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Cloud computing as a facilitator of SME entrepreneurship

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The rapid adoption of Cloud-based information and communication technology (ICT) services reflects a Schumpeterian creative destruction scenario [Schumpeter, J. A. 1942. *Capitalism, Socialism and Democracy*. New York: Harper & Row], as they increasingly supplant traditional in-house ICT capital investment models [Ross, P. K., and M. Blumenstein. 2012. *Leveraging the Opportunities of the Cloud: The Impact of Cloud Computing Strategies on Organisational Structures, Management Practices and ICT Worker Skill Sets in Queensland Private and Public Sector Organisations*. Brisbane: Griffith University and the Department of Science, Information, Technology, Innovation and the Arts (SITIA)]. This research examines how Cloud technologies facilitate the development of internationally orientated small- and medium-sized enterprise (SME) entrepreneurship by providing greater access to global markets, lowering opportunity costs and supporting collaboration and innovation in an increasingly connected world. The Cloud computing paradigm also brings associated threats for SMEs, including potential challenges in adapting to Cloud-based and supported business models and increased competition from globally based competitors. Therefore, while Cloud technologies offer a potential boon to SME entrepreneurship, they may also usher in a period of rationalisation, as some firms will inevitably fail to successfully adapt to a globally competitive Cloud environment.

Keywords: cloud computing; entrepreneurship; SMEs; innovation; opportunity costs

Introduction

A growing body of literature links economic development and rising living standards to innovation and entrepreneurship (Audretsch, Keilbach, and Lehmann 2006; Hussain, Sultan, and Ilyas 2011; Parker 2009; van Praag and Versloot 2008). Entrepreneurs, for example, have scored highly on employment creation, productivity growth and high-quality innovations (van Praag and Versloot 2008, 65). While the exact nature of entrepreneurship has been widely debated (Casson 2003; Iversen, Jorgensen, and Malchow-Moller 2008; Parker 2009; Schumpeter 1942), Shane and Venkataraman (2000) suggest that entrepreneurs are individuals who exhibit a willingness to take risks, as they actively seek out business opportunities. Entrepreneurship has further

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been associated with self-employed workers, start-up firms (nascent entrepreneurs) and small- and medium-sized enterprises (SMEs) (Parker 2009; Reynolds et al. 2005).

More recent research has examined the emergence of 'next generation' entrepreneurs, the so-called digital natives, whose innovation and sales strategies are increasingly built on emerging Internet-based technologies (Gagliardi 2013). The size of this potential market is reflected by the approximately two billion people who are currently connected to the Internet, with a further three billion people forecast to be online by 2020 (Wadhwa 2014). Therefore, while research linking entrepreneurship to the exploitation of new inventions and technologies is not new (Schumpeter 1942), the Internet has opened up a raft of potential *global* business opportunities for new and emerging firms (Ross and Blumenstein 2012). Knight and Cavusgil (2004) concur that 'global technical competence' is an important factor behind the success of 'born global' firms. This paper therefore seeks to further examine the impact of new technologies on entrepreneurship, by examining how Cloud computing technologies may facilitate and/or support entrepreneurial behaviour.

Cloud technologies reflect a Schumpeterian creative destruction scenario (Schumpeter 1942), as new Cloud-supported business strategies increasingly supplant traditional in-house information and communication technology (ICT) capital investment models (see Ross and Blumenstein 2012). Cloud computing is therefore a disruptive innovation (Sultan and van de Bunt-Kokhuis 2012) that requires organisations to manage their ICT requirements in new and innovative ways (Ross 2011; Ross and Blumenstein 2012, 2013). Cloud technologies have further opened up a global market for the development and sale of Cloud-based products and services. The rapid uptake of platforms such as tablets and smart phones, which are designed to interact with Cloud-based services, is hastening these trends.

Research further suggests that adopting Cloud-based ICT services may be highly suitable for SMEs, as they have the potential to reduce some of the traditional disadvantages that SMEs face

