

# **SME ADOPTION OF WIRELESS LAN TECHNOLOGY: APPLYING THE UTAUT MODEL**

**John E. Anderson**

East Carolina University  
andersonj@mail.ecu.edu

**Paul H. Schwager**

East Carolina University  
schwagerp@mail.ecu.edu

## **Abstract**

Wireless network technologies present unique opportunities and challenges for businesses, and Small & Medium Enterprises (SMEs) are no exception. Recently Vankatesh et al. (2003) proposed a more complete model for the understanding of the acceptance and adoption of Information Technology. Their model builds upon and extends beyond the well established Technology Acceptance Model (TAM). This study utilizes this new Unified Theory of Acceptance and Use of Technology (UTAUT) to further validate the model and enhance our understanding of the adoption of wireless technologies as well as SME adoption.

**Keywords:** WLAN, wireless local area networks, technology adoption, UTAUT, TAM, small & medium business

## **Introduction**

Wireless network technologies has advanced technologically and received greater market acceptance in the last few years. Wireless Local Area Network (WLAN) hardware shipments rose 65% from 2001 to 2002 with business shipments of 11.6 million units and home shipments of 6.8 million units with total market revenue of \$2.2 billion (Instat 2002). Total WLAN units shipped in the 1st and 2nd quarters of 2003 were already 16.7 million (Instat 2003a, Instat 2003b). Mobile computing devices supported by commercial applications and wireless networks will likely create much of the future growth in electronic commerce (Varshney and Vetter 2000). Wireless communication allows consumers and businesses to transcend time and place, thus increasing accessibility and expanding both social and business networks (Palen 2002). Wireless communication also promises to provide convenience, localization, and personalization of services (Clarke 2001).

WLANs support mobile computing in small areas such as a building or campus. They extend or replace wired Local Area Networks (LANs) in both infrastructure and ad-hoc configurations. Primary WLAN uses include: LAN extensions, nomadic access through hot-spots, and access to the Internet. Future WLAN uses could be: infrastructure for wireless digital communities, mobile commerce, and location-based services. (Varshney 2003)

Although current WLAN speeds are less than wired Ethernet, WLANs offer business a quick and inexpensive way to set up LANs because cabling is not needed (Agrawal, Chari, Sankar, 2003). In addition to the two major benefits of implementation speed and decreased cabling cost, vendors such as Cisco cite benefits such as: increased flexibility, lower support and maintenance costs, improved employee efficiency, improved employee productivity, easier collaboration, improved company image, more efficient use of office space, reduced errors, and improved business resilience. (Cisco 2003)

While the practitioner literature has followed the exploding growth of wireless communication and computing technologies along with the promised business benefits little attention has been given in the academic literature to user acceptance of WLANs. One study looked at acceptance of mobile wireless Internet devices (ie. Lu, Yu, Liu, and Yao, 2003). No studies were found which looked at acceptance of WLANs.

From an IT perspective, small businesses are both understudied and unique (Riemenschneider, Harrison, Mykytyn, 2003). Since the benefits described above apply equally to large and to SMEs we culled the literature focusing on IT user acceptance

in SMEs. Four studies looked at the larger theoretical picture of IT adoption in SMEs using the Theory of Planned Behavior (TPB) (Harrison et al. 1997), a technology-organization-environment framework (Kuan et al. 2001), and a comparison of reasons for adoption and benefits gained between SME and large firms (Daniel et al. 2002). One other study was found that bridged the gap between the adoption and acceptance literature integrating the TPB and Technology Acceptance Model (TAM) to explain adoption of a web site by small business (Riemenschneider et al. 2003).

Riemenschneider et al. (2003) argue that since IT adoption decisions in small businesses are typically made by a single executive, the micro-user focused models TPB and TAM may shed light on the macro-focused organizational adoption question. They found that a “collected” model representing the constructs of both the TPB and TAM provided a better fit than either model alone.

