender, education, and experience differences were found to exist in either the intention to adopt or use wifi technology among SME owners. Our findings do not support earlier research outcomes that found these demographic variables often had a highly significant effect on individual users' ability to access, adopt, and use new technologies. Programs and initiatives designed to equalize access were developed and promulgated by public and private organizations in an attempt to reduce these inequalities. The results of this study seem to indicate that, whether from a cultural shift or through formal education programs, traditional demographic factors have a very small or insignificant effect on both intent to use wifi and actual wifi usage by SME owners. The digital inequalities are narrowing, yet problems still remain.

*H2* and *H3* found only partial support for no differences in ethnicity or age and the intent to use the wifi technology. Differences were found to exist among age groups such that younger SME owners were more likely to exhibit the intentions to use and adopt the wifi technologies. These findings support previous research outcomes, as noted in the literature review. Most troubling among our findings was that there is still an ethnic digital divide that exists among Hispanic and White SME owners. While both Hispanics and Whites indicated a positive intent to adopt the new wifi technology, the path size was smaller than the 0.20 deemed as acceptable in past research. Only White SME owners indicated a significant and positive use of the wifi technology. The use of digitalized technologies has been found to have a positive effect on internal process performance, financial performance and effective customer relationships (Lee *et al.*, 2009; Li *et al.*, 2009). These findings suggest the Hispanic SME owners will be negatively impacted by their inability or unwillingness to use wifi technology.

Chinn and Fairlie (2007) argue that much of the disparities seen in access and use of wifi could be related to the lack of telecommunications infrastructure. While great progress has been made in connecting schools, libraries, and other public institutions in urban municipalities, there are still problems in reaching rural and remote areas (Organization for Economic Cooperation and Development, 2007). Meanwhile, municipal wifi networks have not been able to provide the cheap, reliable service demanded by users (Allison, 2006; Belson, 2006; Grover, 2007; Reuters, 2007). Commercial providers are now moving to fill the demand in urban and rural areas, but disparities in access remain (Grubestic, 2008).

### **Limitations and directions for future research**

One major limitation of the study is the low numbers of Asian-American and Black/African-American SME owners in the data employed in this study. The limited

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numbers of responders restricted our ability to identify whether the use of wifi technology had any influence on the reduction of the digital divide in these minority-owned businesses. Thus, our findings may only be generalizable to White and Hispanic-owned SMEs. There is a great need to collect data from a wider range of diverse SME owners in future research in order to address this limitation.

A second limitation is the lack of individual economic data from the respondents. Many studies have noted that variations in income have a major impact on the ability to access, use, and adopt new technology (Chinn and Fairlie, 2007). Low socio-economic status has been found to correlate with ethnicity. Still other research has found that ethnicity is a significant negative predictor of technology adoption after controlling for economic variables (Dupagne and Salwen, 2005). Blacks and Hispanics still exhibit lower rates of technology access and the skills required to use the technology above and beyond any economic factors (Mossberger *et al.*, 2006). This study asked the annual gross revenues of the firms represented in the study. Evidence from government statistics suggest that the SME sample in this study represented a range of middle-class incomes. However, future studies could include questions seeking to identify the socio-economic status of the individual respondents. Answers to the socio-economic questions could be used either as a direct measure of the respondent's ability to access, adopt, and use new technology or a control variable used to examine the unique effects of ethnicity.

A final limitation centers on the use of one RC area for data gathering purposes. Future research should include data gathered from a multiplicity of RCs. Data should also be gathered from respondents who do not reside or work in an RC. Comparisons of data from both RCs and non-RCs will ensure the researchers' ability to compare and contrast diverse technology users.

## Conclusion

President Barack Obama is an outspoken advocate of access to universal broadband for all Americans (Gross, 2009; Hesseldahl, 2009). The national stimulus package passed by Congress after his inauguration included \$350 million to create a national broadband map. The map will be used to shape the government's broadband policy and ascertain where best to invest government funds. Nevertheless the USA is currently in fifteenth place in broadband penetration among developed nations who have high-speed wireless access, having fallen from fourth place in 2001 (Organization for Economic Cooperation and Development, 2007). Multiple business models have been suggested for providing public access to high speed internet that is universally available and affordable (Hudson, 2010). Universal broadband access could add nearly \$500 billion dollars to the US economy, while giving users a greater choice in the wireless devices they use (Lowry, 2007). Yet SME owners continue to worry about the costs of investing and participating in e-commerce (Temponi and Cui, 2008). SME owners are much more likely to invest in technology adoption if they have access to external credit (Franquesa and Brandyberry, 2009). Internal resource constraints clearly impact SMEs' ability to invest in innovative technology. Further concerns about security and the need for knowledgeable manpower remain. Financial and marketing disparities among minority-owned and non-minority-owned businesses continue. Access to an expanded broadband system and its use would unquestionably

impact SMEs' ability to reduce SME owners' concerns and improve their productivity and performance.

The business leaders in the Hispanic community clearly agree. They recently formed a Hispanic Entrepreneurs Task Force (HETF) seeking access to high-speed networks for Hispanic small businesses (TelecomWeb News Digest, 2006). The HETF's position is that access to wifi technology and high-speed internet is essential for the economic and educational advancement of Hispanic SMEs. Other efforts have been made that give Hispanic SME owners access to business training and other services in the Spanish language (Hispanic PR Wire, 2006). Our findings suggest there is still a critical need for training that develops e-literacy and e-commerce skills for Hispanic and other minority-owned SMEs. Policies that shape behavioral intentions and effect continued use must be targeted to specific group needs (Hsieh *et al.*, 2008; Vega *et al.*, 2008). Training in the use of wifi and broadband technologies could provide digital access to growing minority markets online. Minority SME owners need to be able to connect with customers and suppliers in unique and innovative ways via the new technologies.

We would argue that, based on the findings of this exploratory study, access to wifi is critical not only for economic growth, but for the continuing reduction of the digital divide. Advantages accrue to those SMEs who have the technical competencies that enable them to bridge the digital divide and move toward improved performance. The results of this study suggest that wifi access, adoption, and use can serve as the next great levelers in the race to reduce the digital divide.

#### Note

1. See <http://laptop.org/en/vision/mission/index2.shtml>

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