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Examining ICT application adoption in Australian home-based businesses

An innovation-decision process approach

Stephen Burgess
Victoria University, Melbourne, Australia, and
Rafael Paguio
College of Business, Victoria University, Melbourne, Australia

Abstract

Purpose – The purpose of this paper is to report on a study that examines an under-researched area, the use of information and communications technologies (ICT) in Australian home-based businesses (HBB).
Design/methodology/approach – HBB constitute a large part of the economy, yet little is known of how they use ICT to improve their business operations. The study involved a case study comprising interviews with 30 business operators in the Western region of Melbourne, a major Australian city. The findings were analysed using a unique approach to Rogers' (2003) Diffusion of Innovations, employing the innovation-decision process as a lens for the analysis.
Findings – The study findings suggest that ICT application adoption in HBB participants is not uniform, with adoption of applications such as e-mail differing from adoption of newer applications, such as social networking. ICT use needs to be considered according to individual ICT applications and explained in the context of particular HBB. The study contributes to studies of innovation adoption, particularly in relation to the use of ICT applications in HBB.
Research limitations/implications – It should be remembered that this study involved interviews with a broad selection of 30 HBB in the Western region of Melbourne, Australia. The results should be considered in the context of hypothesis generation in regards to HBB rather than hypothesis testing that can occur with larger samples. The authors feel that this study would be representative of the practices of ICT adoption in many such groupings of HBB in cities of major Western countries, but hesitate to claim that similar, specific uses of ICT applications would be matched elsewhere.
Practical implications – This study has a number of practical implications. The results suggest that researchers should consider adoption of individual ICT applications in HBB. Further, policy makers looking to support the use of ICT by HBB should consider that the HBB in this study had adopted different ICT applications and were at different stages of ICT adoption. This is worth considering when deciding upon policies relating to how to suppzort the HBB sector (such as provision of training support and so forth).
Originality/value – The paper introduces a unique means to assess the adoption of ICT applications by examining their level of penetration, level of maturity and usefulness to HBB.

Keywords Semi-structured interviews, Diffusion of innovations, Home-based businesses, ICT applications, Innovation-decision process
Paper type Research paper

1. Introduction

In Australia, as in most economies around the developed world, small businesses contribute to a significant proportion of overall business activity. Defined as those employing less than 20 people, small businesses count for as much as 96 per cent of the total number of businesses in the country (Department of Industry, Innovation, Science, Research and Tertiary Education (DIISRTE), 2012).

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In recent years, academic research has been drawn to a large subgroup within small businesses, those that are conducted from the operator's home. These are known as home-based businesses (HBB) and they comprise a large and growing majority of small businesses. For instance, HBB in Australia comprise over one million businesses and account for 57 per cent of all businesses. In Scotland it is estimated that 56 per cent of all businesses are home-based (Mason and Reuschke, 2015). HBB deserve consideration because they also experience the lowest survival rate of businesses (Australian Bureau of Statistics, 2014).

Due to their large numbers, HBB represent an economically significant sector in terms of employment generation. According to Wang *et al.* (2009), HBB represent the fastest growing business segment in most western countries. In 2011 the majority of HBB (61 per cent) ran as one-person operations providing livelihood opportunities to their operators, while 24 per cent employed one to four additional employees (DIISRTE, 2012). However, there is concern that HBB are not as productive as non-HBB. In particular, HBB compare poorly in terms of value-added and labour productivity (Australian Bureau of Statistics, 2010).

To enhance HBB performance to generate even more economic contribution from the sector, governments had first focused on addressing the bureaucratic and information issues that impede the establishment and operation of HBB (Ali *et al.*, 2011). Training course offerings from various Government bodies have recently included topics related to the adoption of information and communication technologies (ICT) applications. This development has been motivated by the increasing awareness that the use of computers and the internet could deliver efficiency and market reach benefits that may circumvent the resource constraints of HBB. However, this initiative has not been matched by a corresponding increase regarding research into the adoption and usage of ICT in HBB.

Through semi-structured interviews, this study aims to examine the adoption and use of particular ICT applications by HBB through the lens of Rogers' (2003) innovation-decision process. In particular, the research questions examined are:

RQ1. To what extent are ICT applications being used in HBB?

RQ2. How are they being used?

RQ3. Is there an intention to keep using them?

RQ4. What are the reasons for non-adoption of ICT applications?

RQ5. Where awareness exists of an ICT application, but a decision to adopt or not to adopt has not been made, what are the reasons for this?

RQ6. Is awareness of ICT applications still lacking?

RQ7. Are there any factors specific to HBB that affect the use of ICTs across the stages of Rogers' innovation-decision process?

2. Literature review

2.1 HBB

Pratt (2000, p. 106) defined HBB owners as "self-employed individuals who operate a business or profession primarily in or from a home office". The Australian Bureau of Statistics (2010) described two classifications of HBB: at home (where most of the work of the business was carried out at the homes of the operators) and from

home (where there are no other premises owned or rented other than the homes of the operators).

Many "micro" (very small) businesses are HBB. These types of businesses often require little start-up capital and are defined by their small number of employees (often less than ten, with other definitions suggesting that they have less than five). Often the employees are family or household members employed on a casual basis. Typical sectors for micro businesses are commerce, manufacturing and services (Meadows *et al.*, 2003; Burgess *et al.*, 2009). Early in the twenty-first century, HBB had a growth rate of 16 per cent (Walker *et al.*, 2003). The number of HBB is growing and they are becoming an alternative to regular, salaried employment. As such, service businesses, which can easily move from "commercial" sites to "non-commercial" sites, are more likely to be home-based. A significant growth driver of rural HBB has been city-based residents desiring to move out of the metropolis and start a HBB in their new place of residence (Mackloet *et al.*, 2006; Rowe *et al.*, 1999). HBB are also a starting point for businesses that wish to expand in the longer term (Mason and Reuschke, 2015).

2.2 The role of ICT

Studies that examine HBB in general are not widespread (Jain and Courvisanos, 2013). Those specifically examining the adoption and use of ICT in micro or HBB are available, but are not as common as small businesses studies – this is despite the fact that many of these small business studies actually include micro businesses (Burgess *et al.*, 2007).

Micro businesses generally lag behind other businesses in their use of ICT. An example of this is illustrated in Figure 1, which examines the use of ICT in 1,800 small- and medium-sized businesses in Australia (Telstra Corporation, 2013). Figure 1 shows the level of usage of ICT (owning a computer, using the internet and having a website) was lowest for businesses with only one or two employees (common for HBB) and tended to increase as businesses increased in size.

