

## **EXPLORING THE FACTORS AFFECTING EMPLOYEES' ADOPTION AND USE OF INNOVATION**

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### **ABSTRACT**

This paper explores the factors affecting Australian organizations' employees in their adoption and use of innovative technologies. Using a qualitative research strategy, this paper uses a series of in-depth interviews and focus group discussions with academic and administrative employees at a university in Australia. The qualitative approach is considered to have a deeper insight into the complexities and dynamic factors that influence the adoption of innovative processes in organizational settings. The findings of this research highlight the need for a broader understanding of the key factors affecting employees' decisions to adopt innovation. The results provide important clues for comprehending the factors influencing and determining employees' adoption and continued use of innovation in the workplace. With the trend towards end-user applications of technological innovation increasing, the results suggest some guidelines in effectively and efficiently managing the adoption process of innovation in organizational settings. This paper highlights the implications for management practices relating to innovation management in Australia's tertiary sector. Finally, this paper identifies possible limitations and areas of future research in this field.

### **INTRODUCTION**

Technological innovation leads to improved systems and potentially improves organizational performance. For the purpose of this paper the term 'innovation' is used to mean a technologically advanced system. We define an 'innovation' as a system possessing some elements of newness in it which is instrumental in improving work performance leading to enhanced organizational efficiency. Performance gains are often obstructed by users' unwillingness to accept and use the available systems. Thus, the issue of users' acceptance of technology has generated considerable interest amongst academics

and practitioners, prompting numerous studies to be undertaken (Davis, 1989). Understanding information technology (IT) acceptance is considered important because the expected benefits of IT usage such as improved efficiency, effectiveness, or productivity, cannot be realized if individual users do not accept these systems in the first place (Bhattacharjee & Sanford, 2006, p.805). The past three decades have witnessed rising organizational investment in information technologies (Venkatesh, Morris & Ackerman, 2000). Such investment is aimed specifically to increase individual productivity and contribute to organizational productivity. While advances in technology continue at an astronomical pace, the use of these emerging information technologies has fallen well below expectations. This represents one plausible explanation for the less than expected productivity gains from investment in IT. Thus, understanding the factors influencing user acceptance, adoption, and use of emerging information technologies in the workplace is a critical issue for researchers and practitioners (Venkatesh, Morris, & Ackerman, 2000, p.34).

According to Bhattacharjee (1998, p.139) the “shelfware syndrome” has been coined to describe software productivity packages sitting idle on book-shelves without being used by the persons for whom they are intended...the issue of motivating the potential users to utilize technology remains a significant problem for organizations”. Over the years, more and more organizations have invested heavily in new technologies in order to stay competitive within their respective industries. This increasing investment calls for an examination of factors affecting the adoption of innovation by organizations’ employees and the relationship of this adoption to performance. Organizational innovations that are incorporated into the work processes of an organization have little value if they are not used or complied with by employees. It is argued that employees must adopt innovation to reap its intended benefits, yet it is evident that there are employees who are not accepting technological innovations nor the supposed benefits. This leads to the abandonment of such innovation. Therefore, an organization should understand the acceptance process and factors that are crucial in making this process effective (Lee, Kim, Rhee & Trimi, 2006, p.470).

Although innovation adoption has been studied extensively, drivers of adoption and research on innovation acceptance at the individual level remain limited (Frambach & Schillewaert, 2002). Designing an effective approach that increases end-user acceptance and subsequent use of innovation continues to be a fundamental challenge that has not been addressed in the literature. In this sense prior research is limited in terms of individual employees’ adoption of innovation at the tertiary educational level. The current literature indicates that we know relatively little about the ways in which individuals adopt and the factors that influence individual adoption of innovation (Bhattacharjee, 1998; Frambach & Schillewaert, 2002; van Everdingen & Wierenga, 2002; Venkatesh & Davis, 2000). Therefore, innovation implementation issues remained unsolved. For this reason further research is required to fill this gap in the literature (Frambach & Schillewaert, 2002; Schepers & Wetzels, 2007; Yi, Jackson, Park, & Probst, 2006). This paper is, therefore, devoted to identifying the relevant factors that contribute to the development of a work environment conducive to individual adoption of innovation and thereby gaining expected benefits from the innovation.

## **OBJECTIVES AND MOTIVATION FOR THE RESEARCH**

### **The main objectives of this study are to:**

- Explore the factors influencing individual employees' adoption of an innovative technology in their workplaces in the Australian tertiary education sector.
- Identify and discuss the academic and managerial implications of the findings of this research.
- Identify the limits and future research potential in the field.

### **Motivation for the study**

Numerous prior studies examined the possible drivers of innovation adoption using quantitative data (Ahuja & Thatcher, 2005; Al-Gahtani & King, 1999; Chang & Cheung, 2001; Cheung, Chang, & Lai, 2000; Igbaria, Guimaraes, & Davis, 1995; Igbaria, Zinatelli, Cragg, & Cavaye, 1997; Jaspersen, Carter, & Zmud, 2005; Lewis, Agarwal, & Sambamurthy, 2003; Schepers & Wetzels, 2007; Van der Heijden, 2004; Venkatesh & Davis, 2000). Virtually all the above studies examined the issues that quantitatively lacked deeper insights into causes or themes underpinning adoption of innovation. Therefore, the motivation for this research principally stems from the lacuna in the extant literature in terms of rich qualitative information relating to factors affecting employees' adoption and use of innovation. Identification and exploration of factors affecting such adoption is a complex research task as adoption is a dynamic and complex process. Therefore, studies using quantitative data often lack the required depth in terms of uncovering information hidden deep in respondents' minds. This particular issue was the main rationale for undertaking this qualitatively based research to deepen our understanding of the issues. It does so by highlighting the underlying driving forces shaping workplace usage of an innovation in general and university employees' usage behavior of an advanced technology in particular. Therefore, the outcome of the study is likely to contribute to broadening our understanding of the acceptance behavior and practice of technological innovation in Australian workplaces.

## **LITERATURE REVIEW AND THE THEORETICAL FRAMEWORK**

The literature review presented in this paper includes the general literature on innovation adoption as well as the specific literature relating to the issues associated with the practice of innovation. Furthermore, the literature includes both qualitative and quantitative research with special emphasis on the factors affecting organizations' employees' adoption and practice of innovation. The literature review is presented under the following main headings that will eventually be consistent with the factors included in the theoretical model:

### **Individual factors**

According to Lewis, Agarwal and Sambamurthy (2003), individual factors are one of the most important determinants of adopting innovation. It refers to individuals' cognitive interpretations of innovation and themselves. Several studies found that individual factors such as perceived usefulness, personal

innovativeness, prior experience, image and enjoyment of innovation have a stronger influence on an individual's attitude towards innovation (Al-Gahtani & King, 1999; Davis, 1989; Igbaria, Parasuraman, & Baroudi, 1996; Lewis, Agarwal, & Sambamurthy, 2003; Venkatesh & Davis, 2000). It has been noted that "individual characteristics have been reported to play a key role in management information systems success" (Lee, Kim, Rhee, & Trimi, 2006, p.472). Some authors found that innovativeness tends to affect people's perceptions regarding innovation (Yi, Wu, & Tung, 2006). Prior experience and familiarity with technological innovation have also been found to reduce anxiety and build confidence in innovative ideas or practices (Fuller, Vician, & Brown, 2006). Similarly, Yi, Jackson, Park and Probst (2006) noted that a system is believed to be useful provided that system helps increase one's social status and image. Furthermore, the entertainment potential of an innovation may strongly influence whether to accept that innovation (Van der Heijden, 2004).

