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Entrepreneurial alertness and digital commerce adoption in SMEs

ABSTRACT

The purpose of this paper is to determine the relationships between entrepreneurial alertness, learning goal orientation and digital efficacy as managerial factors to the adoption and benefits of digital commerce of small and medium sized enterprises (SMEs). A survey of Australian SMEs was conducted and 109 useable responses were received. Descriptive statistics depict respondents' views of digital commerce use and business benefits resulting from adoption, while multiple regression analysis revealed the relationships between key constructs. Specifically entrepreneurial alertness and learning goal orientation predicted the growth benefits SMEs gain from using digital commerce. Being able to see connections and make associations and digital efficacy was significantly related to efficiency benefits stemming from digital commerce adoption. The findings of this study contribute to our knowledge of digital commerce adoption, its benefits and how these relate to entrepreneurial alertness, learning and digital efficacy and hold implications for SME owner/managers and researchers.

INTRODUCTION

The digital landscape present many opportunities to alert entrepreneurs, from those that seize opportunities to create new firms in the virtual world to those who use digital technologies and tools to enhance business efficiencies, improve customer service, achieve significant cost savings and improve external network relationships with partners, stakeholders and suppliers (Jones, Simmons, Packham, Beynon-Davies & Pickernell, *in press*; Kaplan & Haenlein, 2010; Simsek, Lubatkin, Veiga & Dino, 2009). While the adoption of digital technologies by small and medium sized enterprises (SMEs) could provide numerous business-related benefits (Nguyen, 2009) and is seen as essential for future economic progress in Australia (Department of Broadband, Communication and the Digital Economy 2008), not all SMEs are keen to adopt new technologies. In fact Love, Irani, Standing, Line and Burn (2005) argue that reality is more complex for SMEs. Similarly, Fillis, Johansson and Wagner (2004) propose that individual firm and managerial factors play a key role in seizing digital opportunities. Valliere (*in press*) shed more light on the question as to why some SMEs are more likely to see digital opportunities, take action to exploit, and implement digital commerce than other through his conceptualisation of entrepreneurial alertness.

Entrepreneurially alert owner/managers are more likely to notice changes environmental changes or internal triggers (Fillis *et al*, 2004) and in making sense of these triggers, may infer an opportunity to adopt digital commerce and seize the benefits it offers (Daniel & Wilson, 2002). Other managerial factors that influence digital commerce adoption include competencies (Nguyen, 2009), attitudes (Fillis *et al*, 2004) as well as learning and digital efficacy (Yi & Hwang, 2003). Simsek *et al*, (2009) find that an entrepreneurial alert information system enables SMEs to facilitate entrepreneurial action, while Yi and Hwang's study (2003) outlines the importance of learning goal orientation and self-efficacy for digital commerce adoption. While numerous authors have studied the barriers, benefits, costs (Love *et al*, 2005; Daniel & Wilson, 2002) and managerial competency factors (Fillis *et al*, 2004; Jones *et al*, *in press*) of SMEs related to information technology adoption, we're not aware of studies which relate entrepreneurial alertness to the adoption of digital commerce. Thus the purpose of this paper is to determine the relationship between entrepreneurial alertness, learning goal orientation and digital efficacy as managerial factors to the adoption and benefits of digital commerce for SMEs. As such this study contributes to the digital

commerce adoption and entrepreneurship literature, highlighting the role of entrepreneurial alertness, learning and efficacy for SMEs.

This study proceeds by first reviewing the literature regarding factors expected to influence digital commerce adoption, in particular entrepreneurial alertness, learning, digital efficacy, and adoption use and benefits. There-after the method and results of the study is presented and hypotheses assessed, finally the discussion and conclusion highlights the key findings and implications of the study.

THEORETICAL BACKGROUND

Research model and hypotheses

Figure 1 presents the proposed research model. This model is based on the e-commerce adoption model (Daniel & Wilson, 2002) which postulates that technology use and benefits is influenced by learning goal orientation and digital efficacy (Yi & Hwang, 2003). In this study we've added entrepreneurial alertness, since this construct can also be related to the use of digital technologies and benefits realised. This model in this paper explicitly studies technologies firms are currently using, and not those they are planning to adopt. It is expected that as firms use digital technologies, they should realise certain business benefits such as growth in sales and customers, as well as increased efficiencies (Daniel & Wilson, 2002).