Most small businesses use ICT to improve efficiencies. Many studies have shown that small businesses typically use accounting and "office" software in their businesses

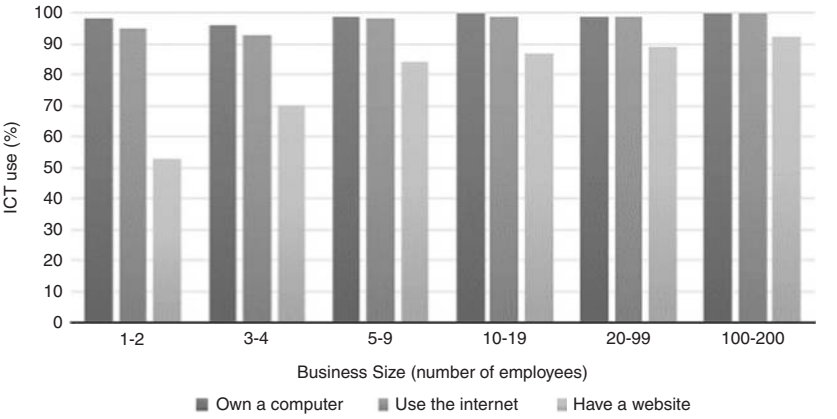

Figure 1.
Technology use in Australian SMEs

Source: Compiled from Telstra Corporation (2013)

(Burgess *et al.*, 2009). A study of HBB in New Zealand (Clark and Douglas, 2011) found that they used a range of ICT.

Anwar and Daniel (2014) have identified a new breed of HBB that have emerged, "online" HBB. These businesses either use the internet significantly as part of their business operations or operate as purely online businesses. This paper is more concerned with the former group, as well as those HBB that use other ICT to assist their operations.

Different researchers have highlighted the separate use of ICT applications across micro businesses. Table I provides a summary of these studies and the relative adoption rate for each application. The authors believe that it is reasonable to assume that this adoption level would be similar for HBB.

2.3 ICT use in HBB: diffusion of innovations

There are many theoretical approaches that can be used to investigate the adoption of innovations such as ICT in organisations such as HBB. For instance, Scozzi *et al.* (2005) discussed models for investigating the adoption of business modelling techniques in SMEs. The models they discussed encompassed planning (involving strategic and operative planning), innovation development and models for learning (or "internalization of knowledge", p. 129). These translate to three, non-sequential innovation adoption phases of planning, execution and learning. Zhu *et al.* (2006) examined the adoption of e-business across different countries through the use of three e-business "assimilation" stages – initiation (pre-adoption), adoption and routinisation (post-adoption). One of the most popular approaches employed to study the adoption and use of technology is Rogers' (2003) diffusion of innovation. The use of this approach, and its associated innovation-decision process, can provide insights into how technologies are adopted in everyday lives. The innovation-decision process was selected in this study for two major reasons. It represents the sequential stages of adoption of an innovation (thus reducing complexity in analysis) and yet provides greater granularity by identifying five stages of adoption rather than three.

ICT application	Adoption rate	Relative adoption rates
E-mail	Higher	Telstra Corporation (2013): 97% adoption rate; Clark and Douglas (2011): 98% adoption rate
Online banking	Higher	Telstra Corporation (2013): 91% adoption rate
Business presence on third party website or portal	Higher	Burgess (2011): 82% adoption rate
Use of mobile phone for business (not voice calls)	Medium	Clark and Douglas (2011): 82% of HBB used mobile phones for calls and other purposes; Telstra Corporation (2013): 68% of small businesses possessed a smartphone
Business website	Medium	Telstra Corporation (2013): 66% adoption rate; Clark and Douglas (2011): 63% adoption rate
Accounting software	Medium	Halabi *et al.* (2010): 60% adoption rate
Online transactions (buying or selling via a website)	Medium	Telstra Corporation (2013): 70% received payments over the internet; 81% paid for goods over the internet
Social networking	Lower	Telstra Corporation (2013): 35% of small businesses had a social media presence (93% of these used Facebook)
Twitter	Lower	Telstra Corporation (2013): 35% of small businesses had a social media presence (28% of these used Twitter)

Table I. ICT applications adopted for study

An advantage of using the innovation-decision model is that it "charts a progression of activities during the adoption process" (Seligman, 2006, p. 115). The innovation decision process comprises a series of stages describing the adoption process. Note that according to Rogers (2003) an innovation does not actually have to be "new" for it to be considered to be an innovation for a business. All it has to represent is that it is new to the business, in this case the HBB.

The five steps or stages of the innovation-decision process are, in order of occurrence (Rogers, 2003):

(1) *Knowledge* – when a decision maker is made aware of an innovation and begins to understand how the innovation functions. This stage can be influenced by the way in which knowledge of an innovation is distributed via communications channels, such as through mass media or from person-to-person.

(2) *Persuasion* – when a decision maker forms favourable or unfavourable attitudes towards an innovation. One of the aspects that can affect attitude is the perceived attributes of the innovation, but opinions can also be influenced by other factors. Also, possible adoption is influenced by who has the authority to make the adoption decision, the potential existence of technology champions (or change agents) to promote the adoption of the innovation and other factors as well.

(3) *Decision* – when a decision maker engages in activities that lead to either choosing to adopt the innovation or rejecting it.

(4) *Implementation* – when a decision maker puts in place the new innovation. At this stage there is still likely to be some uncertainty in relation to the adoption of the innovation, so further information in regards to how to obtain and use the innovation may be sought.

(5) *Confirmation* – when a decision maker wants reinforcement about the decision to adopt the innovation. The decision is made to continue or discontinue use of the innovation.

Factors such as industry sector, management support, management skills, cost of the technology and business size have been shown to influence ICT adoption by SMEs (Bayo-Moriones and Lera-López, 2007; Kannabiran and Dharmalingam, 2012). The Telstra Corporation (2013) study mentioned earlier suggested that smaller businesses (such as HBB) do not adopt ICT at the same rate as their larger counterparts.

There have been a small number of studies that have examined technology adoption in micro and/or home businesses. As mentioned earlier, Clark and Douglas (2011) examined the adoption and diffusion of ICT in HBB in New Zealand. They were interested in the "factors which act as motivators or barriers to adoption, as well as their potential influence on adoption decisions" (p. 352). The authors also discussed other adoption studies, such as those which examine different business functions and those that group the factors into broad categories, such as organisational factors, environmental factors and technological factors. In regards to diffusion, they referred to "the spread of ICTs or the extent to which specific technologies are used within business activities" (p. 353). Niehm *et al.* (2010) examined technology adoption and diffusion in small family businesses. Whilst the study included businesses that were "home based" and those that were not, the findings suggested that ICT did not diffuse as widely though HBB as in other businesses.