### **Organizational factors**

Several studies have indicated that an individual's adoption of innovation not only depends on individual attitudes but also on organizational policies, approaches and actions (Peansupap & Walker, 2005). Organizational factors are external to an individual who is considering adopting the innovation. MacGregor et al. (2009) found that organizational characteristics are linked to the perceived importance of the drivers of adopting technological innovation. These form the basis of organizational factors where individuals work. Organizations need to provide facilitating conditions, which include the extent and type of support provided to individuals that would influence their use of innovation. Facilitating conditions are believed to include the availability of training and provision of support. Facilitating conditions have been identified as influencing the adoption of a number of new information system innovations (Lu, Yu, & Liu, 2005). These factors include training (Al-Gahtani & King, 1999; Clegg, Carey, Dean, Hornby, & Bolden, 1997), managerial support (Ahuja & Thatcher, 2005; Igbaria, Parasuraman, & Baroudi, 1996) and incentives (Bhattacharjee, 1998). These influences have an impact on an individual's awareness of the functioning and application of an innovation, its usefulness and fit with the job, which ultimately dictate whether something new can be adopted (Frambach & Schillewaert, 2002). Organizational influences can motivate employees to adopt an innovation. Training increases level of confidence in the ability of an individual to learn and practice an innovation because training enhances individual skills and abilities in performing similar jobs (Lee, Kim, Rhee, & Trimi, 2006). Managerial support is associated with greater level of adoption and acceptance of an innovation, while conversely lack of organizational support is considered to create problems when innovations are being considered (Lee, Lee, & Kwon, 2005). Factors such as the provision of discretionary time to individuals working with the innovation or recommendation of bonuses for working with an innovation impact on people's decision to adopt it (Bhattacharjee, 1998; Chen & Ching, 2002).

### **Social factors**

Employees' adoption of innovation is driven by their social environment. Innovation used by others in employees' social environment is also likely to play an important role. Social influence is the extent to which members of a social group influence one another's behavior in the context of adoption (Konana & Balasubramanian, 2005; Venkatesh & Brown, 2001). It is perceived pressure and influence that peers feel when adopting an innovation and this influence is exerted through messages and signals that help to form perceptions of the value of innovation or activity (Fulk & Boyd, 1991). According to Parker and Castleman (2009, p.175), "[a]n actor's ties with another actor can vary on a continuum from strong (e.g. friends and/or those with frequent interactions) to weak (e.g. acquaintances)". Ajzen and Fishbein (1980)

refer to such influence as normative beliefs about the appropriateness of adoption of innovation. According to this perspective, employees may adopt an innovation not because of its usefulness but due to perceived social pressure. Such pressure may come from individuals whose beliefs and opinions are important, including peers and people who are in social networks (Igbaria, Parasuraman, & Baroudi, 1996). According to Abrahamson and Rosenkopf (1997), it is a largely internal influence that potential adopters exert on each other that persuades them to adopt. Research also revealed that social factors were more significant than economic factors in driving adoption of innovation by individuals in an organization (Peansupap & Walker, 2005; Westphal, Gulati, & Shortell, 1997). Research also found that, moral support and encouragement from peers are instrumental in employees considering the merits of innovation (Farr & Ford, 1990; Lewis, Agarwal, & Sambamurthy, 2003; Yuan et al., 2005). Furthermore, a person's positive feelings about the usefulness and performance of an innovation can be influenced by favorable references about that innovation (Yi, Jackson, Park, & Probst, 2006, p.355).

It should be noted that most of the studies included in Table 1 below are quantitatively based because not many qualitative studies on this area of research have been published. Few studies have used qualitative research methodologies in contexts that differ from the present study (e.g. Kartiwi, 2006; Drew, 2002). Furthermore the literature review points to a number of issues that may affect the adoption and implementation of innovative processes by organizations' workforce.

A brief summary of the literature review on the above three broad factors is presented in Table 1. The table organizes the three broad factors into specific factors within each broad category.

Factors	Authors (Year)	Scope and findings
Organizational Factors	Peansupap & Walker (2005); Frambach & Schillewaert (2002)	These two studies focused on the innovation adoption process in organizational settings. Both papers specifically looked at innovation implementation issues. These studies developed useful conceptual frameworks in specifying the innovation adoption process by proposing some useful constructs.
<i>Training needs</i>	Lee, Kim, Rhee, & Trimi (2006)	This paper identified some external factors affecting technology acceptance behavior. This quantitative paper tested a model of innovation acceptance by introducing a number of factors including training and found a direct influence of training on actual usage without any mediating effect.
<i>Managerial support</i>	Lee et al. (2005); Igbaria, Zinatelli, Cragg, & Cavaye (1997).	These papers specifically examine the effect of management support on intention to use a technological innovation and found a significant moderating effect on adoption behavior.
<i>Incentives for the usages</i>	Bhattacharjee (1998)	This paper identified incentives as a major driving force of IT usage with strong empirical data.

Individual Factors	Lewis et al. (2003) Lee, Kim, Rhee, & Trimi (2006)	The studies investigated the impact of individual and managerial factors on technology use in work place. Both studies used quantitative methods and were based on established theory such as TAM.
<i>Usefulness of an innovation</i>	Kim et al. (2007); Al-Gahtani, & King (1999); Davies (1989)	This paper inter alia examined the impact of ease of use on enjoyment and then the mediating effect of enjoyment on the relationship between ease of use and relative advantage.
<i>Personal initiative</i>	Yi et al. (2006); Lewis et al (2003)	Yi et al. (2006) used an integrative approach and investigated if innovativeness in IT along with other variables has any effect on behavioral intention of healthcare professionals in relation to using an innovative technology. The results supported the proposition. Lewis, et al (2003) found empirical evidence in favor of significant effect of personal innovativeness on IT use.
<i>Prior experience</i>	Venkatesh & Davis (2000)	Venkatesh & Davis (2000) utilized longitudinal data to examine the moderating effect of experience on: firstly, the impact of social factors on usefulness; and secondly, on impact of social factors on usage behavior via intention to use an innovation. Results supported these moderating effects of experience on innovation adoption
<i>Self image</i>	Moore & Benbasat (1991); Venkatesh & Davis (2000)	Moore and Benbasat (1991) developed a number of constructs to measure users' perception of an innovation following a series of relevant statistical procedures. Image was one of those constructs. The results of the pilot study revealed image is a significant factor affecting individual adoption of innovation. Venkatesh & Davis (2000) used image and social influence as a predictor of usefulness of an innovation which affect the intention leading to use an innovation. The results confirmed the hypothesized relationships.
<i>Enjoying the innovation</i>	Van der Heijden (2004); Venkatesh & Brown (2001)	The author empirically tested a structural model to explore the impact of perceived enjoyment (hedonic aspect) along with perceived usefulness of using an innovation on the intention to use that innovation. The results indicated a strong

		effect of enjoying an innovation on the intention to use.
Social Factors	Konana and Balasubramanian (2005); Venkatesh & Brown (2001)	The authors generally investigated the impact of social factors on adoption of an innovation.
Peer assistance	Yuan et al. (2005); Van Everdingen & Wierenga (2002)	These papers used a variety of theoretical models to examine the impact of peer influence on usage of technological innovation. Yuan et al. (2005) examined team level peer influence on internet usage across five organizations and found support for a 'socialized model' of innovation adoption'. Van Everdingen and Wierenga (2002) looked at intergenerational peer influence on inter-firm adoption decision and found that peer and top management influence are instrumental in explaining adoption decision.
Social net work	Yi et al. (2006); Venkatesh & Brown (2001)	Yi et al. (2006) tested a complex model of IT adoption and found that subjective norms (social network) have a significant impact on behavioral intention to adopt technology.  Brown & Venkatesh (2005) conducted a longitudinal examination of factors including social influence. The results confirmed the influence of family and friends have positive effects on usage behavior of an innovation.

Table 1: A summary of the literature

### THEORY AND CONCEPTUAL MODEL

This paper uses a number of theoretical frameworks that are well established in the literature and are considered relevant to the philosophical foundation on which the research is based. These are the theory of reasoned action (Ajzen & Fishbein, 1980; Ajzen, 1991), the technology acceptance model (Davis, 1989) and the conceptual framework provided by Frambach and Schillewaert (2002). This paper also considers the theoretical advancement of technology acceptance model (TAM) and TAM2 (Karahanna, Agrawal & Angst, 2006; Venkatesh & Davis, 2000).

#### The Theory of Reasoned Action

The Theory of Reasoned Action (TRA) is a widely established and applied model concerned with the determinants of conscious intended behavior. TRA lays the conceptual framework in terms of the distinction between beliefs, attitudes, intentions and behaviors (Al-Gahtani & King, 1999). The theory is

designed to predict and understand the behavior of an individual. According to TRA, an individual's specific behavior is determined by his or her intention to carry out the behavior. Behavioral intention is jointly determined by two basic determinants: firstly, the person's attitude toward the specific behavior; and secondly, subjective norms concerning the behavior in question (Ajzen & Fishbein, 1980, p.6). TRA theorizes that a person's attitude toward a behavior is determined by his or her salient beliefs about the consequences of performing it and an evaluation of that behavior's outcome (Davis, Bagozzi & Warshaw, 1989, p.984). Behavioral beliefs are defined as the individual's subjective probability that performing the target behavior will have consequences and evaluation refers to an implicit evaluative response to the consequence (Ajzen & Fishbein, 1980).