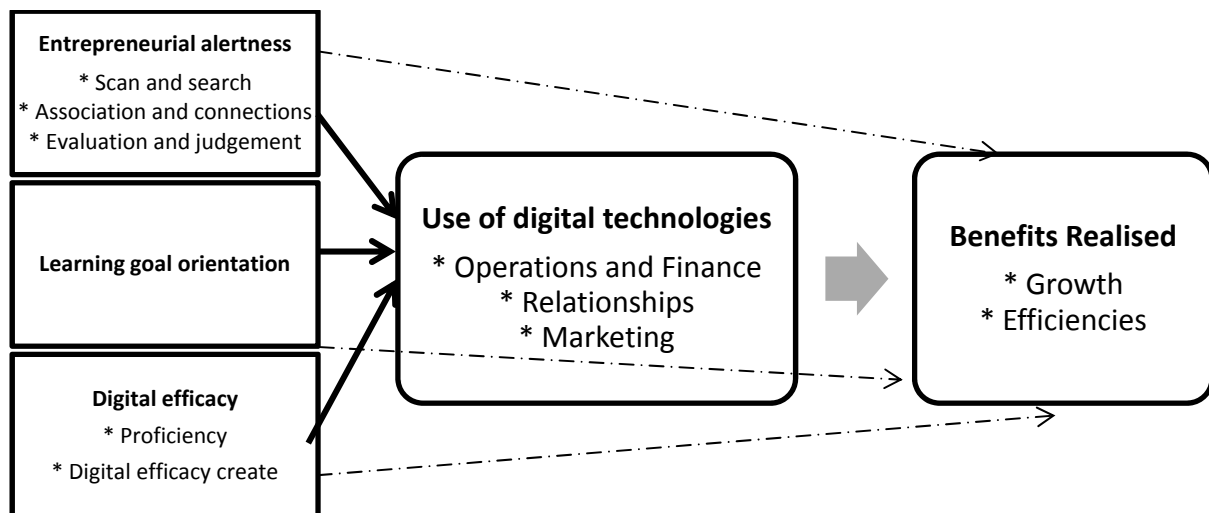


Figure 1: Proposed research model (adapted from Yi & Hwang, 2003; Daniel & Wilson, 2002)

Adoption use of digital technologies and perceived benefits

A number of studies have shown that SMEs can use digital technologies for wide ranging business-related reasons such as customer (Daniel and Storey, 1997; Poon and Swatman, 1999; Wilson, Daniel, Sutherland, McDonald & Ward, 2001); competitors and supplier (Porter, 2001; Daniel & Wilson, 2002) as well as internal efficiency reasons (Poon & Swatman, 1999). This wide ranging number of reasons indicates that digital commerce is not a simple innovation, but rather a cluster of complex innovations which firms can choose to adopt (Daniel & Wilson, 2002). Therefore firms can choose between a number of alternative actions such as not adopting any technologies (Jones et al, *in press*); adopting a number of technologies related to operational and financial systems, internal communication and information sharing, or networking and relationship building, or marketing (Love et al., 2005), or integrate all of these technologies (Daniel, 2003). Based on the level of adoption use of digital commerce technologies, varying benefits may be realised from this adoption (Nguyen, 2009). It is expected that the higher the level of perceived benefits, the more likely firms would be to continue using digital technologies, since they are aware of changes and

may receive updates and learn more about new technologies. Daniel and Wilson (2002) show that the most important benefit SMEs in the UK derived from technology adoption was improved internal knowledge sharing; improved competitive position; enhanced efficient service and the ability to attract new customers. Not all firms decide to adopt these technologies, one of the reasons firms decide not to adopt digital commerce may be linked to the fact that they are not alert to digital opportunities.

Entrepreneurial alertness

Entrepreneurial alertness plays a critical role in firms' discovery and evaluation of opportunities (Kirzner, 2008) and might help explain why some firms are more likely to seize opportunities and act entrepreneurially than others (Simsek et al., 2009). Lack of theoretical clarity and measurement issues stalled research progress of this concept, however Tang, Kacmar and Busenitz (2012) recently proposed a validated measure of entrepreneurial alertness, while Valliere (*in press*) has enriched the theoretical foundations and antecedents of the concept. Therefore the time is ripe to extend the concept of entrepreneurial alertness to digital opportunities and technology adoption and examine whether some SME owner/managers who are more entrepreneurially alert than their peers are more likely to adopt and realise the benefits from available digital opportunities.

Tang *et al* (2012) conceptualise alertness as having three complementary dimensions: scanning and search for new information in the digital realm; connecting previously-disparate information regarding digital changes in the market place; and evaluating whether the new information represents an opportunity. These three dimensions work in a process like fashion where individuals first become aware of gaps or shortcomings by actively looking for new bits of information, second creatively associate these disparate bits of information with existing knowledge and schema (Valliere, *in press*) and then finally make evaluations and judgements about the dynamism perceived and decide whether the opportunity is a general one, or one they would like to adopt and exploit (McMullen and Shepherd, 2006).

The first dimensions, scanning and search, enable SME owner/managers to look for digital ideas to solve resource problems, improve customer service as well as improving relationships within their networks, such as with suppliers. SME owner/managers develop both tacit knowledge from experience, conversations and digital interactions with stakeholders, and explicit knowledge codified in firm and market reports and other formal documents (Tang *et al*, 2012). Owner/managers might also purposefully look for answers to questions about the value of digital technologies, possible cost savings and efficiency improvements (Jones *et al*, *in press*). Information gained through this scanning and search process would be added to existing cognitive frameworks and experiences (Valliere, *in press*). Those SME owner/managers who actively scan and search the digital environment are therefore more likely to use new technologies and also more likely to realise the benefits these technologies may offer, thus:

H1a: Alert scanning and search is positively related to use of digital technologies.

