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Abstract

Previous research on virtuality has been dominated by discussions of virtual teams, involving either students or organisational employees, with the latter dominated by larger organisations. Little attention has been paid to the SME sector, despite the apparent benefits that could accrue to SMEs that make effective use of virtual collaboration and cooperation technologies. In this paper we report on our investigations into the use of virtual technologies by SMEs in Hong Kong, an economy which is dominated by SMEs (98% of all firms). Drawing on our interviews with nine SMEs, we assessed both their current and likely future usage of virtual technologies. We were surprised to find that most of these SMEs are intentionally low-tech in their attitude towards virtual technologies. We discuss the reasons for and implications of this phenomenon before drawing the paper to a close with a set of recommendations for future research.

Keywords: Small and Medium Sized Enterprises, IT Applications, Virtual Collaboration

1. Introduction

Virtual technologies are increasingly the subject of academic research, and indeed are often seen as a breakthrough opportunity for organisations keen to improve their operating efficiency by reducing travel time and its associated costs, while making good use of their distributed human assets. Virtual technologies can be applied in a variety of ways, including in the support of virtual teams, virtual communication and collaboration, and even in virtual organisations. Examples of virtual technology application areas abound from those designed to facilitate communication, collaboration, to remote work and telecommuting, and even knowledge management using such specific tools/applications as email, IP telephony (e.g. Skype), groupware (e.g. GroupWise, GroupSystems, SameTime), enterprise knowledge portals, and wikis. The computing needs of SMEs (Small and Medium Sized Enterprises) have also been studied extensively in past research, with particular emphasis on small-scale systems and more recently e-commerce opportunities. However, SMEs have not been the subject of investigation with respect to their use of virtual technologies, despite the fact that their often constrained financial circumstances make them ideal candidates for taking advantage of cost-saving applications, and despite their distributed networks of customers and suppliers. Some 98% of Hong Kong's organisations are SMEs, and hence the potential impact of virtual technologies on the Hong Kong economy is considerable. It is this set of circumstances that motivates this exploratory study into the use of virtual technologies by

Hong Kong SMEs, specifically asking how these SMEs are using virtual technologies (if at all) and what future developments they see occurring.

2. Literature Review
2.1 Virtual Technologies & Their Applications

Strictly speaking, virtual technologies are extremely widely applied in contemporary society and work: just about everyone uses telephones (whether wireless or fixed line) and many use email. These are two fundamental examples of a technology that enables communication between physically remote interlocutors who are thus able to interact 'virtually'. However, the use of more sophisticated virtual technologies, particularly in the context of virtual teams, dates only to the early 1990s, and indeed only in the last few years have significant contributions been made, particularly in the domain of virtual teams (see Boudreau et al., 1998; Malhotra et al., 2001; Maznevski and Chudoba, 2000). The literature has developed out of earlier areas of work including Group Support Systems and Computer Supported Cooperative Work (CSCW)(Grudin, 1991). Lipnack and Stamps (1997) define a virtual team as a "group of people who interact through interdependent tasks guided by common purpose … [and work] … across space, time and organizational boundaries with links strengthened by webs of communication technologies". However, some other authors refer to virtual teams as teams that never meet face-to-face (Jarvenpaa et al., 1998), though most authors accept that the team primarily interacts over technology, with some face-to-face interaction (Geber, 1995).

The literature on virtuality is not universally positive in tone. It has been noted that virtual work can also pose new challenges to organisations (Quinn, 1992). For example, while team diversity is celebrated for stimulating creativity and allowing a variety of skills to be brought to bear on organisational problems (Kirchmeyer and Cohen, 1992), it may also reduce team cohesion and increase the levels of unproductive conflict experienced (Pelled, 1996). Conflict can be defined as disagreement, both manifest and latent, among team members and implies incompatible goals or interests (Robbins, 1974). Conflict in teams can be broadly categorized into two main types: relationship conflict and task conflict (Pinkley, 1990). Relationship conflict has affective components such as tension and friction (Jehn and Mannix, 2001). It involves personal issues such as mutual dislike, personality clashes, and annoyance among team members. Some studies have reported that relationship conflict is detrimental to team performance (Jehn, 1997). Virtual teams could experience, for example, relationship conflicts related to the language used for communication, as well as conflicts associated with cultural differences. The more fluent use of a language by native speakers, who dominate the airtime during conference calls and face-to-face meetings at the expense of their team mates, can also be important (Sarker and Sahay, 2003). National diversity can also give rise to conflict when team members of one nationality (or ethnic group) have negative feelings towards their virtual colleagues from other nationalities/groups, whether as a matter of national prejudice, or simply as a result of their interactional experiences. Ethnocentrism (the belief that one's own nationality is superior), prejudice (unfavourable perception of people from other nationalities), and stereotyping (exaggerated generalisation of attributes about people from other nationalities) are three traits related to national diversity that hamper communication in virtual contexts (Adler et al., 1995). Differences in individualism-collectivism, a stable cultural dimension (Hofstede, 1980), may cause team members to be divided in their opinions on whether to place team interests before personal interest, whether to adopt individual or group based appraisal mechanisms, and whether comments about others should be restricted to professional life.