Clark and Douglas (2011) suggested that there are not only limited studies in the use of ICT by micro businesses, but in particular the use of ICT by HBB. Further, research into ICT use in general is often limited by treating small businesses as one homogeneous group (Burgess *et al.*, 2009). What is currently not available is detailed information about the adoption, usage and evaluation of specific ICT applications in HBB. Thus, this study looks to extend earlier work by extending the range of ICT applications that are examined and the implications in regards to antecedents of ICT adoption (incorporating the motivators for, or barriers to, adoption), the decision to adopt ICT and the consequences of ICT adoption in HBB.

From these main research issues, a number of specific research questions have been adopted for this study. These are framed with reference to stages in Rogers (2003) innovation-decision process, but are also informed by Niehm *et al.*'s (2010) and Clark and Douglas' (2011) studies:

- To what extent are ICT applications being used in HBB? (adoption stage)
- For those that have been adopted, how are they being used? (implementation stage)
- For those that have been adopted, what are the benefits/problems associated with adoption and use? (confirmation stage)
- For those ICT applications that have been adopted, is there an intention to keep using them? (confirmation stage)
- What are the reasons for non-adoption of ICT applications? (decision stage)
- Where awareness exists of an ICT application, but a decision to adopt or not to adopt has not been made, what are the reasons for this? (persuasion stage)
- Is awareness of ICT applications still lacking? (knowledge stage)
- Are there any factors specific to HBB that affect the use of ICTs across the stages of Rogers' innovation-decision process?

3. Methodology

The research questions for this study are investigative in nature. It was decided to adopt a case study approach to explore the research questions, as ICT adoption, usage and evaluation generally involves socio-technical decision making and case studies allow for this type of investigation to occur (Yin, 2003; Darke and Shanks, 2002). Additionally, case study research is appropriate where current knowledge is limited (Shanks and Bekmamedova, 2013). The approach for "cross-case analysis and comparison, and the investigation of a particular phenomenon in diverse settings" (Darke and Shanks, 2002, p. 115). A diagram of the research process is provided in Figure 2.

In order to investigate the research questions, it was decided that the use of semi-structured interviews of HBB was the best approach. This is because semi-structured interviews provide the opportunity to investigate beliefs, motivations and reasons for actions (Leedy and Ormrod, 2013), in this instance, the adoption and use of ICT applications. This approach also allowed for a few central questions about each ICT application to be asked and the flexibility of the approach allowed for further probing of responses where required. After a series of introductory, demographic questions, the remainder of the questions examined each separate ICT application,

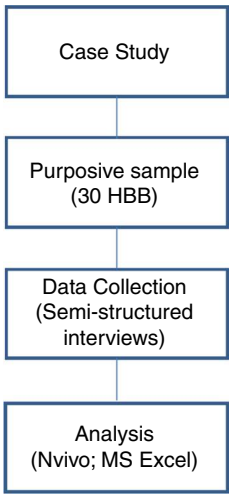

Figure 2.
The research process

in particular if the application was being used, its level of usefulness and open-ended questions examining the benefits and problems associated with its usage.

Individual, face-to-face interviews were undertaken with a purposive sample of 30 HBB. As the authors were located in a university in Melbourne, Australia, local government bodies in Melbourne's western suburbs were co-opted to contact potential participants from their list of HBB constituents. The sample was constituted to have representations from a broad coverage (refer Table I) of HBB. The objective was to cut through the various segments in the HBB sector and collect information from possibly differing perspectives to address articulated research questions. It was important to investigate HBB across different sectors as this reflected the vast range of sectors that HBB operate in. As indicated, it was also important to examine HBBs that operated "at home" and "from home" (as indicated by Mason and Reuschke, 2015). There was a good (50/50) split of female and male owners that were interviewed. Mason and Reuschke (2015) suggested that the majority of HBB in Scotland were operated by males. Unfortunately resource restrictions did not provide the opportunity to investigate HBB in rural areas.

Prior to each interview, the websites and/or social networking presences of the businesses (where available) were accessed and their content not only informed the conduct of the interviews, but also contributed as an extra source of data for the cases to add depth and context to the results. Typically, the owner/manager of each HBB was targeted for each interview as HBB typically comprise a single employee (or a "handful" of employees at most) where the owner/manager is responsible for the vast majority of major decisions. Ethics approval for the conduct of the study was gained from the human research ethics committee of the authors' university.

The purposive sample methodology described above finds support in Greenhalgh's (2001) prescription for recruiting qualitative research participants by first identifying particular segments of interest to the research and seeking representatives out. The number of interviews is in line with Mariampolski's (2001) guideline of no less than ten and preferably between 15 and 30 interviews to effectively address research objectives for studies using the interview data collection technique. Refer to Table II for a profile of the HBB interviewees.

ANZSIC business categories	Number of businesses	Owners		Average number of employees	Operations	
		Female	Male		At home (%)	From home (%)
Property and business services	12	5	7	2.4	22[a]	78
Retail trade	4	3	1	1.0	50	50
Personal and other services	3	2	2	3.0	25	75
Accommodation, Café and restaurants	3	2	1	3.0	100	–
Cultural and recreational services	2	1	1	2.5	25[a]	75
Transport and storage	2	–	2	2.5	25[a]	75
Health and community services	1	1	–	1.0	–	100
Manufacturing	1	–	1	6.0	–	100
Construction	1	1	–	4.0	–	100
Overall	30	15	15	2.6	32	68

Note: [a]Some businesses in these categories indicated a split between working "at home" and working "from home"

Table II. Profile of interviewees

The content of the interviews was recorded in Nvivo, which classified the various data items according to various constructs identified in the literature as described in the previous section. Nvivo was useful as an analysis tool as it allowed for participant comments to be classified in a number of different ways. In this study, tree nodes were set up for each ICT application and a separate strand of tree nodes were set up for comments related to different stages of adoption. In addition, certain results were stored in the spreadsheet package Microsoft Excel to calculate averages and percentage adoption rates. Clark and Douglas' (2011) study of HBB examined business use of the internet, business features of websites, business uses of e-mail and business use of mobile phones. The authors felt that this type of approach would be useful for this study, and were keen to examine ICT adoption of applications for well-established as well as newer ICT applications. Thus, the authors adopted the list of ICT applications found in previous studies of micro businesses (refer Table I) as the basis for this study.

4. Results

4.1 Individual ICT applications

This section discusses the experience of HBB in regards to each of the nine ICT applications that were identified. The results are presented according to the stages of Rogers' (2003) innovation decision process for each application.

4.1.1 E-mail. All of the businesses used e-mail, so the discussion was therefore mainly based around how it was used and any perceived benefits or problems that had resulted from its use.