H1b: Alert scanning and search is positively related to the benefits of digital technologies.

The process of connecting and associating new stimuli with existing knowledge and coming to new insights represents the second stage, namely association and connection. In this stage information that supports existing beliefs are more easily incorporated into an individual's existing schema, while negative data may be weighed, considered and either be rejected or the existing schema might be adjusted to accommodate this information (Fiske and Taylor, 1984). This process enables individuals to see the 'big picture' rather than consider each piece of information separately; therefore pattern-recognition (Baron and Ensley, 2006) plays an important role here. Scanning and search and association will happen continuously as the

owner/managers works through the problem or new idea enrichment. As firms use digital technologies new stimuli regarding these technologies would be associated and connected with existing schema. Furthermore benefits realised from digital adoption would further enhance the connection and association process, thus:

H2a: Alert association and connection is positively related to use of digital technologies.

H2b: Alert association and connection is positively related to the benefits of digital technologies.

In the evaluation and judgement stage owner/managers might perceive the existence of digital opportunities, however they might decide that these are third person opportunities, in other words they believe the opportunity exists for someone else to exploit (McMullen & Shepherd, 2006); or if they decide it is a first person opportunity, they themselves might decide to exploit the opportunity or adopt the digital technology. This evaluation and judgement stage of entrepreneurial alertness seem to be critical in the entrepreneurial alertness process (Tang *et al.*, 2012). In the evaluation and judgement stage SMEs would decide through the use of digital technologies, whether to pursue and adopt further technologies. Additionally the benefits realised or not experienced is also expected to influence future evaluation and judgement for further digital adoption, thus:

H3a: Alert evaluation and judgement is related to use of digital technologies.

H3b: Alert evaluation and judgement is related to the benefits of digital technologies.

Learning goal orientation

Entrepreneurial learning has been shown to promote entrepreneurial behaviour, despite severe time, attention and other resource limitations SMEs face (Ravasi & Turati, 2005). Experiential learning, commonplace in SMEs, is closely linked to all three dimensions of entrepreneurial alertness, from scanning and search, association and idea generation to evaluation and judgement (Corbett, 2007). Specifically owner/managers, who are highly motivated to learn (high learning goal orientation), attempt tasks to investigate the novelty of emerging technologies, find out how things work or to improve their skills. In the case of digital commerce adoption owner/managers with high levels of learning goal orientation would be more driven and energised to master new technologies. Such owner/managers believe digital ability is an incremental competency that can be improved continuously by experimenting with new technologies, thereby acquiring knowledge (Wood and Bandura, 1989). They look for perplexing tasks that provide opportunities to enhance their expertise and skills and are not fazed by mistakes. These they view as a normal part of the learning process.

Learning goals have been related to a number of adaptive outcomes, including higher levels of efficacy, task value, interest, positive affect, effort and persistence, learning strategies, as well as better performance (Printrich, 2000). Individuals with a high learning goal orientation are more likely to stick to a task, persevere and even increase their efforts until they achieve their goals. These are typically the individuals in an organisation who feel compelled to help and solve technological problems, for a challenge or enjoyment. In SMEs it is expected that firms, which support and encourage individuals with high learning goal orientations, will make more use of digital technologies, since these individuals will be encouraged to master new digital tools. Additionally it is expected that individuals with high learning goal orientation will experience benefits from the challenge of the task and develop self confidence in using and mastering new technologies. Therefore, we hypothesize that:

H4a: Learning goal orientation will be positively related to the use of digital technologies;

H4b: Learning goal orientation will be positively associated with the benefits derived from digital technology use.

Digital efficacy

Self-efficacy (ESE) refers to the self-confidence owner/managers have that they hold the required abilities to be successful, which plays an important role in determining their level of motivation in pursuing opportunities (Kickul, Wilson & Marlino 2004). Wood and Bandura (1989) noted that “to be successful one not only must possess the required skills, but also a resilient self-belief in one's capability to exercise control over events to accomplish desired goals.” Many studies have validated the relationship between self-efficacy and challenging tasks in various contexts such as entrepreneurial intentions (Kickul et al., 2004), images of an opportunity (Mitchell & Shepherd, 2010), complex decision making (Wood and Bandura, 1989), computer skill acquisition (Gist, Schwoerer & Rosen, 1989; Mitchell, Hopper, Daniels, George-Falvy & James, 1994), and user acceptance of technology (Agarwal, Sambamurthy & Stair, 2000; Venkatesh, 2000).