Unifying the various models of IT acceptance was completed by Vankatesh, Morris, Davis, and Davis (2003) wherein they integrated the elements of eight prominent models (1. Theory of Reasoned Action, 2. TAM, 3. Motivational Model, 4. TPB, 5. Combined TAM-TPB, 6. Model of PC Utilization, 7. Innovation Diffusion Theory, 8. Social Cognitive Theory) into a Unified Theory of Acceptance and Use of Technology (UTAUT). They empirically validated the model with six longitudinal field studies of six different departments of six large firms in six different industries. UTAUT accounted for 70 percent of the variance (adjusted R<sup>2</sup>) in usage intention, better than any of the eight models alone. UTAUT is held up as “a definitive model that synthesizes what is known and provides a foundation to guide future research in this area (p. 467).”

## **Problem & Purpose**

UTAUT provides great promise to enhance our understanding of user acceptance. However, the initial UTAUT study focused on large organizations. Also, because of their design, WLANs present a unique set of circumstances. Therefore this research focuses on two main questions

Does UTAUT hold up in the context of small business?

What factors determine the adoption of WLANs by SMEs?

The focus of this study is to further validate UTAUT in the context of SMEs and in regards to WLANs.

## **Method**

Our investigation will use the survey methodology. The survey has been constructed based on the questions of UTAUT as found in Vankatesh et al. (2003) The population of US SMEs, which we define as those organizations having between 1 and 500 employees, will be the focus of this study. This is consistent with the generally accepted definition of “small” business. InfoUSA, a commercial database firm, will be the source of data on firm contacts. In the case of multiple locations, we will choose the headquarters address.

The instrument will be mailed to 1200 companies that meet our size criteria, randomly selected from the database. A cover letter and postage paid return envelope will be included. A reminder-post card will be sent to the sample three days after the survey. A second mailing will be sent to non-respondents two weeks later. We are hopeful of return of around 200 surveys so that appropriate statistical analysis may be performed.

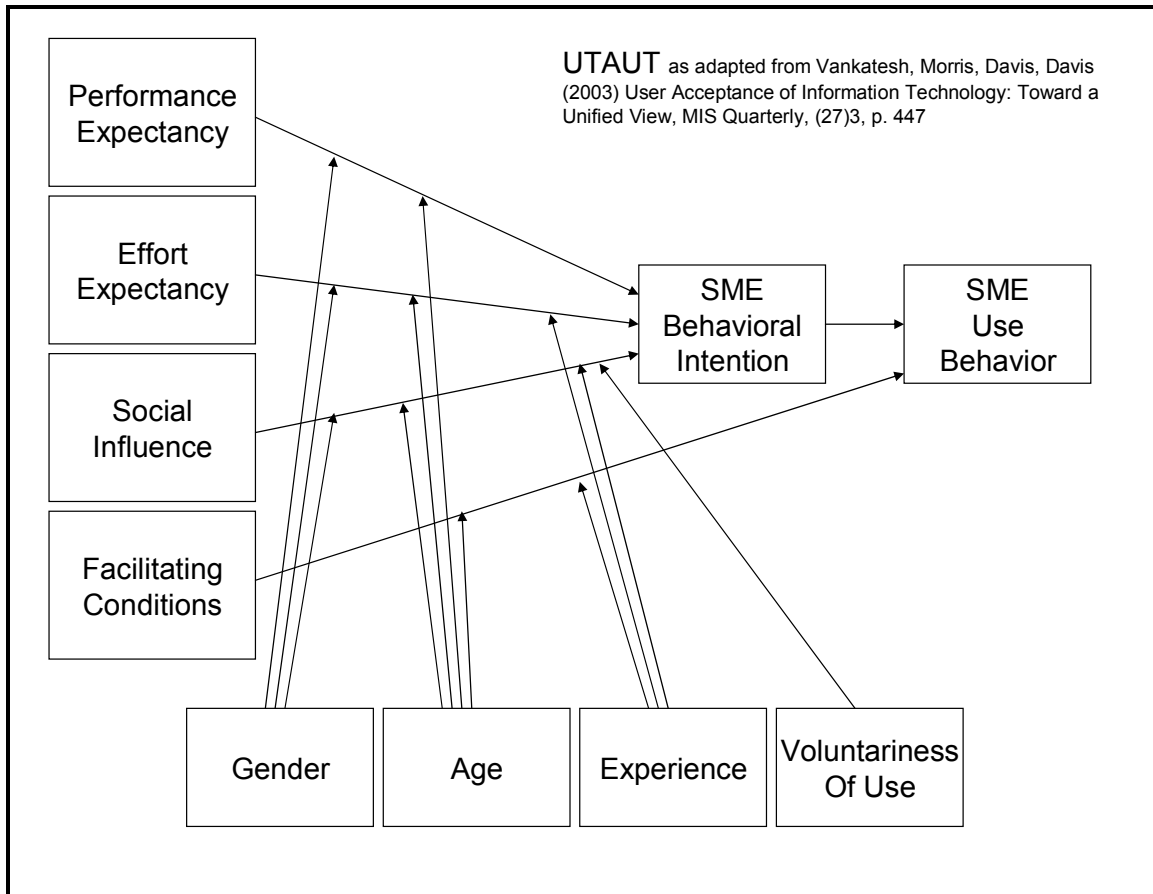
We will follow as closely as possible the measurements and analyses of Venkatesh et al. (2003) in terms of reliability, validity, means, standard deviations, and correlations.