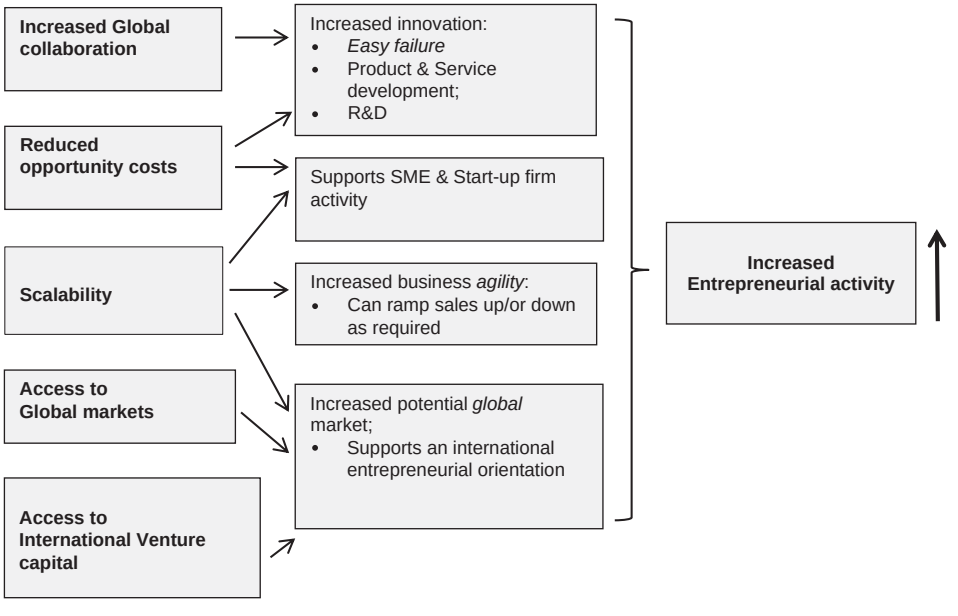

Figure 1. Cloud computing and entrepreneurship.

in comparison to larger firms, including capacity and financial constraints (Etro 2009; Hyytinena and Toivanena 2005; Misra and Mondal 2010, 505; Ross and Blumenstein 2012, 2013). Cloud technologies further enhance the ability of SMEs to exploit business opportunities across national borders (Oviatt and McDougall 2005, 540; Prashantham 2013).

Interestingly, despite the media hype surrounding Cloud computing technologies, research on their impact on management practices and organisational strategies remains an under-explored area to date (Ross 2011; Ross and Blumenstein 2013). The following broad questions were therefore developed from the literature and the investigators' prior studies to assist in guiding this exploratory research. First, how do Cloud technologies support and bolster entrepreneurship and innovation? Second, to what extent do Cloud technologies foster an international entrepreneurial orientation? Third, what is the capacity of Cloud technologies to 'level the playing field' between SMEs and larger firms, including multi-national enterprises (MNEs)?

The paper begins by discussing the research background and methodology before analysing and synthesising the literature on entrepreneurship and Cloud computing. This includes the development of a framework that analyses how these factors may interact to support entrepreneurship and innovation (see Figure 1). The paper discusses Cloud computing challenges, including the organisational and strategic changes that firms may need to implement in order to adopt and/or *adapt* to Cloud-based and/or supported business models. In line with the aforementioned objectives of this research, the paper focuses on the impacts of Cloud technologies on SMEs, including start-up firms (Parker 2009; Reynolds et al. 2005).

Research background and methodology

This research project was undertaken in collaboration with the Queensland Government Department of Science, Information Technology, Innovation and the Arts (SITIA) and forms part of ongoing research into Cloud computing technologies and their impacts on business models and strategies. The project utilised qualitative research methods, as they are well suited to the explorative inductive approach required to examine this relatively new and emerging area (Cooper and Schindler 2001, 139–140). Primary data collected during the course of this research included 36 in-depth interviews with a broad range of stakeholders associated with Cloud computing technologies and strategies across the private and public sectors. This included more than 20 interviews with Australian organisations and a further 16 interviews with Cloud computing experts in the USA. Interviewees included Chief Information Officers, managers of ICT-focused organisations where ICT products and services were the primary focus of the organisation, managers of ICT support departments where ICT played a supporting role for the organisation, ICT industry association representatives and academic Cloud computing experts. Confidentiality guarantees and associated university ethical requirements meant that interviewee and specific firm names could not be used in this paper.

The interviews were semi-structured; however, interviewees were given every opportunity to expand on matters that were of particular interest and/or concern to them. Interviews were recorded and transcribed where possible, while detailed notes were taken and typed up immediately following the interview in circumstances where recordings were not possible; for example, where interviewees declined to be recorded and/or background noise made recordings impractical. The interview data were analysed and coded using NVivo qualitative data analysis software (Buston 1999, 183–202; Coffey and Atkinson 1996; Gibbs 2002). This process identified recurrent comments and themes that were pertinent to this analysis. The qualitative data were further supported by direct observations and discussions made by the researchers.