According to Marakas, Yi and Johnson (1998), computer self-efficacy (CSE) is a multi-level construct relevant to application based digital technologies, but also on a general level. This type of efficacy is based on an individual's judgement of their efficacy across specific applications or at the overall domain of general computing (Pavlou & Fygenson, 2006; Yi & Hwang, 2003) and can serve as a proxy for managerial competencies (Bassellier, Reich & Benbasat, 2001). We extend this concept of computer self-efficacy to the more general domain of digital commerce and examine digital efficacy at a firm level by determining the range of individuals within an SME who are confident of their skills to use digital technologies to perform operational tasks as well as those who are confident to create new digital artefacts for the firm using existing digital tools. Depending on the performance of these daily operational tasks (which is seen as digital proficiency) and creating new digital artefacts such as websites or social media pages the efficacy of the firm overall should improve or weaken their overall motivation to adopt digital technologies and solve problems (Wood & Bandura, 1989). Yi and Hwang (2003) find that computer self-efficacy is positively related to increased use of digital technologies. According to social cognitive theory (Bandura, 1982) encouraging experiences and positive incidents tend to enhance efficacy, therefore it is expected that benefits experienced through increased digital use will strengthen digital efficacy.

H5a: Digital proficiency is associated with use of digital technologies.

H6a: Digital efficacy is positively related to the use of digital technologies;

H6b: Digital efficacy is positively associated with the benefits derived from digital technology use.

METHODOLOGY

This studied surveyed SMEs in Australia, using a questionnaire to determine the adoption of digital commerce and tendencies such as entrepreneurial alertness, learning goal orientation and digital efficacy.

Population and sample

The population of interest for this paper is SMEs using or developing digital commerce technologies. In Australia SMEs are defined as firms employing less than 200 employees aligned to ABS guidelines (Wiesner, McDonald & Banham, 2007). Specific industries of interest were communications, retail and tourism, since these industries were identified as experiencing significant pressures to adopt digital commerce.

A random sample of 1 000 SMEs was drawn from the Instant Mailing Lists database (commercial database company). Criteria to select these firms were less than 200 employees,

from the retail, tourism and communication industries, representative range of states throughout Australia. Each firm was contacted telephonically, informed about the aim of the research and invited to participate. Consenting firms were sent the questionnaire either by post or with a link to the online version. Data collection was undertaken in October to December of 2012. In total 125 responses were recorded (total response rate of 12.5%) Of these 16 were rejected as incomplete, therefore the 109 useable responses (effective response rate of 10.9%) and were used as a basis for the findings of this study.

A little more than half of firms (52.8%) in the sample are micro-enterprises, employing less than five full-time employees, while 15.8% employ between 5 to 20 employees, 8.7% between 20 to 50 employees and the rest 50 to 199 employees. The majority of firms (46.5%) in the sample have been in existence for longer than 15 years, while 5.5% of firms had done business less than 3 years and close to a third (33.8%) indicated that they have been in existence between 3 to 15 years. The majority (37.8%) of firms indicated that their turnover was between \$1 to \$5 million per annum, while 23% indicated a turnover exceeding \$5 million; and 5.5% reported their turnover to be less than \$100 000 per annum. The firms in the sample varied between serving mainly business customers (25.9%) on the one hand to serving mainly final consumers (28.3%) at the other, with most concentrating on sales within Australia (55.1%). Only 10.2% of firms in the sample indicated that they sold more than 70% of the products or services outside the country. Firms across all states were targeted for the survey; however most respondents (28.3%) were based in Queensland, followed by 18.1% in Victoria, 15.7% in New South Wales and 10.2% from Western Australia.

The method of determining non-response bias adopted in studies such as Goode and Stevens (2000) was adopted for this study. In this method the earliest responses received were compared with the later responses. The useable responses were split into two equal sets of 54 responses according to the dates on which they were received. No significant differences were found for any of the eight sections of the instrument. It is therefore concluded that the responses received are unlikely to contain non-response bias.

Measurement Instrument

The research was carried out using a questionnaire which firstly explained the aim of the study, eligibility, voluntary nature and a simple definition of digital commerce that we preferred respondents keep in mind when completing the survey. The questionnaire contained seven sections. Section 1 to 4 explored the reasons, use, benefits and integration of digital commerce adoption, while Sections 5 and 6 focused on entrepreneurial alertness, learning goal orientation and digital efficacy. The final section of the questionnaire collected general firm information (size, age, industry). This paper uses data related to adoption use of digital technologies, benefits, entrepreneurial alertness, learning goal orientation and digital efficacy. Future papers will examine other relationships.

The survey instrument was piloted with 23 SMEs. Ambiguous and repetitive questions were removed or adapted and the layout was also changed to facilitate responses. Despite these changes, the questionnaire proved to be a bit long for some respondents and incomplete responses suggest respondent fatigue.

Digital commerce adoption was measured by actual use of digital technologies, rather than adoption intentions or the technology features or platforms utilised, in accordance with Daniel, Wilson and Myers (2002) in their study of e-commerce adoption of UK SMEs. Respondents were asked to indicate whether they were using, developing or not using a particular digital tool in their firms (Daniel & Grimshaw, 2002). These digital technologies resorted into three main areas: finance and operations; outward relationship-type of activities and marketing activities. Benefits realised from adoption of digital technologies was

measured on a 4 point Likert scale and resorted into two factors related to growth and efficiency (Daniel, 2003). The dependent variables were measured using existing scales, for example entrepreneurial alertness using a 4 point Likert scale and items proposed by Tang et al (2012), learning goal efficiency on a 4 point Likert scale adapted from Yi and Hwang (2003)'s study and Brett and VandeWalle (1999), and digital efficacy on a 5 point scale adopted from Hsu & Chiu (2004). (The questionnaire is available from the authors on request).