### **The Technology Acceptance Model**

The Technology Acceptance Model (TAM) - first introduced in 1986 - is an adoption of the theory of reasoned action specifically tailored to explain user acceptance of information technology (Davis, Bagozzi & Warshaw, 1989). Davis, Bagozzi and Warshaw, 1989 have postulated that "The goal of TAM is to provide an explanation of the determinants of computer acceptance that is general, capable of explaining user behavior across a broad range of end-user computing technologies and user populations, while at the same time being both parsimonious and theoretically justified" (p.985). TAM emphasizes that two particular beliefs - perceived usefulness and perceived ease of use - are of primary relevance for computer acceptance behaviors (Bruner & Kumar, 2005; Davis, 1989). Theoretically TAM and TAM 2 differ in that TAM2 includes the social and cognitive instrumental process (Vankatesh & Davies, 2000). Building on this theme, this paper integrates some of these additional variables which include subjective norms such as influence of peers and social networks as well as experiences and images. Furthermore, TAM2 hypothesizes that beliefs are directly linked to intention and usage behavior (Karahanna, Agrawal & Angst, 2006).

### **Individual technology acceptance model**

Frambach and Schillewaert (2002) presented a conceptual framework based on the argument that individual acceptance of innovation is based on perceived beliefs concerning the innovation that are being focused on. Frambach and Schillewaert's model indicates that individual usage of innovation relies not only on attitudes but also on management strategies, policies and actions; and these factors include training, social persuasion and organizational support. "Organizations will try to influence subordinates' attitudes toward adoption of an innovation and some individuals more readily accept certain innovations while others do not" (Frambach & Schillewaert, 2002, p.171). The model further proposes that personal innovativeness is determined by various personal characteristics such as demographics, tenure, product experience and personal values (Frambach & Schillewaert, 2002, p.171). According to the model, individual acceptance of innovations is also driven by the use of a focal innovation in their social environment. Such social influences may stem from two sources - network externalities and peers (Frambach & Schillewaert, 2002, p.171).

In this study we have used the conceptual model presented in Figure 1 and tested it with qualitative data. The relationships between the factors and innovation adoption as identified by the literature review (see Table 1) have been used as the basis of the proposed association between various factors and innovation adoption in the conceptual model (Figure 1) for testing purpose. The qualitative data provided support for the relationship between individual, organizational and social factors on one hand, and individual adoption of innovation on the other. As the model shows, we have decided to explore the linkages between the above mentioned factors and the adoption of innovation at the individual level. This involves



passing the mediating influence of attitude toward innovation following the recent theoretical advancement of TAM (known as the TAM2 framework). Importantly, attitudes had been excluded from this model (Karahanna, Agrawal & Angst, 2006; Venkatesh & Davis, 2000).

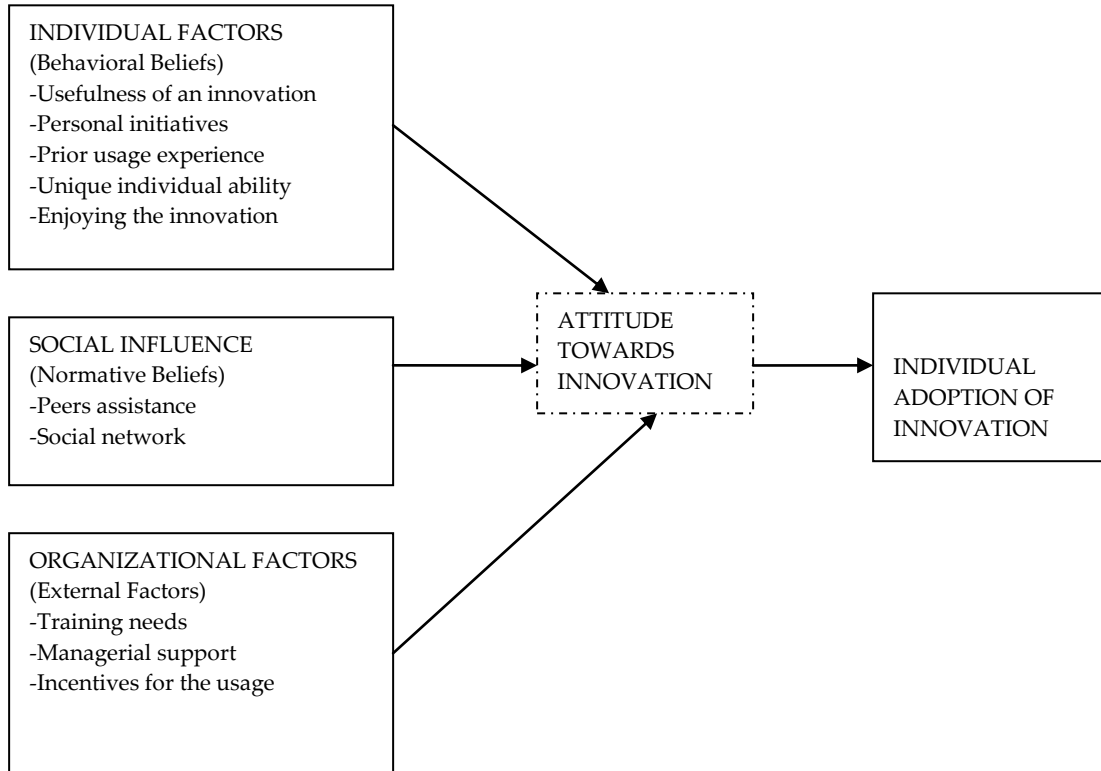


Figure 1: A conceptual model of factors affecting innovation adoption

## METHODOLOGY

### The method

The study examines the use of selected new features of Microsoft Outlook. We have chosen these features because they are regarded as an advanced function of calendar. Furthermore, most employees are not supposed to use this sophisticated feature of this particular application in their day to day work. Some employees may not be aware of the existence of such an advanced feature at all. The categorization of the advanced feature of Microsoft Outlook is based on the fact that this feature is beyond the core (email) function of Microsoft Outlook. To evaluate the specific technological advances relating to the calendar application in Microsoft Outlook, this paper uses a series of qualitative interviews with academic and professional employees at the University of South Australia (UniSA).

The study instrument was validated following six steps involving opinion and feedback of academic experts, IT technologists, personnel managers and prospective respondents (university employees). The ten specific questions on various factors affecting workplace adoption of technological innovation were developed following a six-step confirmation process, described below:

Step 1: Developing a preliminary list of questions based on a review of prior studies that either directly used or mentioned these questions or provided clues as to this question in their observation. Step 2: A formal list of questions was developed from the preliminary list with meaningful wordings for each question. Step 3: These formal questions were asked of experts in the relevant field including academics, personnel managers and IT specialists at UniSA. Furthermore their comments and suggestions were recorded. Step 4: A list of final and appropriately worded questions (10) was then developed by incorporating the personnel's comments and suggestions. Step 5: A pilot study was then conducted involving 15 randomly selected employees from UniSA to confirm the validity of this instrument consisting of ten questions. Step 6: The pilot tested questions were further modified based on feedback received from the pilot study. After the validity of the questions were confirmed through the above process, the ten refined questions were then finalized for interviewing respondents.

### **Rationale for using qualitative method**

As stated earlier, the rationale for using the qualitative research approach stems from the fact that most prior studies on this topic used quantitative methods. The qualitative method was chosen because it has the capacity to record people's deeper insights or perceptions into phenomena (Gummesson, 2000) and is suitable for investigating the acceptance of innovation in the Australian tertiary education sector. Qualitative research strategies have been used in other business and management-related areas (see Woodruff & Schumann, 1993; Masberg & Silverman, 1996; Hirschman & Thompson, 1997; Price, Arnould & Curasi, 2000). Furthermore, interviews are integral to the qualitative method and for this reason have been selected so that the researcher can interact directly with respondents with the specific aim of obtaining information from them. The open response format provided an opportunity to obtain a rich amount of information in the respondents' own words, thus facilitating a deeper level of understanding.

### **Sampling method and data collection approach**

The population sample for this study consisted of academic and administrative staff at UniSA. Data were collected using an unstructured questionnaire containing open-ended questions. Fifty-three employees were selected following random sampling technique using a random table. The selected employees were then contacted by telephone so that their consent and availability to participate could be confirmed. They were then sent emails with attached an information sheet explaining the background and purpose of the research. A total of forty-one participants confirmed their willingness to participate. Hence, these 41 employees constituted the final sample for this study.