Implementation. For the most part, e-mail was used to send business information (such as newsletters and details about products or services). This is interesting as e-mail allows for two-way communication – but this usage relates to one-way communication from business to recipient. For instance, a HBB operating in the entertainment field used Microsoft Word to create music lists in different languages

which could then be e-mailed out to clients. This provided significant savings as the costs to print and send these out was described as "astronomical". E-mail was also commonly used to send more formal documents (such as orders, quotes and invoices). An interviewee from a construction business noted that when customers requested quotes they expected a quick response: "There is a risk that business will be lost if they are not sent promptly, as potential clients are canvassing other providers". A lesser number of businesses used it for marketing, especially to follow up leads. An interesting use identified by some of the ICT services businesses is that they set up client computer systems to send them an automated e-mail when a problem occurred with the system. Another use was that e-mail was intentionally used by a small number of HBB to maintain an audit trail of communications.

Confirmation. All businesses certainly indicated that they were intending to keep on using e-mail. There were a number of positive outcomes of e-mail use that were identified. A number of participants described its use as being "indispensable", a comment especially on the fact that it saved time. It was also suggested that e-mail was ideal to use when "out on the road" and for keeping in contact with clients who were some distance away (it was convenient and cheaper than telephone).

E-mail had become the preferred method of communicating with clients for many participants. For instance, comments such as "It's a default platform for communication with our customers" and "It's the lifeblood for keeping in contact with clients" were commonplace. The flipside to this was that a small number of businesses that used e-mail still preferred to talk directly to customers, either face-to-face or by telephone, rather than interact via a keyboard.

A number of negative aspects of e-mail use were also identified. For instance, a major theme that emerged was that it could be difficult to manage, mainly through problems with spam. It was also not always reliable, with problems such as e-mails not being delivered, limited mailbox size or when the "system goes down".

Table III summarises the major themes that emerged from the discussions with HBB about their use of e-mail. Note that major themes of the discussion are identified in italic text, whilst minor themes are in regular text. The summary confirms that e-mail is a well-established ICT application in HBB, with most of the discussion relating to how it was used and the positive and negative outcomes associated with its use. There is no doubt that the overall conclusion to be made in regards to e-mail is that its benefits outweigh any problems in regards to its use.

Knowledge	Persuasion	Decision	Implementation	Confirmation
None as no data recorded	None as no data recorded	None as no data recorded	*Uses:* *Send business information* *Send orders/ quotes/invoices* Marketing Automated e-mails Paper trail	*Positive outcomes:* *Prefer to e-mail* *Indispensable* *Fast; Saves time* *Great for dealing with clients at a distance* *Great when on the road* *Negative outcomes:* *Can be difficult to manage* *Not reliable* Prefer to talk

Table III.
Major themes from interview data related to e-mail use

4.1.2 Web portals/directories. Participants were asked if they intentionally had a business presence on any other websites, such as the Yellow Pages or regional or industry directories. More than eight out of ten participants had such a presence, although their assessment of their usefulness was lower when compared with the other ICT applications that were also highly used. In a study of third-party website usage, Burgess (2011) also found a high adoption rate amongst Australian small businesses.

Decision. A small number of businesses that had not yet implemented a third-party website had made the decision to, but had not yet acted on that decision. Of those that had decided not to proceed with a web portal or directory, the main reason was that there was no compelling need. For instance, a signwriting business indicated that they received enough custom from word-of-mouth and from repeat business.

Implementation. The vast majority of third-party website implementations were for the purpose of promoting the business. This is either for receiving direct business enquiries from new customers or for referring them to the business website. The general consensus seemed to be that many directories offered a free or inexpensive means of "getting your name out there". Some businesses adopted a strategy of listing on as many free directories as they could, whilst others adopted a more strategic approach, listing on specific regional or sector-based directories.

Confirmation. As was mentioned earlier, most businesses that had implemented third-party websites were not overwhelmed by their success. The few that did find the implementation useful reported obtaining more work or extra enquiries. In the case of the Yellow Pages, it did manage to provide extra business for some subscribers, whilst others complained about the high cost of listing on this service. Low cost was a reason for some businesses to maintain their third-party listings with many regional and general business directories that provided free listings. Other observations by businesses were that third-party websites were mainly ineffective or that they had no way of measuring their effectiveness. Some interviewees felt that most people searched for businesses via a Google search rather than through a third party directory.

The general usefulness of web portals/directories seemed out of line with its penetration rate as shown in Figure 3. Perhaps the explanation for this could be related to the fact that this application was available early on when there were fewer alternatives in advertising businesses to potential customers online, thus the high penetration. Another reason suggested by interviewees was the low if not nil subscription costs.

Table IV shows the main themes that emerged from the web portal/directory discussion.

4.1.3 Online banking. Participants were asked if they used online banking in their business. Around eight of out of ten respondents indicated that they did use online banking and generally found it to be very useful. These results are consistent with the Telstra study which reported that 79 per cent of small businesses describe internet banking as "essential" (Telstra Corporation, 2013).

Decision. Those businesses that had chosen not to use online banking were aware of its existence and had made a clear decision not to use it. There were generally two reasons for this. A small number of businesses actually preferred to do their banking in person, with one business actually still dealing in cheques. A window tinting business interviewee preferred to "stroll to the bank branch and talk to people there". A similar comment was made by an interior decorator. The other reason inhibiting online banking usage was security concerns, specifically a fear of hacking.

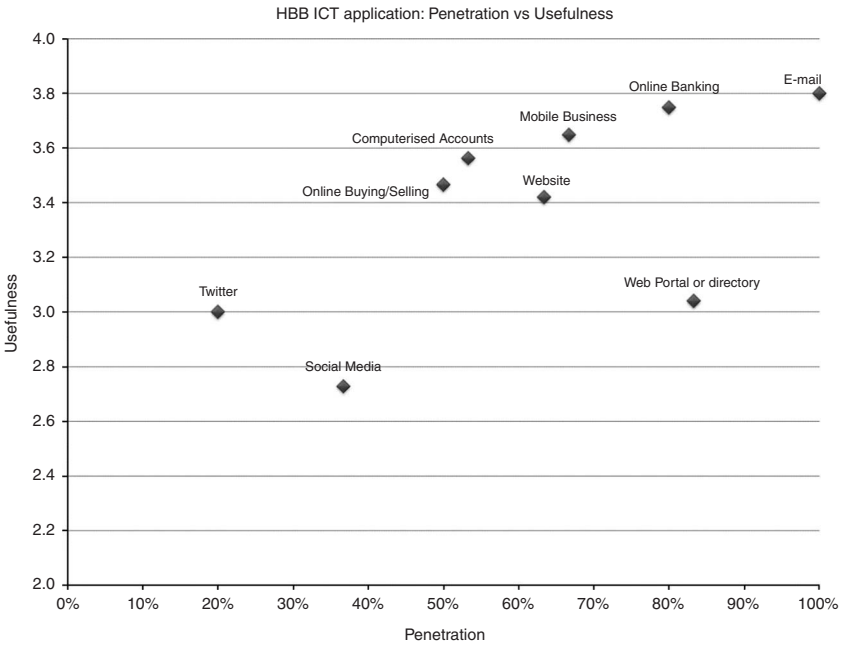

Figure 3.
Penetration vs usefulness of ICT applications

Knowledge	Persuasion	Decision	Implementation	Confirmation
None as no data recorded	None as no data recorded	Have not implemented yet	Use: *Promotion*	*Positive outcomes:* *Has led to some work* Cheap *Negative outcomes:* Ineffective Most people search with Google Have not tried to measure their effectiveness Costly

Table IV.
Major themes from interview data related to web portal/ directory use

Implementation. There were three main uses of online banking. Most commonly, this was to pay suppliers and to receive payments from customers. Another strong theme emerging was that businesses liked the ability to check their current bank balances at any time – for the purposes of monitoring cash flow or just seeing if payments had been made from clients or to suppliers.