Data analysis

The data were analysed using IBM SPSS V19. Descriptive statistics, reliability coefficients and correlations were calculated for the variables. While descriptive statistics provide a general picture of the data, the Cronbach alpha coefficients provide a measure of the internal consistency of variables, while the correlation analysis allow for an initial test of the hypothesis. Multiple regression analysis was used to further test the hypothesised relationships between the constructs.

RESULTS

Table 1 shows the mean and standard deviation for the dependant and independent variables. The Cronbach alpha coefficient is shown in italics for each construct. The coefficient scores meet Nunnally's (1978) threshold for internal consistency, with the independent variable entrepreneurial alertness' three dimensions scanning and search (0.77), association and connection (0.88) and evaluation and judgement (0.84) showing acceptable reliability. This was also the case for learning goal orientation (0.78); and proficiency (0.88) and digital efficacy (0.76) as measures of a firm's digital confidence. The dependent variables, use of digital technologies' three dimensions operations and finance (0.79), relationships (0.77) and marketing (0.73); as well as growth benefits (0.74) and efficiency benefits (0.76), indicated internal consistency.

The mean scores for the constructs of entrepreneurial alertness showed that most SMEs rated themselves highly on scanning and search (3.02) and then evaluation and judgement (2.99). In terms of firm digital confidence, firms who were using digital commerce showed high levels of proficiency across all staff working for the firm (3.91), while for digital efficacy which included items related to creating web sites or social pages, had a lower mean score (2.44) indicating that fewer individuals in firms have this level of confidence. Use of digital commerce was particularly prevalent for marketing (3.59) and operations and financial (3.54) activities, as can be expected since many SMEs make use of financial packages for accounting purposes. Only those firms who used digital commerce answered the questions about the benefits obtained. Generally SMEs indicated more growth (2.79) benefits realised from digital commerce, than efficiency benefits (2.63).

Correlation analysis

The correlation analysis shown in Table 1 provides an indication of the relationships between constructs and the dimensions of the constructs. The three dimensions of entrepreneurial alertness are significantly associated with one another, with scanning and search and association and connection showing the strongest correlation (0.643; $p < 0.01$). The dimensions evaluation and association (0.499; $p < 0.01$) also show significant correlation, as well as scanning and search with evaluation and judgement (0.365; $p < 0.01$). This is in line with Tang et al's (2012) measures and supports the argument that entrepreneurial alertness is a conceptual process, starting with scanning and search as a divergent process, converging in evaluation and judgement; as the action orientated dimension of entrepreneurial alertness. Digital proficiency and efficacy was also significantly correlated (0.437; $p < 0.01$), yet distinct from proficiency, meaning the ability and confidence to use a digital application. In contrast digital efficacy related to the creation of digital artefacts such as creating a website or social pages, indicating advanced knowledge and confidence.

Table 1: Descriptive statistics and correlation analysis

Constructs	Mean	SD	1	2	3	4	5	6	7	8	9	10	11
1. Scan	3.02	0.51	<i>0.77</i>										
2. Association	2.69	0.65	0.643**	<i>0.88</i>									
3. Evaluation	2.99	0.54	0.365**	0.499**	<i>0.84</i>								
4. Learning	2.71	0.58	0.544**	0.393**	0.258**	<i>0.78</i>							
5. Proficiency	3.91	0.67	0.212*	0.207*	0.162	0.343**	<i>0.88</i>						
6. Digital Efficacy	2.44	0.85	0.254*	0.227*	0.123	0.326**	0.437**	<i>0.76</i>					
7. Operation & Finance	3.54	0.52	0.299*	0.326**	0.170	0.133	0.078	0.228	<i>0.79</i>				
8. Relationships	3.15	0.66	0.337**	0.255*	0.245*	0.352**	0.049	0.200	0.630**	<i>0.77</i>			
9. Marketing	3.59	0.45	0.249*	0.073	0.009	0.148	0.205*	0.273**	0.666**	0.490**	<i>0.73</i>		
10. Growth benefits	2.79	0.56	0.623**	0.502**	0.95	0.665**	0.189	0.358**	0.139	0.524**	-0.41	<i>0.74</i>	
11. Efficiency benefits	2.63	0.61	0.542**	0.581**	0.303*	0.305*	0.126	0.313*	0.396**	0.428**	0.331*	0.702**	<i>0.76</i>

n=109

* Significance

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

In our study use of digital technologies were divided into three main areas: operations and finance, relationship or outward bound activities and marketing. Operations and finance was strongly and significantly associated with marketing activities (0.666; $p < 0.01$) and then with outward relationship activities (0.630; $p < 0.01$). Outward relationships and marketing was also significantly correlated (0.490; $p < 0.01$), supporting the notion that firms progressively adopt digital technologies across all the range of business activities. The benefits realised from digital commerce, growth and efficiency, were also strongly and significantly related (0.702; $p < 0.01$).