Virtual organisations have also been posited, i.e. organisations that do not have a physical presence as such, but rather 'exist' purely in the online world. Of course, even virtual organisations need to employ human beings at some stage of their processes – the various pieces of the organisation must be located somewhere. Nevertheless, organisations in the intermediary segment of e-commerce, such as Google (www.google.com), Ali Baba (www.alibaba.com), Advanced Book Exchange (www.abebooks.com), ESDLife (www.esdlife.com), TaoBao (www.taobao.com), etc. may be regarded as virtual organisations, managing their primarily information-based distributed resources on the web with minimal recourse to the physical world, except where they also need to sell or deliver a physical product.

Notwithstanding purely virtual organisations, many non-virtual organisations are in a position to adapt virtual technologies to their operating environment. This has been repeatedly demonstrated in the educational environment, with universities in particular adopting educational support tools such as WebCT and Blackboard so as to enable various forms of virtual interaction with their students. This virtual interaction has been taken a step further with the interactions of virtual student-based teams investigated in a variety of domestic and international contexts (e.g. Davison et al., 2004; Panteli and Davison, 2005). However, where small and medium sized organisations (SMEs) are concerned, the literature on virtual technology applications is much less rich, as will be illustrated in the following section.

2.2 Small and Medium Sized Enterprises Use of Information and Virtual Technologies

Small and Medium Sized Enterprises (SMEs) play a major role in the global economy. 98% of firms in Hong Kong are classified as SMEs (VSMEIC, 2006), and similar figures apply in other economies (Jutla et al., 2002; Fu et al., 2001). However, while large companies tend to dominate news headlines, SMEs receive much less attention. This does not mean that research on the use of IT by SMEs is absent: there is a broad and rich literature, including journals that specifically target the SME domain (e.g. Journal of Small Business Management, International Small Business Journal). For instance, a search on "Science Direct" using the terms "SME" and "Information Technology" uncovered over one thousand articles, far more than can be usefully reviewed in the current paper. Al-Qirim (2004) provides a useful overview of this literature, in particular with respect to the Electronic Commerce Literature. Sample studies that are of particular note are Cragg & King's (1993) study of small firm computing, Iacovou et al.'s (1995) study of EDI and small firms, Levy et al.'s (1998) assessment of the way IS enables SMEs to shift away from cost reduction towards adding value, Levy et al.'s (2002) examination of the role of IS in knowledge sharing in SMEs, Levy and Powell's (2000) examination of IS strategy in SMEs, Salmeron and Bueno's (in press) suggestion that SMEs in the same industry tend to be isomorphic (cf. DiMaggio and Powell, 1983) with respect to IS adoption, and Thong et al.'s (1996) analysis of the importance of top management support for IS implementation in SMEs.

Notwithstanding the richness of the general literature on SME adoption and use of IT, the literature that relates specifically to the application of technologies that enable virtual collaboration in SMEs is much sparser. Vescovi (2000) notes that so long as SMEs focus on innovation, they can reap significant advantages from Internet-based communication, while Hvolby and Trienekens (2002) consider the participation of SMEs in globally interlinked supply chains that enable cooperation across markets and industries. This cooperation is important, since SMEs have limited resources, and so may be better advised to cooperate

with one another rather than expending resources of competition. Mezgar et al. (2000) emphasise the importance of this cooperative characteristic, commenting that traditionally, SMEs have been overly individualistic, each SME individually facing the market and so competing with other players. Mezgar et al. (2000) promote the idea of network-node based cooperative production planning, particularly in the manufacturing sector. The network node approach permits SMEs to benefit from virtual partners with higher manufacturing volumes being achieved and market demand fluctuations handled better.