### **Representativeness of the sample**

Samples were drawn from the whole university population, i.e. employees. Therefore, care was taken to ensure that all the four faculties (Division of Business; Education, Arts and Social Sciences; Health Sciences; and Information Technology, Engineering and Environment) and the three administrative units (Chancellery, Flexible Learning Center, Campus Central) are represented in the sample. Furthermore, to ensure representativeness of the sample the gender, job classification and academic divisions of the

employees were considered prior to the invitation to participate. Table 2 presents a breakdown of the respondents according to the divisions in which they work. The table shows that there is a balance in terms of numbers and locations from which respondents were chosen for interviews.

Work location	Number of respondents	Percentage of respondents
Division of Business	8	19.6
Arts and Social Sciences	6	14.6
Education	6	14.6
Health Sciences	7	17.1
Information Technology, Engineering and Environment	9	21.9
Others	5	12.2
Total	41	100%

Table 2: A breakdown of respondents according to their work locations

### Data analysis technique

There are several ways in which data can be analyzed (Creswell, 1994). For the purpose of this paper we have followed the format suggested by Creswell (1994) and developed categories of data and made comparisons and contrasts between the types of information gathered. We also looked at alternative explanations for the findings. In conducting data analysis we have adopted the approach suggested by Miles and Huberman (1994) in the management of the analysis of the qualitative data. Additional care was also taken to ensure that the data analysis was relevant to the theme of this study. The actual data entry included using a digital recorder to record interviews which was then transferred into a computer file. A brief report of each interview was also generated following completion of each interview. Transcription of the interviews was recorded to facilitate data analysis.

## DISCUSSION OF FINDINGS

The results are presented in terms of raising, addressing, reporting and analyzing answers to key questions examined. These questions have been formulated based on the extant literature exploring the innovation adoption process generally and the possible issues impacting on such adoption and its usage. The answers are organized and interpreted on the basis of employees' perceptions concerning the possible factors that influenced their adoption of new technological systems introduced into their workplaces. The responses and comments on each issue are summarized. The relevant quote(s) from respondents in response to a particular question can be seen in Appendix 1. The findings have been compared to those elicited in prior studies. Furthermore the findings relating to each question are linked to the adoption of an innovation in the context of a university. The results are presented under three broad factors by further breaking them down into a number of issues as follows:

### Individual factors

Individual factors represent an individual's cognitive interpretations of themselves as well as the technological innovation that an individual is considering adoption. Individual factors comprise usefulness of an innovation, personal initiative, prior experience, unique individual ability

and enjoyment issues. Literature provides strong support in favour of the argument that individual factors drive innovation in a significant way (Al-Gahtani & King, 1999; Davis, 1989; Igbaria, Parasuraman, & Baroudi, 1996; Lewis, Agarwal, & Sambamurthy, 2003; Venkatesh & Davis, 2000; Lee, Kim, Rhee, & Trimi, 2006). The specific results are presented under the following specific issues:

#### ***Usefulness of an innovation***

The responses relating to the above issue were obtained through the question, “How do you find out the usefulness of a new system or technology before adopting it?”

The respondents were unanimous on this issue in that they discover the potential benefits of using a new technology before adopting it. Many respondents mentioned about checking the usefulness of the new technology in terms of its specific purpose and merits over the previous one before making any decision to use the innovation. Respondents also mentioned about experimenting with the new feature of the concerned technology by consulting fellow employees, friends both within and outside the organization who have prior experience with the technology. These comments confirm the findings of Kim, Chan and Gupta (2007) that individuals evaluate the consequences of their behavior in terms of perceived usefulness and base their choice of behavior on the desirability of the usefulness. It has been observed that if an individual believes that using the new system will lead to more efficiency and effectiveness in their work, the innovation is more likely to be considered for adoption (Lee, 2004). Therefore, it follows from Kim, Chan and Gupta (2007) and Lee (2004) that technological innovation needs to be measured to assess its effectiveness before it is accepted in the workplace.

The above findings suggest a pilot study of the potential user of the technology to discover the actual usefulness of the innovation. This pilot study is likely to reveal the perceived usefulness of an innovation in terms of some specific benefits. The university’s management can then use the findings of the study as the basis of a training guideline for prospective adaptors and users of an innovation.

#### ***Personal initiative***

Information as to whether personal initiative can play any role in adopting new technology has been gathered using the question, “How does personal innovativeness (initiative) influence individuals to explore a new system or a technology?”

Respondents were of the opinion that personal initiative and innovativeness are instrumental in trying and practicing an innovation at the workplace. Employees mentioned that since exploring a new technology is a sort of fun for them, they enjoy playing with it. Some employees explore new technologies because they have potential personal benefits in terms of improvement of their skills leading to better job prospect. These findings are consistent with Frambach and Schillewaert’s (2002) argument that personal innovativeness drives a person’s tendency to adopt a new technology. Furthermore, prior research also found that individuals with higher personal innovativeness are expected to develop a more positive attitude toward the adoption of technology (Agarwal & Prasad, 1998; Lewis, Agarwal, & Sambamurthy, 2003). This finding is relevant to the introduction of new technologies in Australia’s education sector. In particular the personal initiatives of university employees to try a new technology stems from the intellectually driven research environment of the university, something that enthusiastic employees embrace. In fact, this may become the basis of survival for many employees in terms of securing their

jobs through positive and innovative attitudes and actions concerning advanced software applications in their workplace.

### ***Prior experience of employees as a drive***

This issue has been examined using the question, “How does prior experience with similar technology can help adopt a new system?”. Responses to this issue seemed to be polarized. Some respondents endorsed the view that prior knowledge and experience with similar technology is very helpful in making a decision regarding the adoption of new technological devices. More specifically the respondents mentioned that previous experience with an older version of the system helps in the transition to an advanced system where familiarity makes the transition easier and smoother. These findings corroborate the finding of Fuller, Vician and Brown (2006) that prior experience and familiarity with technology reduces anxiety and provides users with the confidence to try a new technology. Prior experience was also found to have a positive effect on the use of systems (Lee, Kim, Rhee & Trimi, 2006).

However, some respondents expressed contrary viewpoints on this issue as they believe that prior experience might obstruct the adoption of technological innovation. The argument was that people often liked to compare a system with its previous version and if the new system did not fit to their mindset, they would tend to react negatively to the proposed innovation resulting in resisting the implementation of the innovation at their workplaces.

While the above polarized positions of respondents are interesting, the situation is understandable from the point of view of the current trends in the tertiary education sector in Australia. Computer application software is regularly upgraded at universities to remain competitive at the industry level. Therefore tertiary institutions prefer to recruit employees with prior knowledge in computer software applications. Resistance to introduction of new technologies in the workplace is also not uncommon in the tertiary sector. Therefore, employees with prior experience in regular adoption of computer technologies would have a positive mindset in embracing innovation. Consequently experienced employees are less likely to stand on the way of implementation of an innovation at their workplaces. Therefore, these findings have implications for recruitment of experienced personnel that would result in cost savings for universities in terms of minimizing or avoiding wasteful resistance as well as in terms of saving training costs.

### ***Employees' Self image as a driver***

The above issue has been investigated using the question, how do you feel when you find out that you can do something with technology that your co-workers cannot do?. Respondents agreed that an employee having some skills in using a technology is seen by many as a capable and knowledgeable person that provides that person with a certain amount of status and prestige in the organization. It gives a sense of achievement and a feeling of power as well. They feel good in that they have some skills that others don't have. However, those employees believe that possessing such skills implies a responsibility on them to teach and show others how to use the system requiring additional workload for them. Some respondents believe that they cannot afford any extra time as they could use that time otherwise to increase their productivity at work. Respondents also opined that in a typical work environment where there is a high degree of interdependence with other employees in carrying out one's duties, improved image and status become important to many individuals. Research shows that using a technological system would result in improving an individual's image in terms of job performance (Venkatesh & Davis, 2000) because a system is instrumental in enhancing the social status of an individual (Yi, Jackson, Park, & Probst, 2006, p.355). Employees with expertise in a particular technology are well recognized as useful resources in a university setting. Recruitment of such employees with a technology background would not only promote

the image of an individual but also that of the university. Furthermore, employees with knowledge of a technological system as well as having interpersonal skills can be instrumental in converting a fellow 'technophobic' into a 'techno-lover' in a learning environment where technophobia is quite common. In this sense, self image of an individual employee would be instrumental in popularizing a new technology in the workplace. The employers can also develop a workload concession program for those who are actively engaged in mentoring their colleagues.