Cloud computing and entrepreneurship

The term 'Cloud computing' covers a range of rapidly evolving technologies that offer self-service ICT capabilities that are delivered via the Internet (Bias 2010, 13). This process has been facilitated by the rapid adoption of the Internet and associated high-speed broadband services, which allow consumers to access Cloud-based files and data from any device that is linked to the Internet (Etro 2009, 182). One interviewee, for example, advised, 'the assumption is that I can do anything I want, from anywhere, on any of my devices'. Amazon was in many ways a pioneer in the sale of Cloud-based services when it began to offer spare internal computer capacity to external customers in 2006 (Hof 2006). Worldwide spending on Cloud-based products and services has since developed at an exponential rate and is forecast to rise from US$47 billion in 2013 to US$108 billion in 2017 (IDC 2013).

Researchers have divided Cloud-based products and services into three associated areas: infrastructure, platform and software services (Sultan and van de Bunt-Kokhuis 2012). Infrastructure services include externally based data storage, network and computational (CPU) facilities, such as those provided by Amazon and Google. Software services include popular software programs, such as email, and comprise the largest Cloud market sector share in terms of sales and revenue (IDC 2013). Platform services lie between infrastructure and software and provide middleware, including platforms and tools to build Cloud-hosted applications (Landis and Blacharski 2013, 20).

Cloud technologies therefore provide opportunities for *product innovation*, with ICT-focused firms developing and selling new Cloud-based products and services to a rapidly expanding global market. They further provide opportunities for *process innovation*, as non-ICT-focused organisations purchase Cloud-based services, rather than investing in their own in-house ICT capabilities, in order to reduce costs and increase competitiveness. Despite these differing classifications, the distinction between Cloud *vendors* and Cloud *consumers* can be quite fuzzy. Firms, for example, may use Cloud platforms to develop their own Cloud-based software services, which then 'sit' on an external Cloud provider platform. Cloud-based infrastructure services also provide relatively cheap computational power that allows organisations to analyse large amounts of in-house 'big data', which in turn assists these organisations to develop their future in-house plans and strategies (Sabherwal and Becerra-Fernandez 2011, 6).

Much of the Cloud computing literature differentiates between 'Public', 'Private' and 'Hybrid' clouds. Public Clouds are owned by external providers, such as Google or Amazon, that provide their services to the general public. Private Clouds in contrast are created in-house to specifically cover their organisations only. Some banks, for example, have created their own 'Private Clouds', because they do not wish to store sensitive client data in Public Cloud facilities (DFD 2011). Hybrid Clouds are simply a mix of in-house and external ICT deployment models, and are common amongst organisations making the transition to Cloud-based ICT services (Ross 2011).

Because SMEs and start-up firms (nascent entrepreneurs) do not generally have the financial capacity to create their own large-scale private ICT networks and/or Private Clouds (as outlined in further detail later in the article), the following discussion on Cloud-based models and strategies refers to either Public or Hybrid Cloud-supported business models.

Cloud computing drivers

Figure 1 outlines a framework for how Cloud drivers are underpinning dynamic market changes that are facilitating innovation and entrepreneurship. Major drivers for the rapid adoption of Cloud-based strategies and technologies include *cost reductions* and *scalability*. Large public

Cloud vendors, for example, operate huge data warehouses that are pooled at scale, with their services offered to a global market (Mudge 2010). The resulting economies of scale and density then allow Cloud vendor firms, such as Google and Amazon, to offer services, including data storage and server space, at relatively cheap prices (Mudge 2010). Cloud-based ICT models then provide cheaper 'up-front costs', as firms shift away from capital investment in ICT infrastructure, licence and personal maintenance costs, towards a 'pay-on-demand' ICT model, whereby firms only pay for the externally based ICT services that they use. This is especially attractive for smaller firms, as outlined in further detail later in the article. Other positive Cloud computing externalities include reduced utility and infrastructure expenses as firms require less floor space to house ICT infrastructure, along with decreased electricity costs.

The *scalability* offered by Cloud-based services refers to the ability of organisations to rapidly scale up or scale down their ICT requirements, such as database needs, as required (Ross 2011). Cloud services are therefore well suited to organisations with variable ICT workload requirements that exhibit major periodic increases and decreases in demand (Misra and Mondal 2010, 507). Some products also have limited market lives. A manager from a computer game development firm, for example, advised that new games typically generated a great amount of interest when first released, but were then discarded as other newer games came onto the market. Cloud-based sales then allowed the firm to ramp up or down supply with little additional cost. From the computer game *vendor's* perspective, therefore, a Cloud-based product equals a buyer who is scalable, as variable costs for additional clients are relatively low. Cloud services are similarly well suited to cyclic activities that are only held on an intermittent or annual basis, such as sporting events or government elections, as they allow ICT support services to be purchased for specific periods of time.