The four constructs of UTAUT are hypothesized to have a significant role as direct determinants of user acceptance and usage behavior.

- H1: The influence of performance expectancy on behavioral intention will be moderated by gender and age, such that the effect will be stronger for men and particularly for younger men.
- H2: The influence of effort expectancy on behavioral intention will be moderated by gender, age, and experience, such that the effect will be stronger for women, particularly younger women, and particularly at early stages of experience.

- H3: The influence of social influence on behavioral intention will be moderated by gender, age, voluntaries, and experience, such that the effect will be stronger for women, particularly older women, particularly in mandatory settings in the early stages of experience.
  - H4a: Facilitating conditions will not have a significant influence on behavioral intention.
  - H4b: The influence of facilitating conditions on usage will be moderated by age and experience, such that the effect will be stronger for older workers, particularly with increasing experience.
- H5: Behavioral intention will have a significant positive influence on usage.
- H6: UTAUT will account for a significant percent of the variance (adjusted R2) in usage intention.

**Figure 1. Unified Theory of Acceptance and Use of Technology**



Source: Vankatesh, Morris, Davis, & Davis 2003

Because one our goals is to verify UTAUT, we will follow as closely as possible the measurements and analyses of Venkatesh et al. (2003) in terms of reliability, validity, means, standard deviations, correlations, factor analysis, and structural equation modeling.

**Table 1. Items Used in Estimating UTAUT**

**Behavioral intention to use the system**

I intend to use WLANs in the next 12 months.

I predict I would use WLANs in the next 12 months.

I plan to use WLANs in the next 12 months.

**Performance expectancy**

I would find WLANs useful in my job.

Using WLANs enables me to accomplish tasks more quickly.

Using WLANs increases my productivity.

If I use WLANs, I will increase my chances of getting a raise.

**Effort expectancy**

My interaction with WLANs would be clear and understandable.

It would be easy for me to become skillful at using WLANs.

I would find WLANs easy to use.

Learning to operate WLANs is easy for me.

**Social influence**

People who influence my behavior think that I should use WLANs.

People who are important to me think I should use WLANs.

The senior management of this business has been helpful in the use of WLANs.

In general, the organization has supported the use of WLANs.

**Facilitating conditions**

I have the resource necessary to use WLANs.

I have the knowledge necessary to use WLANs.

The system is not compatible with other LANs I use.

A specific person (or group) is available for assistance with system difficulties.

**Voluntariness of use**

Although it might be helpful, using a WLAN is certainly not compulsory in my job.

My boss does not require me to use a WLAN.

My superiors expect me to use a WLAN.

Source: Adapted from Venkatesh et al., 2003

## Presentation and Discussion

The surveys will be distributed to presidents and owners of SMEs throughout the United States. The survey has been distributed to a pilot group to assist with the further refinement of the instrument. The results of this initial pilot group will be presented at the conference.

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