### ***Enjoyment with innovation as a driver***

The above issue has been explored with reference to the question, "What is your opinion of the argument that people enjoying working with computer technology are the early adopters of a technological innovation?" Many respondents believe that people, who enjoy working with technology, tend to be the early adopters of technology. People who enjoy working with computers are the first in line to adopt the system. They indicated that playfulness and having fun are important in adopting a new thing. Few respondents mentioned that if the technology seems familiar, then they enjoy it and become more confident and are inclined to use it. However, if the system is totally new, they do not feel much enjoyment with the technology rather they may be afraid of it. There are individuals who just like to discover things. They like to explore the technology and there is no pressure from management at all. In a similar vein Van der Heijden (2004) stressed that entertainment potential is expected to have a strong influence on innovation adoption decisions. It also provides an opportunity to escape reality and become absorbed in a new world. This finding makes sense in that an individual employee's strong inclination towards an innovative technology is likely to impact on that person's propensity to adopt that technology. At the university level employees who really enjoy working with an advanced technology in many instances would naturally drive the introduction of that technology and would possibly lobby their managers for its introduction. Furthermore, employees with prior knowledge would also encourage and assist peers in embracing a technological innovation at the university.

### **Social factors**

Innovation used by others in employees' social environment is likely to play an important role in adoption of innovation in the workplace. Social influence is the extent to which members of a social group influence one another's behavior in innovation adoption (Konana & Balasubramanian, 2005; Venkatesh & Brown, 2001). It is perceived pressure and influence that peers feel when adopting an innovation and this influence is exerted through messages and signals that help to form perceptions of the value of innovation or activity (Fulk & Boyd, 1991). Ajzen and Fishbein (1980) refer to such influence as normative beliefs about the appropriateness of adoption of innovation. According to this perspective, employees may adopt an innovation not because of its usefulness but because of perceived social pressure. Such pressure may be perceived as coming from individuals whose beliefs and opinions are important, including peers and people who are in social networks (Igbaria, Parasuraman, & Baroudi, 1996). According to Abrahamson and Rosenkopf (1997), it is a largely internal influence that potential adopters exert on each other that persuades them to adopt. Several studies found that social factors were more significant than economic factors in driving adoption of innovation by individuals within an organization (Peansupap & Walker, 2005; Westphal, Gulati, & Shortell, 1997). The following two issues are explored under social factor.

***Peer influence as a driver***

Whether peers can influence an employee to adopt an innovation has been examined by the question, do you believe that peers can help you understand and use a new system or technology?. Results suggest that peer influence is crucial in understanding and using an innovative technology. Peers are the first people that employees approach for help and reference as to whether to use an innovation. or not. Peers can also show an employee as to how to use and manage certain applications of an innovation. The encouragement from peers is also identified as a motivational issue for possible adoption of an innovation. Employees prefer the technological system that their peers use to be able to maintain social bond by interacting with them. Good and helpful peers are essential and they always assist others without putting someone down and do not undermine co-workers for their lack of knowledge in the system. A healthy and friendly environment is, therefore, essential in order for people to receive cooperation and assistance from peers. Respondents also agreed that active and constructive peer assistance is instrumental in learning the innovation quickly and easily. Peer assistance makes the adoption efficient and effective which is considered more useful than guidelines/ handbooks, online material or even participating in training sessions. However, many respondents mentioned that peers should be willing and able to help others. Respondents further agreed that help from peers saves time for adoption of an innovation.

The above findings are consistent with those of prior research that found that support, motivation and encouragement from peers can greatly influence individual employee to adopt an innovation (Lewis, Agarwal, & Sambamurthy, 2003; Yuan et al., 2005). Research also found that adoption of an innovation by peers may signal its importance and advantages, and thus eventually motivate the individual employees to adopt. Like employees at any other institutions, university staff members are also likely to be highly influenced by peers in developing a positive attitude towards adopting and practicing a new technology. Often, employees are under pressure from management to learn a new technology that is considered to be appropriate and may be competitive with other universities' systems. In such a situation peer support becomes crucial in adopting and practicing an innovation at the tertiary level of education. In most cases universities formalize the mentoring roles of experienced employees in educating and training fellow employees in learning new technologies and systems. However, seeking peer support in learning a new technology is a very common practice amongst employees in many educational institutions in Australia and Internationally.

***Social network as a driver***

The possible impact of social network on adoption has been assessed in terms of the question, what is your opinion about the argument that social networks can influence an employee to adopt a new system or technology? Employees stressed the fact that network's advice and recommendations influence their decisions to use the new system to keep up with their network. Respondents use Internet as the possible source of information and communicate online to exchange important information about new technologies and their usage. Furthermore virtual communities are also crucial in generating ideas about the technology around the world. Respondents indicated that social networks generate updated information about new technologies that boosts employees' motivation and enhance their confidence level resulting in active trial of a new technology. Some employees opined that while a social network can positively influence the adoption of a new system or technology, this can also have a negative effect on adoption of an innovation. Respondents have pointed out that social network's influence has its most impact when individuals are convinced of the real benefits of the innovation in terms of improvement of their workplace performance. It is interesting to note that some respondents are often under undue pressure from network to try a new technology that employees would not have normally tried.

The influence of social network on adoption of innovation is understandable given the very strong networking culture existing in many Australian educational institutions. A university has a large population of students and employees who are most likely to be connected via a wide range of social networks internally and externally. Since social networks can play a major role in diffusion of computer technologies, the influence of these networks on university employees in adopting new technology is inevitable. As Australia's education system has become market-oriented and internationalized, social networks have now become internationalized as well. Thus the globalized nature of social networks would be even more effective in driving prompt and efficient adoption of innovative technology in the Australian education sector.

### **Organizational Factors**

The results relating to organizational factors are discussed with reference to three issues, these being training needs, managerial support and incentives for the usage of an innovation. These three issues together capture the role of an organization in fostering innovation in the workplace. The results are presented in terms of responses to relevant questions linked to the above issues. Organizational factors in general have been found to be crucial in driving adoption of an innovation as organizations need to provide facilitating conditions for adoption of technology in workplaces. These conditions include active support to individuals that would influence their use of innovation. Facilitating conditions are believed to include the availability of training and provision of support. Facilitating conditions have been identified as having an effect on infusion or adoption of a number of new information system innovations (Lu, Yu, & Liu, 2005). These influences affect an individual's awareness of the functioning and application of an innovation, its usefulness and fit with the job which leads to its adoption (Frambach & Schillewaert, 2002). The results relating to organizational impetus for adoption are discussed below under three issues.

#### ***Training as a driver***

"Whether training plays any role in the adoption process of an innovation has been assessed through the question, how does training help employees learn and understand a new system or a new technology?" The respondents generally agreed that training is a critical issue and it helps employees to better understand a new system and learn about the new technology. They strongly feel that training is essential and need to be more specific and effective in the organization; especially when an unknown system or new technology is introduced. In the absence of proper training, employees will not be able to use the new system optimally towards achieving its set purposes. Respondents further believe that training improves employees' efficiency and effectiveness, productivity and knowledge of the new technology and its application. The respondents specifically indicate that training does make them more comfortable and confident when using new technology and helps them to learn different features and how to use them in practice. Therefore, training becomes essential because it equips employees with the required knowledge and skills to use the new technology in the most effective and efficient way. However, the respondents differed as to whether individual or group training would be useful in learning a new technology. Most respondents mentioned that individual training works much better than group training. In individual training participants can learn and understand quickly. In a group training context participants may be introduced to ideas about the basic functions of the technology but frustration occurs when they try to use it by themselves. Some respondents opined that individual training is very effective but group training is also useful when most time is spent with individuals showing them how to do it. For individual needs, however, personal training becomes vital.



It is to be noted that finding extra time required to learn a new technology is a major source of stress for most employees in Australian tertiary institutions. Academics, for example, may believe that adoption of a new technology takes away their time which they could use productively in research related activities that are required for their survival. Since they are rewarded for their research efforts in terms of promotion, for example, they are most likely to be reluctant to spend extra time trying a new technology. Stressful situations may also arise from the uncertainty associated with how much time is needed to become familiar with the new technology.