Apps, which are basically Cloud-based software applications, have been a further key component in the uptake of Cloud computing services, with reports suggesting that the iTunes App store alone approves around 13,000 new Apps every month (Urban 2013, 21). Platforms such as smart phones and tablets are well suited to Cloud-delivery models, because many of their ICT processes occur through Apps that operate in the Cloud. As such they do not need the same computing power or memory as conventional computers. The recent introduction of tablets in India and China that sell for as little at US$40 will also lead to a rapid increase in the online market for these emerging economies (Wadhwa 2014, 15). The international market for App sales, therefore, supports a global start-up firm mentality (Prashantham 2013), as outlined in further detail later in the article.

Cloud computing further allows non-ICT-focused firms to focus on 'core business'. While virtually no organisation can now run without ICT support, Cloud computing can allow firms to focus on their core competitive advantages, rather than being distracted by running their own in-house ICT systems. This may include outsourcing functions that are peripheral to the main strategies and objectives of the firm, to relatively cheap Cloud-based providers. This reduces the need for firms to run, maintain and upgrade their own ICT systems, such as email, while concurrently allowing access to up-to-date ICT products and services. Cloud technologies further allow ICT applications to be synced on multiple devices. Cloud models are therefore likely to reduce the number of ICT support staff that firms require (Ross and Blumenstein 2013).

Cloud computing challenges

Cloud computing practices of course are not without their challenges. An international survey of firms found that the foremost concerns of potential purchasers of Cloud services were data

security and data privacy (WEF 2012, 9). Existing laws and compliance requirements are also impacting on Cloud business strategies. Australian privacy laws, for example, restrict the type of data that public sector organisations can upload to external Cloud-based databases, while the US Patriots Act, which technically allows the US government access to any data stored in the USA, has also discouraged organisations from using US-based data centres (Gershater 2012, 18; Jaeger, Lin, and Grimes 2008, 276). The Edward Snowden leaks relating to the surveillance activities of the US National Security Agency (NSA) have further reinforced such concerns, with reports suggesting that the public disclosure of this information had cost US firms billions of dollars, as governments and firms no longer trust them to handle sensitive data (Stern-Peltz and Armitage 2013).

Another recurring theme elicited during the course of this research was the challenges associated with integrating and shifting legacy ICT systems into the Cloud. One ICT specialist termed this 'the classic problem of software'. ICT managers also advised that Cloud vendors would 'sell the dream' to senior management, in terms of all the wonderful functions that the Cloud-based applications could potentially do, but that the ICT team would then have to work out how to integrate these new Cloud services into existing in-house systems. There was widespread agreement that this could be a complicated and sometimes expensive process. Simply trying to 'bolt on' different individual Cloud applications without an overall Cloud strategy is therefore unlikely to prove cost-effective.

Furthermore, while proponents of Cloud computing point to its ability to promote *flexibility* and *agility* in business decisions, once organisations have integrated their systems with specific Cloud vendor services then they may find shifting to alternative providers difficult. *Vendor lock-in* may also be heightened by organisational inertia, with managers deciding that it is just too much trouble to scan the market for alternate Cloud providers, which would also necessitate the rewriting of service-level agreements (SLAs). Data ownership issues may also make it more difficult to retrieve data from the Cloud and shift it to an alternate Cloud vendor. SMEs, in particular, also have little or no bargaining power with large Cloud providers. Rather, they will generally have to accept the terms and conditions of the SLAs that they are offered.

ICT firms that traditionally developed and sold software that was designed to operate in-house may also struggle to adapt to a Cloud environment. During interviews, ICT firm managers often raised the issue of the added difficulties and complexities involved in developing Cloud-based software, as it must run off multiple systems and devices. Microsoft, which created a global standard in operating systems and associated software for desktop computers, provides a good example of the difficulties in making the transition to a Cloud environment. Despite its considerable resources, Microsoft has had ongoing problems in 'retrofitting' its Windows programs so that they can operate in the Cloud. Reports further suggest that different sections of Microsoft are concerned that its new Cloud-based products will cannibalise sales from its shrink-wrap software sales – until now a highly profitable business. Firms such as Amazon and Google, in contrast, evolved in a Cloud environment with associated different workforce outlooks and cultures.