Confirmation. It was quite obvious that participants who used online banking would continue to use it into the future. The two major benefits identified were that they were able to do their banking at a time that suited them and that they saved time through not having to go to the bank. In addition, many businesses found online banking easy to use and saved on fees, especially when compared with credit card transactions or writing cheques. An interviewee whose business offered computer services commented that: "It's great

when people pay me by direct debit. It makes it so much easier. Most suppliers also prefer direct debit as they make such a small margin when they charge you to use credit cards".

However, some businesses did complain that there was not enough space in the description area of transactions for full details of payments to be made, or sometimes "the payee does not put a reference for the payment". In these instances, time is often wasted trying to track down who made the payment or what invoice was being paid.

Table V shows the main themes that emerged from the online banking discussion.

4.1.4 Mobile business. Mobile devices can include regular mobile phones (that basically just make telephone calls), smartphones, laptop computers, personal digital assistants and tablets. These devices can be used anytime/anywhere, enable immediate and interactive transactions, communications and services, and provide services that can be tailored to individual users (Turban *et al.*, 2006). However, the use of mobile devices for work purposes can result in blurred boundaries between work life and personal life, especially for HBB. Hackney *et al.* (2009) suggested that the use of mobile technologies can cause conflicts between work and family use. For instance, there can be disdain for workers using mobile devices for work whilst in "private" situations, as well as pressures placed on some workers to be available outside of normal business hours (Middleton, 2008).

Decision. Around two-thirds of participants used smart mobile devices for purposes other than making telephone calls. Those businesses that did not use smart phones had different reasons, such as a landscaping business that did not use such devices as they were too easily broken in their work environment. However, that interviewee also suggested that it would be "handy" to be able to access up-to-date weather information as that "impacts on jobs". Another business indicated that there was always someone "at home" to check e-mails and to pass on a message via a telephone call if it was needed.

Implementation. The main business uses of smart mobile devices away from the home/office were to check and send e-mails and thus act as a "mobile office". Typical comments were "my mobile is my office", and "I can check on work when I am on the road". Other uses included sending quotes and orders via the mobile device and using GPS to confirm job locations. Some users suggested that mobile devices played a key role in the conduct of their business. For instance, a software developer indicated that he used his smart phone for social networking, e-mail, Twitter and a calendar (which was "synched" back to his office calendar). This offered continuous access to important applications away from the office: "when I step away from the desk I have key bits of info".

Confirmation. Mobile devices were described by some businesses as being indispensable, with typical comments such as "could not live without it", "have to have it", and "could not run the business without being mobile", with the key benefit being the

Knowledge	Persuasion	Decision	Implementation	Confirmation
None as no data recorded	None as no data recorded	No need to adopt: can do things locally/in person Security concerns	*Uses:* *Make payments* *Receive payments* *Check balances*	*Positive outcomes:* *Time saving* *Convenient hours* Easy to use Saves on fees *Negative outcome:* Tracking payment details at times

Table V.
Major themes from interview data related to online banking use

ability to work anywhere. As expected, a small number of businesses raised work/life balance as an issue. One business proprietor in particular mentioned that with the mobile phone around, she finds herself "still working while on holiday". Thus, a small number of businesses referred to the need to discipline themselves in regards to how they work.

Table VI shows the main themes that emerged from the mobile business discussion.

4.1.5 Website. Participants were asked if they had their own website. Around two-thirds of the businesses had a website, which is consistent with other studies already mentioned (Telstra Corporation, 2013; Clark and Douglas, 2011).

Persuasion. This was the first ICT application where a few participants indicated that they were in the persuasion stage of adoption. These businesses suggested that they did not need a website at the moment, but were thinking that it might be a possibility in the future.

Decision. Some businesses had decided to set up a website, but had not yet done so. There was also a group of businesses that had decided that they had no need for a website. This was generally because they had enough work or had a small number of clients. Other reasons for not having a website included a concern about not having the required skills to implement a website or the cost involved in setting one up. Some of the HBB participating in the study were franchisees. They indicated that part of their franchising fee was devoted to promotion by the franchisor and that franchisees were not encouraged to have individual websites.

Implementation. The two main uses of the business website were to provide information about the business and its offerings ("It tells people who we are and what we do […]") then for marketing and promotion, with some businesses indicating that the majority of their customers found them via their websites. A small number of businesses that operated in different market niches even had a separate website for each niche. For example, a software developer had two websites, one for the general software development aspect of the business and the other devoted to the area of the business that developed "apps" for smart phones.

Confirmation. One of the main benefits identified from having a website was that it helped to establish business reputation and credentials, as it can make the business "look legitimate", provide "a great first impression" and can make it appear like the business had been in operation for some time. An interviewee from a printing business commented that a website provides a company with some "validation", as people see HBB as "businesses that do not pay rent and are not professional". A counselling service commented that "when people look at your website they say: "yeah, this person has been in business for a while". Another benefit identified was that customers requiring further information about offerings could be referred to the business website. The main problem identified was that websites could be time consuming to update.

Knowledge	Persuasion	Decision	Implementation	Confirmation
None as no data recorded	Some businesses in persuasion stage	*No need to adopt*	*Uses:* *Mobile office and accounts* *e-mail* Send quotes/orders GPS	*Positive outcomes:* *Indispensable* *Work anywhere* *Negative outcomes:* Work/life balance

Table VI.
Major themes from interview data related to mobile business use

Other problems, which were also identified earlier in the decision phase by other businesses, was that the website could be costly to update or the business lacked the skills to update the website. A few businesses mentioned that they were considering an update or redesign of the website or had even undergone one recently. For instance a Bed and Breakfast operator commented that she was intending to make the website more appealing and easier to navigate, whilst a printing business had just relaunched its business website which better "tells people who we are and what we do".

Table VII shows the main themes that emerged from the website discussion.