The above finding implies that management should provide extra support in terms of estimating a set period of time and then freeing-up that amount of time so that employees can learn how to use new technology. Alternatively, management could set aside some time for all employees for the required training each year so they do not feel additional pressure in accommodating extra responsibilities. Furthermore, management can offer reduced teaching and administration to accommodate the extra time needed to learn and manage a new technology. Given the importance of time required to learn about and implement an innovation as revealed in this study, we propose that future studies consider the time factor as a separate driver of innovation uptake in tertiary institutions.

### ***Managerial support as a driver***

Impact of above issue on employees' technology adoption behavior has been explored via the question, 'how does managerial support (providing resources) affect you in accepting a new system or technology?' Most respondents interviewed believed that managerial support is important in accepting new technology or systems because it will be difficult to learn and use a new system or technology without active management support. This support includes financial and technical support as well as providing time to learn and understand a new technology. Managerial support is vital as it provides employees with the opportunity to learn about a new technology and boost their confidence and skills. As indicated by many respondents, time is one of the crucial issues for them when trying a new technology or system by developing an adequate knowledge base in that system. Management must provide enough time so that staff can manage their own work and have the time to get acquainted with new technology.

Some respondents argued that employees should not be forced to adopt a new technology or system because applying force may result in employees merely accepting the technology but they would not explore the technology to its full potential. Management needs to provide enough training and other necessary support to employees so that they understand how to use it as well as the benefits of the new technology in their daily job-related activities. Lee, Lee and Kwon (2005) found that managerial support is associated with more adoption and usage while lack of organizational support is deemed to discourage the adoption and effective utilization of a new innovation. Senior management support, in particular is considered vital for innovation to get through. Research by Lee, Kim, Rhee & Trimi, (2006) provides support for this proposition.

This finding makes sense for an education institution that is under constant pressure from students and the government to upgrade its existing technologies to remain competitive in the educational markets at the national and international levels. Therefore, management needs to provide continuous support to its employees in terms of hands-on training and allocating enough time to attend training. The outcome must be the ability to provide better and quicker service to students and staff. An evidence for this argument can be found in the Australian federal government's initiative to provide additional computers to schools so students can enhance their computing skills toward improving their academic performance in the long term.

***Incentives as a driver***

The possible role of proper incentives on adoption of new technology at work has been investigated with reference to the question, how can incentives motivate employees to adopt a new technology? Many respondents equate time with incentives. They feel that time is another important factor and providing the required time may represent a good incentive for adopting a new technology or system. However, a few respondents remarked that financial incentives may not be effective in attracting employees to try a new system. Some employees, however, equated the issue with the retention of their jobs as many employers would like to see their employees update themselves with the latest technologies that are tied to employees' productivity at their workplace. Furthermore, many respondents believe that if the adoption of new technology benefits the organization then the organization should reward employees providing mentoring leadership in implementing innovations at work.

According to Bhattacharjee (1998) employees value individual benefits such as career advancement, personal skills, formal and informal recognition, increased autonomy, beliefs about self worth and achievement and greater job security.

It therefore, follows from the above findings that management support in the form of incentives is crucial for engaging employees in the adoption and usage of an innovation. Incentives are likely to provide extra encouragement to employees in adopting and participating in the continuous use of an innovation in Australian universities, which are currently experiencing major restructuring in terms of providing better quality services to students and clients. Proper incentives would, therefore be most crucial in getting employees involved in the effective use of new technologies. However, management needs to determine the most realistic incentives that management can afford that employees would also accept. Some suggested incentives that employees may prefer include time off, additional points for promotion and certificate of appreciation which would be deemed acceptable in the university environment. However, determining the exact form and extent of incentives that would be acceptable to employees in a university setting, is a subject of further research.

**COMMENTS ON OVERALL RESULTS**

Interview outcomes presented above demonstrate that many of the specific drivers under the three broad categories of factors have a nexus with employees' adoption of technological innovation at their workplaces in tertiary educational institutions in Australia. The level of influence of a particular factor depends, however, on the degree of relevance of those factors to the use and practice of an innovation as indicated by the respondents.

The influence of social factors comprising two specific drivers such as peer influence and social network is worth mentioning because these two drivers have been rarely explored in the extant literature using qualitative research approaches. Prior empirical evidence confirms that external influence is an important factor when technological innovations are being considered for implementation at the organizational level (Yi, Jackson, Park, & Probst, 2006). Therefore, significant impact of social factors on innovation adoption and implementation is consistent with the conventional wisdom. In terms of adoption of an innovation both peer assistance and social network imply assistance and encouragement from others in internal and external terms. Hence, these two factors together contribute to acceptance and practice of an innovation in an educational organization. Respondents have provided their strongest support in favour of influence of

these two factors in their considerations for trying and eventually using the technological innovation. The above findings makes sense as university employees are likely to be motivated to adopt an innovation if they discover that their peers both within and outside their organizations use a similar technology and recommend that colleagues in another institutions should consider using that particular feature of a new technology (Brown & Venkatesh, 2005). This finding corroborates the findings of prior research that found social networks wield a positive impact (Lu, Yao & Yu, 2005; Sykes, Venkatesh & Gosain, 2009; Yi, Jackson, Park & Probst, 2006; Brown & Venkatesh, 2005) and peer influence (Yuan et al., 2005; Farr & Ford, 1990) on adoption of an innovation

Effective and efficient application and practice of innovative technology leads to enhancement of organizational efficiency and cost efficiency in the long-term. These principles apply to tertiary institutions as computer technology and especially various application softwares are most commonly used in Australian universities. Since computer software is an ever-changing type of technology, universities must continuously adopt and apply the advanced software technologies in its various operations. In this vein, the current study has documented some important issues associated with the introduction and use of advanced technology. In particular, the study revealed that training plays an important role in developing employees' required knowledge base and interest in using new computer software. Training may be financially expensive and time consuming but in practice training is likely to save money in terms of minimizing the time and energy required for self learning exercises.

Another crucial issue that needs discussion is managerial support which is vital for the successful adoption and practice of software in the tertiary education sector. For example, if management is reluctant to provide necessary training and support regarding new software, the adoption process would be lengthy and this may compromise the efficiency and effectiveness in using new technological systems. Therefore, the factors 'training' and 'managerial support' do complement each other. Similarly, prior positive experience and enjoyment associated with an innovation are closely related factors because an employee is likely to adopt a technological innovation if he or she is already familiar with it. Furthermore, an active peer assistance program can also add to saving time in the adoption process, and management support is also instrumental in achieving this objective. These interpretations of the findings further reflect on the support that this qualitative research has provided to the conceptual model.

As noted earlier this research revealed some critical issues concerning use and adoption of innovative technologies in tertiary institutions in Australia. Tertiary institutions constitute a vital sector of the Australian economy which is currently growing rapidly in terms of more local and international students (Karmel & Nguyen, 2003), and greater integration with the global economy. Regarding the provision of better services to students and the wider society, the university sector is the focal point for government and policy makers. It is presently experiencing reforms in all spheres of its operation and management particularly in the area of the latest computer technology. The main purpose of this reform is to increase managerial and operational efficiency in terms of employee productivity and quality improvement in the delivery of services. Australia's federal government is committed to improving ICT infrastructure in tertiary and other education settings by spending millions of dollars in recent years (Broadband use in the higher education sector, 2007). The aim is to make students more computer literate by providing additional computers to schools. This initiative of the government is consistent with the findings of this research that suggested more strategic importance of adoption and active use of technologically advanced computer systems in Australia's education sector.

Another important finding is that active support from senior management in terms of relevant training and materialistic incentives would make the adoption process of technology attractive to employees in

Australia's higher education sector. The findings further imply that university management groups need to develop plans for employees so that the new technologies are accepted more easily in tertiary institutions. Specific attention needs to be paid to freeing up time for employees so they can familiarize themselves with new technologies in terms of learning how to use them. The real and measurable benefits of using the innovation can be clearly delineated through pilot surveys of users of technological innovation. This is an important issue that needs to be addressed so employees can use an innovation as informed users. Furthermore, active support from internal peers and external social networks will enhance employees' ability to adopt innovative practices in the workplace. Besides this, resistance of university employees to the introduction of new technology adds to the complexity surrounding uptake of an innovation in the workplace. Although resistance to change is not a new issue in management literature, resistance of employees to technological change in an educational institution setting is of particular relevance to this paper. Employees' resistance to new technology or in other words 'technophobia' may stem from the perceived fear resulting from uncertainty associated with the complexity of use, learning problems, extra workloads and additional time needed to familiarize oneself with new technology. Management needs to develop a well thought out strategy on managing resistance to adopting new technology at the organizational level. The strategy may include providing solid management support that directly reduces user resistance to new technology adoption (Kim & Kankanhalli, 2009) and also tend to ease the use of an innovation (Lewis et al., 2003). Furthermore, senior management commitment to innovation implementation has been found to be instrumental in increasing the possibility of organizational support for the technological change (Kim & Kankanhalli, 2009). Since favorable opinion of peers about an innovation can contribute to countering resistance to a new technology, Massey et al. (2001) suggested that management can first influence opinion leaders in favor of the innovation to enhance acceptance by others.