Entrepreneurship and innovation

Entrepreneurship is a difficult concept to define (Bygrave and Hofer 1991; Shane and Venkataraman 2000). Geneon, for example, outlines the plethora of historical, sometimes contradictory, definitions of entrepreneurship (Gedeon 2010). Despite this range of views, a number of broad themes tend to underpin most discussions on entrepreneurship. These include proprietorship/ownership, risk taking and 'the discovery and exploitation of profitable

opportunities' (Shane and Venkataraman 2000, 217). More recently researchers and public policy-makers have shown a greater propensity to link entrepreneurship to the creation of *new* businesses (Amorós and Bosma 2014; Lumpkin and Dess 1996; Parker 2009; Steffens et al. 2012). Bygrave and Hofer, for example, define an entrepreneur as not only someone 'who perceives an opportunity', but also as someone who '*creates* an organisation to pursue it' (Bygrave and Hofer, in Parker 2009, 6). The Global Entrepreneurship Monitor likewise focuses it research on start-up firms by defining entrepreneurs as those engaged 'in the very earliest stages of new business creation' (Amorós and Bosma 2014; Steffen et al. 2012). The entrepreneur as owner therefore assumes responsibility for the risk associated with starting up a firm, along with any potential future reward.

Entrepreneurs have been further closely identified with innovation that is underpinned by new discoveries and technological advances (Feldman 1999, 17; Schumpeter 1949, in Iversen, Jorgenson, and Malchow-Moller 2008). Schumpeter stated that entrepreneurs in their role as innovators are engaged in one or more of the following five processes:

(1) the creation of new goods and services (or higher quality goods and services);
(2) the creation of new methods of production;
(3) the opening of new markets;
(4) the capture of new sources of supply and/or
(5) the creation of new organisations or industries.
(Schumpeter 1949, 66, in Iversen, Jorgenson, and Malchow-Moller 2008)

According to Schumpeter, these processes (or combinations of these processes) drive economic development through a process of 'creative destruction', by making existing products, services and production processes increasingly obsolete (Schumpeter 1942).

Schumpeter's five innovation processes provide a good starting point for an examination of how Cloud technologies may impact on innovation and entrepreneurship. The entrance of Netflix into the US video hire market, for example, provides a good example of how Cloud technologies are creating new goods, services and methods of production. While Blockbuster Video had formerly dominated the US video hire industry through its network of stores, Netflix introduced a lean Cloud-based operation, whereby customers could access cheap video content, including movies and television shows, via video streaming on their computer. Netflix further shifted to a new business model by offering unlimited video streaming for a relatively cheap monthly subscription fee. This strategy was in contrast to the traditional pay per video (or DVD) model and Netflix soon began to make large in-roads into Blockbuster's customer base. The success of Netflix in part reflects the often relatively cheap variable costs incurred by Cloud-based vendors as outlined earlier, with each additional streaming of a movie being relatively cheaper than the wholesale purchase, transport and storage/display of a hard copy of a DVD in a specialist retail store. A report from the Internet firm Sandvine stated that in 2011 Netflix accounted for over 23% of the daily Internet traffic on North American fixed-access networks and a staggering 33% (or one in three bytes) of peak night-time Internet traffic (Sandvine 2011).

Because Cloud technologies are not limited by geographical proximity, a further advantage of Cloud-based and/or supported business models is the enhanced ability for firms to access new *global* markets, thereby facilitating and fostering an international entrepreneurial orientation (Bals, Berry, and Hartmann 2008; Prashantham 2013). This is a particularly important consideration for SMEs located in relatively small open markets, such as Australia, that seek to

expand sales by tapping into global demand (Metts and Kelli 2011, 82). A number of Australian SMEs examined during the course of this research, for example, were operating Cloud-based business models that focused on customers in the world's largest economy, the USA. In this regard, the Cloud provides a particularly good medium for ICT-linked products and services, such as software or travel services, that can be downloaded and/or purchased from the Internet. Despite these advantages, the Cloud can be a double-edged sword for SMEs. While it potentially provides a larger market, it also introduces increased global competition. Local SMEs may then become vulnerable to off-shore Cloud-based competitors and/or MNEs. This heightens the need for SMEs to improve their Cloud-based product development and sales strategies.

The rapid proliferation of the global Apps market outlined earlier provides a good example of how start-up firms can *immediately* sell their products to a global audience via Cloud-based platforms. This process is in marked contrast to the earlier 'establishment chain' theory of internationalisation, whereby firms first gained knowledge and experience in home markets before venturing overseas (Johanson and Vahlne 2009, 1412). Knight and Cavusgil discuss these changes in terms of the emergence of 'born global' firms, which they define as organisations that sell goods and services in multiple countries either at or near their founding (2004, 124; see also Gabrielsson and Kirpalani 2012). They further advise that rapid advances in ICT, along with the ability to exploit these new technologies, have been important factors behind this trend (Knight and Cavusgil 2004, 125). Some Cloud-supported start-up firms may therefore become 'born global' by the very nature of the products that they are offering, such as Cloud-based Apps (see Figure 1). Start-up firms further have the advantage of immediately embracing Cloud computing technologies and therefore do not have to 'unlearn' previous ICT processes and mindsets, nor deal with the aforementioned problems associated with the integration of Cloud technologies with in-house legacy ICT systems.