An initial assessment of the relationship of entrepreneurial alertness' three dimensions showed significant correlations with learning goal orientation, that is scanning and search (0.544; $p < 0.01$), association and connections (0.393; $p < 0.01$), and evaluation and judgement (0.258; $p < 0.01$), of which scanning and search the strongest. This seems logical since the purpose of scanning and search is to learn more about different opportunities of challenges, in contrast association would be more closely linked to creative, divergent thinking and evaluation and judgement to decisions and actions. Entrepreneurial alertness was significantly correlated to proficiency and digital efficacy in terms of scanning and search (0.212; $p < 0.05$; 0.254; $p < 0.05$ respectively) and association and connections (0.207; $p < 0.05$; 0.227; $p < 0.05$ respectively), however evaluation and judgement was not correlated to proficiency or efficacy. For the use of digital technologies the correlation analysis showed that scanning and search was significantly correlated with operations and finance (0.299; $p < 0.05$), relationships (0.337; $p < 0.01$) and marketing (0.249; $p < 0.05$), while association and connection was correlated to operations and finance (0.326; $p < 0.05$) and relationships (0.255; $p < 0.05$), but not marketing. Evaluation and judgement was only correlated to relationships (0.245; $p < 0.05$). Much stronger associations are shown with the benefits realised from digital commerce. For growth benefits both scanning and search (0.623; $p < 0.01$) and association and connection (0.502; $p < 0.01$) show significant correlations, however evaluation and judgement do not. For efficiency benefits all three dimensions show significant associations, scanning and search (0.542; $p < 0.01$), association and connection (0.581; $p < 0.01$) and evaluation and judgement (0.303; $p < 0.05$).

Learning goal orientation which indicates a high level of motivation to master new digital technologies was significantly associated with proficiency (0.343; $p < 0.01$) as well as digital efficacy (0.326; $p < 0.01$), since it is expected that these two constructs would increase as more employees are willing and energised to learn to use new digital technologies. Learning goal orientation was only correlated to the use of digital technologies to build relationships (0.352; $p < 0.01$), but not operations and finance or marketing. This is possibly due to the fact that learning orientation is seen as a preparation step which is associated with relationships, but not with routinized activities such as operations and marketing, already mastered by most employees. Significant relationships were shown with benefits from digital commerce, especially for growth (0.665; $p < 0.01$), but also for efficiency (0.305; $p < 0.05$). As Wood and Bandura (1998) suggested benefits realised from these activities strengthen learning goal orientation.

Proficiency was not associated with the adoption of digital commerce for operations and finance or relationship digital activities. Proficiency showed a weak, significant correlation to marketing activities (0.205; $p < 0.05$). Digital efficacy was not correlated to operations and finance or relationship adoption activities, however it was significantly correlated to marketing adoption activities (0.273; $p < 0.01$). Proficiency was not related to the benefits realised from digital commerce, however digital efficacy was significantly correlated to growth benefits (0.385; $p < 0.01$) and also efficiency benefits (0.313; $p < 0.05$).

The use of operations and finance technologies was significantly related to efficiency benefits (0.396; $p < 0.01$), as was also the case for marketing digital technologies (0.331; $p < 0.05$). Both growth (0.524; $p < 0.01$) and efficiency (0.428; $p < 0.01$) benefits were realised through the use of relationship type technologies.

Multiple Regression Analysis

Multiple regression analysis was used to assess hypotheses 1 to 6 which proposed that the independent variables, entrepreneurial alertness, learning goal orientation and digital efficacy would be related to adoption use of digital technologies and benefits realised from digital commerce adoption.

Adoption Activities

When looking at adoption use of digital commerce the following relationships were ascertained using regression analysis. Operations and finance activities showed no significant relationships with entrepreneurial alertness, learning goal orientation or digital efficacy. These type of activities are often routinized and digital technologies used here are can be related to the advice and support provided by external stakeholders such as accountants, who Berry, Sweeting and Goto (2006) and Mole (2002) find provide business, emergency, and financial management support in addition to statutory advice, and have a significant impact on SME decisions. Therefore the owner/manager's motivation factors such as entrepreneurial alertness, learning or digital efficacy does not seem to influence the adoption of operational and financial type technologies.

Relationship adoption activities focused on supplier and competitors actions. Regression analysis showed that learning goal orientation ($\beta = 0.352$; $p < 0.01$) was significantly related to relationship adoption activities, explaining 11.2% of the variance in this variable. Therefore H4a which stated that learning goal orientation is positively related to the use of digital technologies is partly accepted, since this hypothesis only holds for relationship adoption activities. Entrepreneurial alertness and digital efficacy was not related to relationship adoption activities.