The major findings of the study can be seen at a glance in Table 3.

Factors examined	Brief findings	Perceived importance	Relevant studies supporting the findings
<i>Training needs</i>	Formal training positively influences individuals' ability to adopt a new technology as training equips employees with the knowledge and skills required to use a new technology in the most effective and efficient way.	Very critical	Ligon, Abdullah, & Talukder (2007)
<i>Managerial support</i>	Managerial support is vital for employees using a new technology. It includes providing financial and technical assistance as well as allocating the time required to learn and understand a new technology.	Very crucial	Lee, Lee and Kwon (2005)
<i>Incentives for the usages</i>	Incentive is a great motivating factor for employees to adopt and practice an innovation. The specific incentives mentioned include promotion, financial benefits and time allocation.	Moderately important	Bhattacharjee (1998)
<i>Usefulness of an innovation</i>	The potential benefit of the innovation is an important factor for acceptance and practice of an innovation. Employees discover the usefulness of an innovation through individual assessment of the benefits via trial, consultation with peers and colleagues having experience in the same technology, exploration of word of mouth and seeking comments and recommendations from others, use of advanced product quality planning (APQP) devised to ascertain the risk and benefits of the new system, assess if the time and money spent on the technology is worth the values it creates.	Very important	Kim, Chan and Gupta (2007)
<i>Personal initiative</i>	Personal interests and initiatives of employees play a pivotal role in accepting and using a new technology. Individuals who are innovative in nature and younger generally accept a new system. Personal interests in technology have been associated with improvements in job satisfaction, creation of better scope to switch between jobs and making life easier in terms of doing things quicker and better.	Moderately important	Frambach and Schillewaert (2002)
<i>Prior experience</i>	Prior experience of potential employees in a comparable system of technology has been found to increase the likelihood of trying a new technology. Prior experience makes it comparatively easier for employees to use a new system as they feel comfortable and confident in doing so. There is also a view that while prior experience is deemed necessary in adopting a new technology, some people love to explore an unknown technology for the thrill of it.	Fairly important	Fuller, Vician and Brown (2006)
<i>Unique individual ability</i>	People able to do their job efficiently and have the skill to share their knowledge with others have been found to be instrumental in making other people try a new technology. These people feel proud in being recognized for their unique skills by others and this in turn motivates them to help those needing assistance and mentoring.	Important	Venkatesh and Davis (2000).
<i>Enjoying the innovation</i>	Enjoyment has been singled out as an important issue in accepting and practicing an innovation. People who love to discover new things tend to first find about a new technology and enjoy the time and excitement in working with it and are most likely to be the innovators of that technology.	Fairly important	Van der Heijden (2004); Yuan et al. (2005)
<i>Peer assistance</i>	While information technologists play a role in assisting employees in learning and adopting an innovation, peers play a different role by going beyond the formal path to assist their peers. Peer direction, guidance, and support are provided in a more informal, close and congenial manner. This encourages and motivates employees further to understand and adopt an innovation.	Extremely important	Lewis, Agarwal, & Sambamurthy, 2003; Yuan et al. (2005)
<i>Social net work</i>	Social networks do greatly influence the adoption of a technological innovation. Employees are influenced by both positive and negative recommendations received from their social network as to whether a particular innovation should be accepted or not. A social network enables members to be aware of the systems that are widely used in their designated industry, which indirectly puts pressure on network members to use that technology in order to remain competitive in the market.	Extremely important	Brown & Venkatesh, (2005); Yi, Jackson, Park, & Probst (2006)

Table 3. Major Findings (Note: The level of importance attached to a particular factor has been assigned based on the qualitative analysis of the information provided by the subjects.)

## CONCLUDING REMARKS, MANAGERIAL IMPLICATIONS AND CONTRIBUTION

This qualitative study has revealed some interesting findings that have refined, deepened and advanced our knowledge of the driving forces shaping adoption and practice of an advanced technological innovation in an Australasian organizational setting. This study is one of the first to pull together all the social, personal and organizational factors and used these factors as drivers of technology adoption and endeavored to present a fuller picture of the forces that drive adoption of technological innovation in an organizational setting in the context of Australian higher education sector.

The discussion of results in relation to each factor presented and analyzed vis-à-vis prior knowledge in the extant literature has provided a comprehensive view of the findings. The study revealed that social factor comprising peer support and social network are the two emerging issues driving adoption and practice of technological innovation in an organizational setting. These findings are understandable and have particular relevance to the growing virtual community driving diffusion of advanced technology in an information age. Furthermore, university employees in Australia are an integral part of social network both within and outside their own institutions that assists and influence their decision to use and practice an innovation in their workplaces. These socially driven issues seem to gain increasing recognition in the technology acceptance and diffusion process and are likely to generate considerable attention of academics, practitioners, information technologists and employers.

Amongst the individual factors the most important ones that frequently came up in the analysis are the prior experience with perceived usefulness of and enjoyment with the innovation. These findings can be linked to the social factors as social network and peers can generate enhanced usefulness of an innovation in the minds of innovation users who perceive the usefulness of an innovation positively. The social factor would likely to exert even stronger influence where employees have prior experience with a similar or an earlier version of an innovation. Amongst the organizational factors, management support and incentive are the two most important drivers as revealed in the study. This finding suggests that management has to play an active role in providing necessary technical, administrative and other necessary support including training and dissemination of information to employees which would be instrumental in getting an innovation acceptable and practicable to employees. The findings further suggest that proper incentives can also be influential in motivating employees to try and eventually practice a technological innovation. Incentives that have been frequently referred to include allocation of additional points for promotion, workload concession for learning a new system and certificate of appreciation.

Based on the above discussion, it can be safely said that the conceptual model presented in Figure 1 is supported by the findings of this study. Overall, some of the findings of this paper lead us a step further in broadening our understanding of the complexities of adopting and using technological innovations in the workplace in Australian universities.

### **The newness of the study**

The findings of this research add new knowledge to the topic. Firstly, this research can be considered an advancement over previous ones in that it has provided some new directions in deepening and broadening our understanding of the drivers of innovation in a workplace context. For example, no previous research has used such a comprehensive model as this study did in terms of examining numerous issues under the broad categories of individual, social and organizational factors. More specifically, this study has combined these factors together to ascertain the collective impact of all the possible factors on the usage behavior of innovation in workplace settings in the Australian tertiary

educational context. Secondly, prior research mostly used the quantitative approach where there was no considerable depth in the understanding and exploration of the driving forces. Thirdly, no prior qualitative research addressed the lacuna that existed in the literature concerning the impact of social factors on innovation adoption in the workplace. This research has produced interesting findings suggesting the growing importance of the socialization aspect innovation adoption in educational sectors. Because of this research the specific influences of social factors have now been revealed. This newness is expected to prompt further qualitatively based studies with broader and deeper insights into additional factors in a multiple organizational setting in Australasia and beyond.

### **Implications**

The findings of the research have implications for various types of managers and practitioners who are responsible for introducing and advancing new technologies in the education sector. Given the trend towards end-users applications, the results of this study will guide management to consider more carefully the effective adoption and usage of technological innovations in a tertiary education organization. The research findings will inform management of the importance of the relevant factors (such as training, and peer support) in driving technology adoption and help reduce new technology implementation-related costs and the ability of tertiary institutions to react faster and act more efficiently in the individual uptake of technological innovation. Furthermore the findings will also assist management to identify individual employees' problem areas and improve their level of technological expertise. For example, university management groups in Australia can emphasize the leading factors impacting on the planned technology adoption process and design appropriate implementation strategies. The focus should be on the proper training of employees for which necessary funding should be made available. Management should also create a congenial atmosphere where there is a greater level of cooperation amongst employees and facilitates a more productive use of new technology. Some form of incentives can also be introduced so that potential users of innovative technology are motivated to use them. Furthermore, incentives for mentors may be introduced to support their fellow employees who are keen to learn about an innovation.