Existing SMEs in contrast may find it more difficult to adapt to Cloud-based and supported strategies. This could be a particular issue for ICT-focused SMEs that have previously developed traditional software products and services which are installed in-house in the client's organisation. As outlined earlier, adapting existing ICT software so that it can operate in a Cloud environment can be a difficult and expensive process. Because Cloud-based services need to operate on multiple systems and devices, they can also take longer to develop than single desktop applications. Interview feedback suggested that some Australian-based ICT-focused SMEs will not be able to afford the capital investment and time required to transition their products to a Cloud environment. One interviewee suggested that this situation will lead to mergers and acquisitions and amalgamations as ICT-focused SMEs that cannot afford the transition to the Cloud are taken over by bigger firms and/or amalgamate with other SMEs. Metts and Kelli use the term born-again global (BAG) to describe firms that successfully make the transition from a domestic to a global outlook following a critical contextual change (2011, 82), such as the introduction of Cloud technologies.

Entrepreneurs, as innovators, further create and open up new industries and markets (Schumpeter 1942). The rapid emergence of smart phones, tablets and Apps into everyday life makes it sometimes easy to forget that this is a new industry; the first Apple App online store was only opened in 2008 (Faletski 2012). A manager of a computer games firm concurred that App-based sales had led to big changes in their target market, which had formally been focused on younger males who played complex computer games that had relatively long and expensive development periods. These games had generally been sold as hard shrink-wrapped copies through conventional stores. However, the market had shifted to simpler App-based games while the target demographic had expanded to include women, many of whom had taken to regularly downloading and playing App-based games on their smart phones and tablets.

Reduced entry and opportunity costs

The ability to access large-scale ICT support systems and services was formerly the preserve of larger firms that had the resources to make these kinds of capital investments in in-house hardware and software systems. The relatively high fixed entry costs, however, provided a barrier to entry for SMEs, which did not have the resources to engage in these kinds of upfront ICT-related capital investments (see Figure 1) (Etro 2009; Ross 2011; Ross and Blumenstein 2013). Larger firms then had a competitive advantage over SMEs in relation to exploiting ICT. This research in contrast suggests that Cloud-based 'pay-on-demand' ICT models help SMEs and start-up firms to better address and overcome these *financial* constraints by profoundly reducing their initial ICT expenditure costs. This in turn allows SMEs potential access to high-level ICT products and services which they may not have been able to afford under previous upfront capital investment/depreciation ICT expenditure models (see Figure 1) (Ross 2011; Ross and Blumenstein 2013). Etro (2009) concurs that reductions in upfront ICT costs linked to Cloud-based ICT services will support the creation of 300,000 new SMEs across the European Union. The associated *scalability* offered by Cloud-based services, as outlined earlier, then allows SMEs to scale up or scale down their ICT requirements, as required, depending on the success or otherwise of their newly released products or services.

Interview feedback further suggests that access to Cloud-based services, platforms and infrastructure for relatively cheap upfront costs gives firms a heightened ability to concurrently develop and test *multiple* new ICT-related (and/or supported) products and services. Firms then had more latitude to try and fail at a number of projects before hitting upon a product and/or service that worked in the market. Furthermore, in the event that a firm's initial offering(s) failed, it was not burdened with associated high ICT capital expenditure 'sunk costs' that often cannot be retrieved. This process was described by one interviewee as *easy failure* (Ross and Blumenstein 2012). Cloud computing services therefore further bolster entrepreneurship and innovation by reducing the *opportunity costs* of developing new products and services. Given that entrepreneurship and innovation are linked to risk-taking behaviour (Casson 2003; Iversen, Jorgenson, and Malchow-Moller 2008; Parker 2009), it could further be argued that reduced opportunity costs encourage firms to engage in more innovative formerly higher risk projects.

Similarly, many interviewees advised that potential projects had often previously been constrained by limited access to in-house ICT services. Overloaded in-house data centres and servers, for example, were often 'booked out', forcing the postponement of product testing and development. The ability to access external Cloud-based data storage services and ICT platforms therefore allowed them to test new products in the Cloud, without the time constraints associated with gaining access to in-house ICT systems. Furthermore, Cloud services allowed them to try out different alternative infrastructure, platform, hardware and software configurations to find the combination that worked best for the intended product or service. One manager described these new opportunities in terms of Cloud technologies providing greater *agility* in business strategies (see Figure 1).