4.1.6 Computerised accounts. Small businesses have been using accounting software for a few decades now. Halabi *et al.*'s (2010) study of Australian small businesses found that 60 per cent had adopted a specific "off the shelf" accounting package. Participants were asked if they used computerised accounting software (such as MYOB). The levels of usage were similar to the earlier study, with just over half of the businesses using such a package. However, the analysis revealed that spreadsheet software was also used in varying degrees by many businesses, mainly as a supplement to their accounting package. It was possible to classify the businesses according to three categories:

(1) those businesses that have everything done by an accountant (and do not use software);

(2) those businesses that use accounting software or a spreadsheet package such as MS Excel to a basic level and then pass the files generated from these onto accountants for further processing; and

(3) those businesses who do everything themselves, using accounting or spreadsheet software, including generating reports and submitting statements to the Government Tax Office.

Decision. The main reason for businesses not to use accounting software was that their accountant handled everything. Another reason suggested was that the software itself was too costly.

Implementation. The implementation of accounting software was mainly according to the three categories mentioned earlier. Either the software was used to generate tax reports, or information was passed onto the accountant to prepare such reports.

Knowledge	Persuasion	Decision	Implementation	Confirmation
None as no data recorded	*Might adopt in the future, but not yet*	*Decided to adopt, but have not implemented yet* *No need to adopt* Lack relevant skills to create website Costly to set up	*Provides information about the business and offerings* *For marketing, promotion – to attract customers* Have two websites	*Positive outcomes:* *Establishes credentials/ reputation* Refer customers to the website *Negative outcomes:* *Time consuming* Lack skills to update website Costly to update

Table VII. Major themes from interview data related to website use

Confirmation. There were no "standout" benefits or problems in relation to the use of accounting software, although there seemed to be some contradictions (refer to Table VIII) in responses. For instance, some businesses described the software as being "irreplaceable" whilst others described it as just suiting basic needs. Also, accounting software was described as being "simple to use" by some participants, but "complex to learn" by others.

Table VIII shows the main themes that emerged from the computerised accounts discussion.

4.1.7 Online buying/selling. Participants were asked if they did any online purchasing or selling of goods over the internet. This differed from purchasing goods or services in a conventional manner and then paying for them via online banking. Just over half of the businesses used online buying or selling. The Telstra Corporation (2013) study of Australian small- and medium-sized businesses found that 70 per cent of businesses received payments over the internet and 81 per cent paid for goods over the internet.

Decision. The main reason for non-adoption of online purchasing or selling was that there were already other options in place, such as payment via traditional means of cash, cheque or credit card. Other alternatives were online banking and electronic payment systems. Interestingly, some businesses actually recognised that they were a service business and commented that online transactions were not applicable to them. With products, the sale and payment could be done online first and then the product delivered. However, with services online transactions are more difficult as the "product" is not standard and has to be customised to specific client requirements. The major payment too often occurs only after the service has been delivered. An example of this was a consulting services business that "sells a service that is delivered straight to companies, so it is not really applicable".

Implementation. In the case of online purchases, a number of items such as materials from suppliers, books and software were purchased. Other uses include booking of venues and placement of job advertisements. Receipt of revenue was less prevalent and was mainly received via the business website, although in one case receipts were received via eBay (probably PayPal).

Confirmation. The main benefit of online buying and selling was that it was quick and convenient. However, for the first time in relation to ICT applications, some participants indicated that whilst they had once had online sales on their website they had discontinued them and reverted to their traditional forms of sale. This was mainly because the online returns did not justify the cost and effort needed to maintain the function.

Table IX shows the main themes that emerged from the online buying and selling discussion.

Knowledge	Persuasion	Decision	Implementation	Confirmation
None as no data recorded	None as no data recorded	*Accountant does it all* No need to adopt Costly	*Uses:* *Accounting software/ spreadsheet to enter transactions* *May or may not pass info to accountant to prepare periodic tax report*	*Positive outcomes:* Irreplaceable Suits basic needs Saves time Simple to use *Negative outcome:* Complex to learn

Table VIII.
Major themes from interview data related to accounting software use

4.1.8 Social media. Participants were asked about the use of two social media applications in their businesses: *full social networking websites* (such as Facebook) and *Twitter* (a "microblogging" service for sending and forwarding brief messages). Adoption rates were low, with less than two in five businesses using a social networking website and only one in five businesses using Twitter. This was again consistent with the low adoption rates of social media by small and medium sized businesses in the Telstra Corporation (2013) study.

Knowledge. Social media applications were the first ICT applications where participants provided comments that implied they were in the knowledge phase of Rogers' innovation-decision process. For both applications, and especially for Twitter, some participants indicated that they had little idea of what the application was or what it was capable of.

Persuasion. With businesses still being persuaded in regards to the use of social media tools, there were more of them in this stage for social networking sites than for Twitter. Either some participants already had a private social networking page and were investigating whether or not they should have a business presence as well, or had seen other examples of business social networking pages (Rogers' notion of "observability") and were considering something similar.

Decision. Some businesses had clearly evaluated social media applications and had decided that there was no need for them in their business as they wasted time, or alternatively that the tools were not suited to their businesses. A computer services business commented that they had "heard lots of stories about people who do use it [social media] for business" and wondered how businesses with "a website, Facebook, Twitter, Myspace" kept them up to date. A Bed and Breakfast operator commented that "Facebook is a time waster. If I got on it, I would lose hours at a time and I won't get anything done".

Implementation. Those businesses that used the two types of social media applications saw a clear difference in how each was applied. Social networking websites were typically adopted for promotion purposes – either to advertise events or special offers. Twitter was mainly used for two purposes, to enhance business links and as a network from which information can be disseminated or sourced.

Confirmation. When discussing the benefits of social media, most adopting businesses considered that they increased their exposure and raised their profile. In both instances the main problem with their use was that they were seen as time consuming in that they required constant monitoring and may distract from business activities. In fact, some business that had previously had a business social media presence had discontinued it. This was once again because the link between private

Knowledge	Persuasion	Decision	Implementation	Confirmation
None as no data recorded	None as no data recorded	*No need to adopt* *Not needed as they are a service business*	*Uses:* *General purposes* Purchase from suppliers Receiving payments	*Positive outcomes:* Quick/convenient *Negative outcomes:* Used to have online sales, discontinued use

Table IX. Major themes from interview data related to online buying and selling use

and business use was being blurred and businesses did not feel that the benefits gained offset the disadvantages of its use.

Tables X and XI show the main themes that emerged from the two types of social media application.