For marketing related activities only the scanning and search dimension of entrepreneurial alertness ($t = 2.310$; $p < 0.01$) and digital efficacy (1.811; $p < 0.05$) were predictors for marketing use, with these constructs explaining 8.1% of the variance in marketing adoption activities. Therefore H1a which stated that alert scanning and search is positively related to the use of digital technologies is partly accepted, particularly for marketing related activities. H6a is also partly accepted, since digital efficacy is positively related to the use of digital technologies, but this is only the case for marketing related activities.

Therefore hypotheses 2a and 3a which postulated that the alert association and connection and evaluation and judgement dimensions of entrepreneurial alertness are related to the use of digital technologies is rejected. Hypothesis 5a which suggested that digital proficiency is associated with the use of digital technologies is also rejected.

Benefits from the use of digital commerce

In this study two main types of benefits resulting from digital commerce use were studied, namely growth and efficiency benefits. The results of the multiple regression analysis are shown in Table 2.

Table 2: Multiple regression analysis

Variables	Growth benefits	Efficiency benefits
Alert Scanning and Search	0.299*	0.242
Alert Association and Connection	0.248*	0.404**
Alert Evaluation and Judgement	-0.264*	0.004
Learning Goal Orientation	0.460**	-0.022
Proficiency	-0.109	-0.093
Digital efficacy	0.156	0.207*
R ²	0.627	0.409
Adjusted R ²	0.581	0.342

n = 109; ** p<0.01; * p<0.05; † p<0.10

As shown in Table 2 alert scanning and search ($\beta=0.299$; $p<0.05$), alert association and connection ($\beta=0.248$; $p<0.05$) and learning goal orientation ($\beta=0.460$; $p<0.01$) had positive and significant relationships with growth benefits, while alert evaluation and judgement had a significant negative relationship ($\beta=0.264$; $p<0.05$) with growth benefits. These variables explain 58.1% of the variance in growth benefits, implying that these benefits can partly be explained by SMEs entrepreneurial alertness and learning goal orientation. The independent variables alert association and connection ($\beta=0.404$; $p<0.01$) and digital efficacy ($\beta=0.207$; $p<0.05$) explain 34.2% of the variance in efficiency growth. Therefore the efficiencies realised from the adoption of digital technologies can in part be explained by SME owner/managers making association and connections to see how different technologies are integrated and also by high levels of digital confidence of staff, ready to embrace these benefits. This analysis enables an assessment of the hypotheses. Hypothesis 1b, 2b and 3b which postulated that the dimensions of entrepreneurial alertness was related to the benefits of adopting digital technologies can partly be accepted, since scanning and search (H1b), association and connection (H2b) and evaluation and judgement (H3b) is related to growth benefits, however only association and connection (H2b) is related to efficiency benefits. Hypothesis 4b is also partly accepted since learning goal orientation is positively related to growth benefits, but not to efficiency benefits. Hypothesis 6b is partly accepted, since digital efficacy is related to efficiency benefits, but not growth benefits.

DISCUSSION

The findings from our study suggest that the adoption of digital commerce is influenced by a complex number of interrelated factors, as Jones et al (*in press*) and Love et al (2005) also confirm. SMEs do not uniformly adopt digital technologies, citing reasons such as client preferences and resources for non-adoption, while the literature provide a wide-ranging number of reasons categorised into macro factors, industry and sectoral factors, as well as firm and managerial factors (Fillis *et al*, 2004; Love *et al*, 2005).

In our study the adoption of digital technologies was grouped into three main categories, namely for operations and finance, outward relationship and marketing activities. Operation and finance digital activities was not related to entrepreneurial alertness, learning goal orientation or digital efficacy, possibly due to the fact that business advisors, such as accountants may recommend the use of these systems and thus reducing the influence of owner/manager's motivational factors. The use of digital technologies for relationship activities was related to learning goal orientation, but not entrepreneurial alertness or digital efficacy. In SMEs where the owner/manager are employees are open to new digital technologies and willing to learn about how to use and realise the benefits there-of, it seems that digital technologies will also be used to enhance relationships with external stakeholders. In these cases SMEs are motivated and driven to improve relationships with suppliers and use

technologies to find information on competitor activities, possibly adding value to the firm's competencies. Marketing activities such as advertising and after sales service was partly explained by the scanning and search dimension of entrepreneurial alertness and digital efficacy. As marketing activities involve direct relationships with customers, SMEs may often become aware of opportunities through interactions with clients and searching for solutions for client problems, thus clients may partly drive the use of digital commerce for these types of activities, as supported by other studies (Daniel & Wilson, 2002; Love et al, 2005). Furthermore the creation of new digital artefacts for clients such as web sites or social media sites enhance the digital confidence of SME owner/managers and employees, it seems these artefacts are often used in marketing related activities to convey messages about the firm's products and/or services. However this study did not relate entrepreneurial alertness to the use of digital technologies.

Adopters of digital technologies, realise growth and efficiency benefits from the use of these technologies.