The ability to test and develop new products and services using Cloud-based technologies further underlies an important difference between Cloud-supported business models and traditional outsourcing strategies, as entrepreneurs can use Cloud-based ICT services to develop and sell their *own* new products and services. Cloud-based business models have therefore been termed self-managed outsourcing (Bias 2010; Jones 2010). This is in contrast to traditional outsourcing practices where former in-house work is simply given to an external subcontractor to perform. This has important implications for *organisational learning*, as Cloud services provide sophisticated ICT facilities that assist entrepreneurs to develop new knowledge and

processes. These services also allow entrepreneurs with limited ICT technical skills to sell products and services over the Internet via Cloud-based platforms. As outlined earlier, the distinction between vendors and consumers of Cloud-supported and/or developed products and services may therefore become blurred in this environment.

Innovation and collaboration

Levy coined the term *collective intelligence* to describe how groups of individuals may combine and enrich their knowledge through collaboration (in Schuurman et al. 2012, 52). An extensive body of literature further links collaboration and teamwork to innovation (Denison, Hart, and Kahn 1996; Fleming and Koppelman 1996; Hoegl and Gemuenden 2001). Folkestad and Gonzalez further differentiate between teamwork in the earlier *industrial* age and that in the contemporary *Internet* age, with teamwork in the former being closed and in-house as it 'rewarded organizations that cloistered scarce information, creating closed secretive organizations' (2010, 115). However, the advent of the World Wide Web has provided firms and individuals with a wealth of often publically available information. Folkestad and Gonzalez suggest therefore that in contrast to the earlier 'closed shop' approach to collaboration, successful organisations in the age of the Internet are those that can 'create innovative solutions from within this information-abundant ecosystem' (Folkestad and Gonzalez 2010, 115). Cloud-based tools and services therefore act as *facilitators* of innovation within this more open Internet-based collaborative environment.

Feldman discusses how 'firms benefit from the R&D efforts of other firms that are in close *technological proximity*' (1999, 7). While Feldman (1999) discussed these ideas from the perspective of industrial clusters and agglomeration economies, cloud tools in contrast are making the geographical location of team members less relevant. Rather, *technological proximity* amongst team members is becoming increasingly linked to *ICT-mediated working relationships* (Bissola and Imperatori 2014; Brunelle 2013; Obal 2009). In this regard, new technologies and associated work practices have spawned a plethora of cloud-enabled cooperative work software programs that facilitate project coordination and the sharing of information amongst virtual teams. These include document and spreadsheet sharing programs, project management systems, Internet-based forums, email, instant messaging and video conferencing. Cloud-based collaborative technologies also provide increased opportunities for telework, where the potential benefits include increased productivity levels, reduced commuting times and costs (and associated reduced employee stress) and access to a wider pool of potential talent (DOC 2013). These changes therefore require firms to better understand and exploit the potential benefits of these new working relationships and business models (Ross and Blumenstein 2013).

This research found that Opensource software, which allows any person to freely use and develop underlying source codes, was a popular collaboration tool amongst ICT-focused SMEs, as by its very nature it is based on international collaboration and innovation amongst the users. Schuurman et al. (2012, 52) similarly link Opensource software to Internet-based collaborative 'open innovation frameworks' that allow individuals to access external sources of assistance, while concurrently helping to develop solutions to problems – a process that has been termed *crowdsourcing* (Howe 2006). Wadhwa (2013) goes so far as to suggest that the heightened ability for people to collaborate across the world via crowdsourcing technologies 'will not only disrupt industries, but will also change societies'. While the use of Opensource software raises ICT governance and intellectual property right issues, interview feedback strongly supported the notion that collaboration and innovation via Opensource software will continue to play an

important and increasing role in the future direction of SME-based ICT product and service development.

Cloud-based technologies are further supporting collaborative international new ventures by linking SMEs and start-up firms to potential partners and venture capital via Internet-based *crowdfunding* sites, such as CloudCUBE and Kickstarter. These sites then allow entrepreneurs to pitch their latest idea(s) to the general public, who may then invest in their project(s) (Falcon 2013; Nisen 2012). While the amount that individuals invest may be relatively small, the combined amount of these investments can be quite large. Kickstarter, for example, advised that they had raised a total of US$220 million from the projects they had launched to date (Falcon 2013), while AngelList stated that it has helped 1300 start-up firms raise US$200 million (Gannes 2013). Crowdfunding sites are therefore offering SMEs potential access to alternative *global* venture capital sources. This could be particularly attractive to SMEs based in relatively small capital markets, with many Australian-based SME managers citing a lack of access to venture capital as their foremost challenge in regard to developing new projects.