4.2 Penetration and usefulness

This section introduces a new lens to investigate the use of ICT by HBB. For each application, it compares the extent of adoption (penetration), the level of usefulness and the level of maturity in regards to adoption. Each participant was asked to rate the level of usefulness of each ICT application that they had adopted on a scale of one (not at all useful) to five (extremely useful). Figure 3 shows the extent of adoption (penetration) of each ICT application across the 30 HBB, plotted against the average response to the usefulness question. In regards to penetration, it can be seen that the extent of adoption for each ICT application was reasonably in line with expectations for the study. e-mail, online banking and presence of web portal or directory had the highest rates of adoption while the social media applications were the least used.

When there are a small number of observations (such as 30 in this instance) it is often useful to look at other measures, such as median and mode, when making a determination as to the perceived usefulness of ICT applications. In Table XII, an overall assessment of the effectiveness of the various ICT applications is determined by taking into account a variety of measures, scaled back to the initial Likert-type value associated with the value. This is because the assessment of ICT usefulness involves an ordinal scale and there is an argument that mean and standard deviation are not suitable for the analysis of ordinal values, such as Likert-type scales. In these instances, it can be more suitable to employ mode or median values (Jamison, 2004). The analysis in Table XII confirms that (for the most part) the most adopted applications were also regarded as being the most useful. The exception to this rule was web portals or directories, which will be discussed in the next section.

One method that can be used to represent the various stages of adoption of participant organisations for each separate ICT application is to show how the comments they made in response to the interview questions were classified into the different stages of the innovation-decision process. Figure 4 represents the main

Table X.
Major themes from interview data related to use of social networking website

Knowledge	Persuasion	Decision	Implementation	Confirmation
Need to find out more	*Considering adoption*	*No need to adopt* Not suited to business use	*Use:* *Promotion* *Events announcements*	*Positive outcome:* Some exposure *Negative outcomes:* Time consuming *Discontinued use*

Table XI.
Major themes from interview data related to use of Twitter

Knowledge	Persuasion	Decision	Implementation	Confirmation
Don't know enough about it	Considering adoption	No need to adopt	Uses: Build links Another source of information	*Positive outcome:* Raise profile *Negative outcome:* Time consuming

ICT application	Mean	Median	Mode	Overall
E-mail	3.80 (very useful)	4 (very useful)	4 (very useful)	Very useful
Online banking	3.75 (very useful)	4 (very useful)	4 (very useful)	Very useful
Mobile business	3.65 (very useful)	4 (very useful)	4 (very useful)	Very useful
Computerised accounts	3.56 (very useful)	4 (very useful)	4 (very useful)	Very useful
Online buying/ selling	3.47 (moderately useful)	4 (very useful)	4 (very useful)	Very useful
Website	3.42 (moderately useful)	3 (moderately useful)	4 (very useful)	Moderately useful
Web portal or directory	3.04 (moderately useful)	3 (moderately useful)	3 (moderately useful)	Moderately useful
Twitter	3.00 (moderately useful)	3 (moderately useful)	3 (moderately useful)	Moderately useful
Social networking	2.73 (moderately useful)	3 (moderately useful)	3 (moderately useful)	Moderately useful

Table XII. Assessment of ICT application usefulness

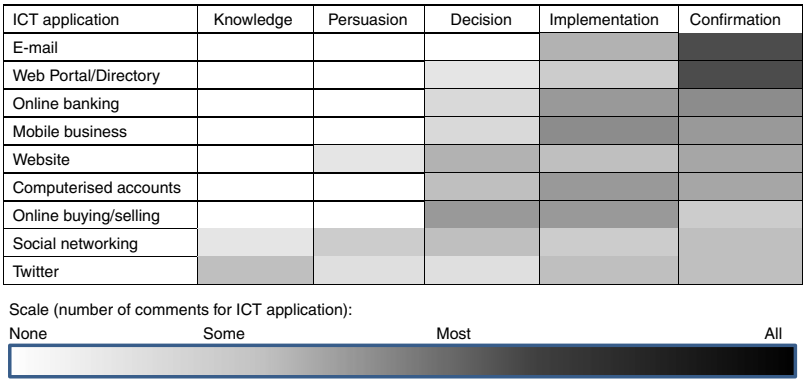

Figure 4. I-D map representing the number of comments related to the adoption and use of ICT applications by participant HBB

themes identified by participant businesses in the form of an innovation-decision map (Bingley and Burgess, 2011). In this instance the I-D map shows where the greatest concentration of comments occurred, with a higher proportion of comments being represented by darker shaded cells.

For instance, in the case of e-mail the majority of comments occurred in the implementation and confirmation stages as all HBB had adopted e-mail. This means that all of the issues faced by participant HBB regarding e-mail related to how it was used (implemented) and whether it would be used on an ongoing basis (confirmation). For other ICT applications, the comments of some participants indicated that their businesses were still in the decision (or even earlier) stages. For example, the uncertainty still surrounding website use was reflected by some businesses still undecided on whether or not to adopt a website. Given the market reach as well as the legitimacy-signalling benefits for HBB, intervention efforts could be initiated to address impediments to website adoption. Finally, the lack of knowledge of social media applications is reflected by the spread of comments across all of the innovation-decision stages. Some businesses knew very little at all about these applications (knowledge

stage), whereas others were at the stage where they had tried the applications and even discontinued their use (confirmation stage). At the minimum, this could imply the need to provide HBB with knowledge of social networking applications. The use of innovation-decision maps for this purpose (examining the volume of relative comments across innovation-decision to identify separate emphases placed on the adoption of different ICT applications) is a new approach to considering the adoption of ICT applications in small businesses.

The level of maturity of adoption of each application can be assessed by where the discussion is centred in the innovation-decision stages. For this, the authors developed three levels of "maturity" of adoption: mature; developing and immature. For instance, ICT applications where the majority of comments related to the decision, implementation and confirmation stages were considered to be *mature*. Although websites had been adopted for some time by HBB, there were still a number of businesses that were in the Persuasion stage, so this ICT application was assessed as being *developing*. Social networking sites and Twitter had comments ranging from the knowledge stage all of the way through to the confirmation stage and thus was assessed as being *immature* in regards to its implementation.

Analysis results are summarised in Table XIII.

5. Discussion

5.1 Research synthesis

This study is unique in that it is the first to examine the adoption of ICT applications in HBB using Rogers' innovation-decision stages as a theoretical lens.

The analysis of interviews of HBB and results presented in Figure 3 confirms that the experience of adoption of ICT applications across all stages of adoption was not consistent in the participating organisations. It is not enough to point out the length of time that these applications have been in existence to explain these findings. For instance, not all ICT applications with high penetration were considered to be "very useful" by participants. Web portals/directories experienced a high level of penetration, but were only considered to be moderately useful. Their continued usage could be explained by the relatively minor cost savings if terminated. In regards to website usage, although these had been available to HBB for some time, there is still some obvious confusion associated with their adoption and doubt as to their level of usefulness. There is enough evidence here to strongly suggest that the penetration levels, maturity levels and usefulness differs across different ICT applications in HBB, but this of course needs to be confirmed with a larger sample of HBB.