Growth benefits entail customer growth, more meaningful customer interactions, growth in customisation of services, identification of business opportunities and more effective advertising. These growth benefits are explained by entrepreneurial alertness and learning goal orientation. Entrepreneurial alertness, specifically the dimensions of scanning and search and association and connection explain the variance in growth benefits. Valliere (*in press*) provide a framework to explain how entrepreneurial alertness, as an opportunity spotting talent starts with entrepreneurial attention focused on a consequential aspect for an individual. Applied to this study, SME owner/managers who are focused on realising growth benefits from their investments in digital commerce will habitually look for environmental changes and assess whether these changes represent digital opportunities, in other words they lower their activation threshold for these opportunities. Taking this further Valliere (*in press*) suggests such owner/managers incorporate the richness of their experiences from digital adoption, associate these with other emerging opportunities and are primed for action to unlock the benefits of digital commerce, therefore more entrepreneurially alert owner/managers should realise more growth benefits from digital commerce, than others who are not 'tuned into' these benefits. As for learning goal orientation, the motivation and energy to learn about the productive use of digital technologies hold customer, communication and advertising benefits for firms. Since these firms are aware of these benefits, they commit the learning effort to realise these benefits. Thus in essence these two 'motivational' factors suggest deliberate mental and exertion efforts by SMEs to realise these growth benefits.

Efficiency benefits relate to working smarter, realising time savings and improving efficiencies in the supply chain for the SME. Our findings show that association and connection, a dimension of entrepreneurial alertness and digital efficacy explain a significant portion of the variance in efficiency benefits. The association and connection dimension of entrepreneurial alertness allows for divergent thinking, considering multiple options and possibilities to make connections and see a larger picture. This dimension is strongly linked to creativity and generating novel solutions to problems. In the context of our study this suggests that SME owner/managers often struggle with achieving efficiencies, especially in small firms, however connecting various useful 'bits' of digital technologies through association and connection allow them to realise these sought-after efficiencies. To enable SMEs to fully realise these efficiency benefits, digital efficacy, that is the confidence to create digital artefacts that work for the benefit of the firm, is required. Supported by social cognitive theory that success from these experiences also enhance efficacy, this seems to be a positive, reinforcing cycle for digital adoption.

This study holds implications for theory and practice. On a practical level despite resource limitations inherent in small firms, SME owner/managers should be aware that they themselves represent an immense resource. The owner/manager has a tremendous influence on the decision to use, actual activities and resultant benefits that could be realised from the adoption of digital commerce. While technologies are merely tools which if used appropriately can lead to business benefits such as increases in customers, improved products and better relationships with external stakeholders, this requires significant effort in terms of learning and strategic focus, unfortunately as Jones et al (*in press*) correctly point out small firms focused on survival and a short-term orientation fail to see the benefits from digital commerce, since these have a longer-term payoff. Despite these challenges many micro and small firms are using 'free' or cost-effective technologies such as collaboration sites, file sharing directories, online surveys, network forums and database technologies to realise growth benefits, that fit their own strategic approach and management style in their business. Being alert to and discovering new digital opportunities seem to be contingent on using and experiencing the benefits technology adoption brings.

Theoretically this study enriches our understanding of how entrepreneurial alertness relate to the adoption and benefits of digital commerce, building the theoretical foundation of Valliere's (*in press*) schematic model of influences on entrepreneurial alertness. This study also extends the concept of digital efficacy and examines it from a firm-level perspective and not merely an individual level perspective. While our study have focused on cognitive, motivational factors which influence adoption of digital commerce and the benefits there-of, a number of other established models such as the technology adoption model (TAM) (Pavlou Fygenson, 2006), diffusion of innovation and perceived attributes of innovation (Rogers, 2003) also help to explain SME technology adoption, therefore this study is not without its limitations.

Caution should be exercised when generalising these results, since limitations from the research design may influence the findings. This paper and analysis represents exploratory work and a more rigorous analysis of the data and research model proposed in this paper is still required. Future research should focus on more qualitative explorations of Valliere's (*in press*) model of entrepreneurial alertness, focusing on the antecedents and digital opportunity exploration. Additionally comparing the motivational processes of adopters and non-adopters would yield valuable insights. This study also suffers from recall bias and self-reporting, inherent in a survey research design. Future research should focus on using experimental and conjoint analysis designs, which could provide more robust results.

CONCLUSION

The purpose of this study was to determine the relationship between entrepreneurial alertness, learning goal orientation and digital efficacy as managerial factors to the adoption and benefits of digital commerce for SMEs. The findings show that a high level of learning motivation was significantly related to the use of relationship enhancing digital technologies. Scanning and the search for digital opportunities and digital efficacy were significantly related to marketing activities. Entrepreneurial alertness and the motivation to learn how digital technologies deliver value tend to predict the growth benefits firms realise from digital commerce adoption. Association and connection as well as digital efficacy explain the variance in efficiency benefits. These relationships suggest complex interactions between a number of variables, showing that the adoption of digital commerce is a function of numerous factors, as Nguyen (2009) highlighted. For SME owner/managers however this study emphasises the facilitating role digital commerce can play to realise growth and efficiency benefits for the firm, provided these firms can make the commitment and learn to make these technologies work for them.

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