### **Theoretical contributions**

This paper makes a contribution to the following theoretical areas. Firstly, this paper has clearly identified the role of social factors in adoption and implementation of an innovation which contributes to refinement of the existing theories in terms of inclusion of social factors as one of the predictors of innovation implementation in an organizational perspective. This variable was either ignored or under-emphasized in prior research. Venkatesh and Davis's (2000) proposed inclusion of social factor into any future modeling is now confirmed, which opens the scope for social factors as an emerging area of research. Secondly, this paper made some unique contribution towards theorizing the impact of factors on adoption of technological innovation in the tertiary education sector. Thirdly, this paper has revealed clear evidence of combining the three broad factors to capture the fuller picture of the influence of drivers on adoption. This should now be the basis of any comprehensive model development that seeks to deepen our understanding of the complexities of innovation adoption.

## **LIMITATIONS AND FURTHER RESEARCH**

This paper has a number of limitations which may limit the generalization of the findings. Firstly, the factors explored in this paper are based on qualitative information provided by a small number of employees in a single tertiary institution in Australia. For future studies' findings to be applicable and gain wider acceptability, they should include several tertiary institutions in a sample chosen either from a number of regions of one country or several countries. Secondly, the factors do need to be

empirically verified by quantitative data. It is contended that future research on this topic should develop a mixed methodology approach in which quantitative data and the application of principal component analysis will uncover the underlying determinants of innovation adoption and use. Furthermore, future research studies may be able to use the perceived characteristics of innovation model (PCIM) as an alternative to the TAM framework (see Jebeile & Reeve, 2007).

This paper provides a useful understanding of individuals' innovation adoption in the context of a tertiary educational institution. The results reported here would seem to be generalizable to other organizations that have similar characteristics, yet the scope and the context of such generalization of results are somewhat limited. The interpretation and implications of the findings in this research paper depend on the nature of an organization and its innovation ethos. Therefore, further research is needed to broaden and confirm the results. Finally, this paper noted that employees do resist new technologies in tertiary institutions in Australia. Therefore, future research should consider 'resistance to change' as a new factor affecting the adoption of innovative technologies.

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Appendix 1: Qualitative comments of respondents on the factors affecting individual adoption of innovation

Factors	Comments of respondents
Training needs	<p>“Training demystifies the fear that people have with new technology. No one in this office embraced the new software we bought here recently (although fairly easy to us) because there was no training about it.”</p> <p>“When I have any new software I try it myself but it makes it very difficult for me and consumes a lot of my time and I am not comfortable but when I am imparted training to do all those things it becomes easier for me to use it. So, I believe that training is extremely important.”</p> <p>“In my previous office the senior-most designer could not use a computer. Then we gave him training and then he became one of the best designers using computers.”</p> <p>“Recently I had training for a new system. Initially, I was scared to use it without training .Now I am more confident. The training was really helpful.”</p> <p>“One of the main worries is time. To find enough time to go for training is quite difficult. The main problem is finding the extra time for training.”</p>
Managerial support	<p>“If you have strong managerial support and resources and you have the required training, then your level of acceptance will be greater and you will be ready to take on changes.”</p> <p>“Managerial support makes you much more confident as the support ensures training, allocation of time and other key resources to try a new technology.”</p> <p>“With our previous software it used to take up to three days to process a job and now with our recent technology it takes about one and half hours to complete the same job. I looked for the software and management bought it. Now we need to go for some training. Managerial support was essential to buy the software in the first place.”</p>

	<p><i>"It is time that I need. Time must be built into my workload to enable me to learn a new system or technology and I feel frustrated because I do not have enough time to do so. I am too busy with my teaching or projects. So, providing time would be crucial for the adoption of new technology."</i></p>
<i>Incentives for the usages</i>	<p><i>"I think such incentives are a very important factor. If management wants employees to use new technology then they need to support it and incentives can be a very useful way of gaining motivation from employees."</i></p> <p><i>"If I am promised new advantages, promotion or financial incentives then it would motivate me to accept new technology."</i></p> <p><i>"Incentives do not have to be money. Time would be a good incentive. If you are given a new technology and you do not have time then you will be reluctant to use it. When management provides you with the required time then you will have the motivation to engage in new technology and explore it."</i></p>
<i>Usefulness of an innovation</i>	<p><i>"Before using any technology I always check the purpose and the advantages of that technology and find out what I can do with it."</i></p> <p><i>"For any new technology that I am considering using, I spend about a week finding out an adequate amount of information about it and then I have an initial trial to check the technology and then I decide whether to use it or not."</i></p> <p><i>"I use the technology in the testing process and find out its benefits upon using it. Then I form an opinion about its usefulness and make a decision as to whether I would accept it or not."</i></p> <p><i>"I use APQP which is an Advanced Product Quality Planning. This is the best practice used by automotive weapon manufacturers. I use this analysis to predict the entire thing going wrong, how likely it is that it could go wrong, what controls are, what the risk is and what the benefits are. From these analyses I can make plans and decisions."</i></p>
<i>Personal initiative</i>	<p><i>"Individuals who are innovative in nature are usually keen to adopt new technology. I think you have to be really innovative to explore new systems or technology."</i></p> <p><i>"Almost everything I do is based on my own interest. Individual interest is a big factor for me. I find that I am comfortable with new technology and it is a lot of fun for me."</i></p> <p><i>"Age has a huge impact. Some people just do not try new things. The younger people aged below 30 who grew up with computers and technologies are most excited if you show them something new. They would be quickly interested in engaging themselves in new things. It is a lot to do with age."</i></p> <p><i>"People will have an interest in technology which relates to their work and helps with their job. I do not like Endnotes software but I know it would be good for my research. I have an interest in engaging with technology that will facilitate my work."</i></p>
<i>Prior experience</i>	<p><i>"Experience with similar technology makes a reasonable impact on how to begin with something new. To try out a new technology, it is not necessary to have prior experience but it would be better if you had experience."</i></p> <p><i>"Absolutely, experience with similar technology shows you the way ahead. You will know the style of the system, working processes, and similarities which make a world of difference compared to the person who does not know. It makes a big difference."</i></p>

	<p><i>"I feel that it is very important. If someone has prior experience with similar technology and similar use then they will adopt it quite easily. They will feel comfortable with the product as they are familiar with the system."</i></p>
<p><i>Unique individual ability</i></p>	<p><i>"It makes me feel quite special when someone has a problem and my peers ask the person to see me for the solution of that problem. I really feel very proud of myself."</i></p> <p><i>"I feel proud of myself as a human being. You know you have the knowledge of mastering something."</i></p> <p><i>"I like to have that knowledge. If I know something that others do not know, I feel that I have achieved something special. It gives me definite pride."</i></p>
<p><i>Enjoying the innovation</i></p>	<p><i>"People who enjoy the technology are most likely to be the early adopters. Most of the people I know working with computer technology do enjoy it and all of them become early adopters. Enjoyment plays a major role in the early adoption process of an innovation."</i></p> <p><i>"That is very true. People who enjoy it, they live around the technology, and they are the first to find out about it and use it. It is almost like a hobby."</i></p> <p><i>"There are people who get excited to do something with computers and enjoy doing so. They enjoy the time using it and they love to discover new things."</i></p>
<p><i>Peer assistance</i></p>	<p><i>"It does not matter how much you know or what you know, peers can help you to a great extent. Peers can show you very important applications which even IT experts did not show you. I have received a great deal of help from peers."</i></p> <p><i>"In a friendly environment, peers are quite important. They normally help each other to understand new things. I have a lot of experience in this aspect because when I first came here I found new technologies which I had not used before. I got help from peers and they were very helpful."</i></p> <p><i>"The help from peers is crucial and very important and encouragement from peers is also very critical. If I did not have peers to support me it would be very difficult to manage. I not only received direct help but also received encouragement from them. They provided me with direction and guidance."</i></p>
<p><i>Social net work</i></p>	<p><i>"Social networks have a huge influence on me. I found out a variety of new technologies from the people I worked for before and from the people I know. Often I hear about new technology from outside my work place. I adopt the technology to remain competitive as other competitors (universities) are using those technologies."</i></p> <p><i>"I always follow social networks. I consult people and take into account what they suggest to me about new technology."</i></p> <p><i>"In an era of emerging technology, you need to have a network of people who are using similar technology globally because it is easier to communicate."</i></p>