Conclusions

The research findings support the premise that Cloud technologies facilitate and bolster entrepreneurship, collaboration and innovation. This includes the ability to access skills and expertise from geographically dispersed team members through ICT-mediated working relationships (Brunelle 2013; Bryant 2003). These processes foster product and process innovation, with ICT firms developing and selling products and services for expanding Cloud-based markets, as organisations increasingly shift to Cloud-supported 'pay-on-demand' ICT business models. Firms may also use Cloud services in order to develop and sell their own products, making the distinction between Cloud vendors and Cloud consumers increasingly fuzzy.

Figure 1 provided a framework that outlines how the dynamic interaction of four Cloud computing factors, increased global collaboration, reduced opportunity costs, scalability and access to global markets, have underpinned these processes. Reduced opportunity costs were linked to the concept of *easy failure* as Cloud services allow firms to engage in product and service development that they may not have previously engaged in had they been limited by the fiscal constraints of traditional upfront ICT capital expenditure models. The reduction in in-house ICT sunk costs also arguably fosters entrepreneurship by lowering the risks associated with developing new ICT-related or supported projects. Scalability was further linked to increased business *agility* as it allows firms to quickly ramp up demand for products and services that prove successful in the marketplace. ICT-related products that can be downloaded by customers from the Internet also have relatively low variable costs for the vendor in regard to each additional product sold.

The research also found that Cloud technologies foster an international entrepreneurial orientation by giving firms potential access to global markets and facilitating increased global collaboration. The former was linked to greater access to new international customer bases and sales platforms, such as smart phones and tablets, while the latter was linked to greater opportunities for innovation and R&D. Will Cloud computing technologies therefore lead to 'born global' SMEs becoming increasingly the norm? This research considers that this will not necessarily be the case, as some products and services will lend themselves to Cloud-based sales and delivery better than others. Cloud technologies are, however, increasing the *capacity* for entrepreneurs to create global start-ups. Furthermore, some Cloud-based products, such as Apps, will focus on global sales from their inception simply because of their nature.

This research further considered the extent to which Cloud technologies have the capacity to 'level the playing field' between SMEs and larger firms, including MNEs. It found that reduced opportunity costs and scalability were of particular benefit for capital poor firms, such as SMEs, and start-up firms by allowing them to better compete with larger firms in terms of access to ICT resources. Cloud-based collaborative tools, such as open source software, also support SME entrepreneurial activity by creating an open innovation framework that allows diverse groups of individuals from different organisations to share and collectively develop new ideas and solutions, a process described by some researchers as crowdsourcing (Howe 2006; Schuurman et al. 2012). Cloudfunding sites also offer alternative sources for venture capital, an important consideration for SMEs and start-up firms that often have difficulties in attracting adequate financial backing.

This study also suggests that born global SMEs that have utilised Cloud-based strategies since their inception may perform better in a Cloud context than SMEs attempting to be BAGs, as the former have the advantage of immediately using Cloud technologies to develop and sell their products and services. Existing firms in contrast face the challenges associated with integrating Cloud-based technologies into existing in-house legacy ICT systems. The research findings therefore suggest that Cloud-based tools and strategies may better support SMEs that are founded with a Cloud orientation. SMEs attempting to shift to Cloud-based and supported business models in contrast may face problems in changing their strategic mindsets to better suit this new environment. Adapting traditional in-house software to Cloud-based system agnostic versions can also be a difficult and time-consuming process, and some ICT-focused SMEs may struggle to adapt to a Cloud-based market. Furthermore, the Cloud computing paradigm exposes SMEs to increased global competition.

To conclude, this paper sought to provide an analysis of Cloud computing and its impacts on SME strategies that goes beyond much of the hype that has often been associated with this topic. This included the development of a framework (see Figure 1) that aims to better explain how and why Cloud computing technologies support increased SME entrepreneurial activity. It further examined how Cloud-enabled workplaces require managers to create and share knowledge through the management of complex geographically diverse and technologically mediated workplace relationships (Brunelle 2013; Bryant 2003; Ross and Blumenstein 2012). The rapid increase in the uptake of Cloud-based services points to the need for further empirical research into this important topic, as firms seek to better integrate Cloud-based ICT into their business strategies in an increasingly connected world.

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