Table XIII. Overall assessment of ICT application adoption stages for participant HBB

ICT application	Penetration	Maturity	Usefulness
E-mail	High	Mature	Very useful
Online banking	High	Mature	Very useful
Mobile business	Medium	Mature	Very useful
Computerised accounts	Medium	Mature	Very useful
Online buying/selling	Medium	Mature	Very useful
Website	Medium	Developing	Moderately useful
Web portal or directory	High	Mature	Moderately useful
Twitter	Low	Immature	Moderately useful
Social networking	Low	Immature	Moderately useful

There was obvious acceptance of the benefits experienced by participant HBB with their use of most ICT applications. Some of the reported benefits include increased efficiency, convenience, wider market reach and generally, the electronic facilitation of routine transactions and communications. The level of approval for each specific application however was moderated by the length of time since the application's introduction in the market, information levels, availability of alternative means of achieving the same benefits and considerations related to work-life issues. From a theoretical perspective, the use of Rogers' innovation framework in the analysis outlined the specific stage of businesses in the adoption process, and the results reflect observable differences with regards to the different ICT applications within the participant group.

An important aspect of this study was the investigation of businesses that had reached the decision stage of adoption, but had elected to *not* adopt the innovation. All ICT applications except for e-mail had a business in this category. By far the most common reason given for non-adoption of the technology was that there was no perceived need to adopt the application. This relates back to Rogers' (2003) notion of relative advantage – the proposed innovation was not typically seen to provide relative advantage over existing practices. Other factors that were mentioned in the literature, such as cost (website; accounting software), lack of skills (website) and business sector (online buying and selling not suited to businesses providing a service) were also evident to a lesser extent in the participant group.

5.2 Limitations and generalisation

The authors feel that this study would be representative of the practices of ICT adoption in many such groupings of HBB in cities of major Western countries, but hesitate to claim that similar, specific uses of ICT applications would be matched. It is also important to remember that the study represents a moment in time – new technologies are emerging and being adopted on a continual basis. However, the authors feel confident in claiming that the study has identified differing patterns of ICT adoption, usage and evaluation with different ICT applications – and expect that differences would also be found in similar studies in other locations. Future research should examine the findings of this study of Australian HBB and examine them in the greater context, with larger samples of HBB and hypotheses examining the notion of different levels of penetration, maturity and usefulness for separate ICT applications.

6. Conclusion

This study adds to the minimal literature available of the use of ICT in HBB. A unique contribution of this paper has been the use of Rogers' (2003) innovation-decision process to demonstrate that it is useful to go beyond the simple measure of adoption rates for different ICT applications in HBB. In regards to the theoretical contribution:

- the use of the stages of adoption allowed the researchers to develop an understanding of the issues affecting decisions related to the adoption, usage and evaluation of different ICT applications in HBB; and
- additionally, the new approach introduced to assessing ICT applications by examining a combination of penetration levels, maturity levels and usefulness provided a new way to assess the adoption (or non-adoption) of these applications.

There were some similarities and surprises in the results when compared to the literature review. The high level of e-mail use was not a surprise, nor was the high level of web

portal/directory usage (as found by Burgess, 2011 or online banking (Telstra Corporation, 2013)). The results suggested that some of the tensions regarding work/life balance and the use of mobile devices existed, as suggested by Hackney *et al.* (2009). The level of website adoption was consistent with other studies (Telstra Corporation, 2013; Clark and Douglas, 2011). Levels of adoption of computerised accounts were similar to those indicated in Halabi *et al.*'s (2010) study of Australian small businesses, with this study providing some extra insight into the nature of these applications. Just over half of the businesses in the study were involved in online buying or selling. Low levels of adoption of social media were consistent with the Telstra Corporation (2013) study.

With regard to the theoretical contribution, it should be remembered that this study involved interviews with a broad selection of 30 HBB in the Western region of Melbourne, Australia. The results should be considered in the context of hypothesis generation in regards to HBB rather than hypothesis testing that can occur with larger samples. From this viewpoint, the results suggest the following research propositions to be tested in future research:

(1) The level of usefulness of ICT applications to HBB varies significantly across those applications and is not necessarily a function of the level of adoption.

(2) The level of adoption of ICT applications by HBB varies significantly across those applications is not necessarily a function of maximised benefits.

(3) The benefits that ICT applications can provide to HBB vary significantly across those applications and could be a function of individual business situations.

(4) The inhibitors associated with the use of ICT applications by HBB vary significantly across those applications and could be a function of individual business situations.

With regard to the practical contribution, whilst a number of research propositions were generated, the results of this research are conclusive enough to suggest that HBB do not adopt and use ICT applications at one standard level, face different challenges in regards to the adoption and use of different ICT applications and identify different benefits from separate ICT applications. This has implications for entities that support HBB use of ICT, such as trainers, consultants and policy makers, who need to be aware of the differences when recommending training programmes and support for the use of ICT by HBB.

This study has a number of implications. The results suggest that researchers should further consider adoption of individual ICT applications in HBB. Further, policy makers looking to support the use of ICT by HBB should consider that the HBB in this study had adopted different ICT applications and were at different stages of ICT adoption. This is worth considering when deciding upon policies relating to how to support the HBB sector (such as provision of training support and so forth).

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About the authors

Stephen Burgess is an Associate Professor in the College of Business at the Victoria University, Australia. He has research and teaching interests that include the use of ICTs in small businesses (particularly in the tourism field), the websites of community based organisations, the use of user-generated content in tourism and B2C electronic commerce. He has received a number of competitive research grants in these areas. He has completed several studies related to website features in small businesses and how well websites function over time, including his PhD from the Monash University, Australia. He has authored/edited three books and special editions of journals in topics related to the use of ICTs in small business and been track chair at international conferences in related areas. He has published in journals such as the *Journal of Information Science*, *Information Systems Frontiers*, *The International Journal of Information Management*, *Tourism Analysis*, *The International Journal of Tourism Research* and the *Journal of Hospitality,*

Marketing and Management. Stephen Burgess is the corresponding author and can be contacted at: Stephen.Burgess@vu.edu.au

Dr Rafael Paguio is a Senior Lecturer at the Victoria University, where he teaches mostly in the small business and strategic management accounting areas. He previously lectured on Entrepreneurship at the Royal Melbourne Institute of Technology (RMIT) University, as well as business strategy subjects at the Asian Institute of Management and the Singapore Institute of Management. Rafael had a role in research management at the Victoria University where he coordinated projects for government and industry clients involving growth, regulation and technology advisory services issues. His research interests gravitate towards technology adoption of small entrepreneurial enterprises for competitive advantage.