3. Context and Research Methodology

The research described in this paper was funded by grants[2] that restricted the scope to Small and Medium Sized Enterprises (SME) headquartered in Hong Kong that were engaged in virtual collaborative work in the Greater China region. In Hong Kong, SMEs are defined as manufacturing enterprises with less than 100 employees or non-manufacturing enterprises with less than 50 employees (VSMEIC, 2006). For the purpose of this research, the number of employees was taken as referring to the number physically located in Hong Kong, or if outside Hong Kong, who are directly paid by the Hong Kong business unit. In order to identify SMEs that would be more likely to have an interest in virtual collaboration and communication, we searched the Hong Kong Productivity Council SME Centre (http://www.smecentre.com/carenet/member/mem_dir.asp) for firms in the manufacturing, import/export and consulting industries that maintained a website. We then analysed the contents of the website to establish whether they maintained offices or employees in China. Hong Kong is reported as having more than 266,000 SMEs, many of them very small family firms, employing approximately 1.18 million people (VSMEIC, 2006). The vast majority of these, however, do not maintain websites, making it difficult to identify the precise nature of their business. From a review of 100 SMEs that did maintain websites, we identified a total of 51 SMEs likely to be engaged in some form of virtual collaboration in China. All fifty one were invited to participate in the research, but only nine expressed any interest to do so (see Appendix 1 for firm details). For these nine, we conducted semi-structured, face-to-face interviews at the company site in which we explained in more detail the purpose of the research and collected data on the virtual communication/collaboration tools currently in use. In each case, we also attempted to identify mutual opportunities for research collaboration, based on our understanding of their current working environment and opportunities.

4. Findings

Five of the SMEs appeared to make rather limited use of virtual collaboration technologies, restricting themselves to telephone (including IDD), email, fax and occasionally IM tools such as MSN Messenger, Yahoo Messenger and ICQ. Two of these five firms used Voice-over-IP applications such as Skype. These five firms generally expressed satisfaction with their communication environment and saw no reason to change it. A sixth firm, which was engaged in the provision of network services solutions to clients around Greater China, made more sophisticated use of virtual collaboration/communication technologies. In addition to the basic set described above, these included video conferencing and virtual private networks (VPNs).

Two of the firms operated in a much more complex environment. One, API, operates eleven manufacturing sites in Greater China and Southeast Asia, with customers for its garment-products in Asia, Europe and North America. While this firm qualifies as an SME given the small size of its Hong Kong operations, it was characterised by information systems

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and technology usually associated with much larger firms. These systems were essential to the daily operation of the firm and its strategic position in a global interlinked supply chain (cf. Hvolby and Trienekens, 2002) stretching from suppliers of raw materials through manufacturers, packaging, international logistics and on to remote customers. This firm made use of a wide range of technologies, including ERP and Workflow systems, EDI and VPNs, to support Vendor Managed Inventory, Capacity Planning, Production Scheduling, and Inventory Management Applications. In discussion with this firm, we identified a potential virtual collaboration bottleneck, with respect to the communications between the software development office, located in Shanghai, and the Hong Kong headquarters. Unfortunately, however, API exhibited no interest in our suggestion to take action to address this bottleneck, instead preferring to focus on RFID applications, an area that, while important, lay outside our intended focus. Ultimately, we were not able to negotiate a joint plan of action with this firm.

The second firm that displayed a higher degree of sophistication, GTI, is an international trading firm and intermediary, headquartered in Hong Kong, but with branch offices globally, each operating as an independent entity. This firm has a history of over 75 years and is remarkably successful in its chosen niche, with a network of over 6000 suppliers and customers. It has made the transition to the information age relatively smoothly and now uses a variety of IT-based applications to manage its complex global supply chain. In a meeting with the CIO and his senior colleagues, we gained an appreciation of the complexity of their business, and indeed identified several promising application areas such as virtual teams that they might wish to exploit in the future. However, we also gained the distinct impression that they believe that they are more than capable of solving their own IT-application related problems or leveraging opportunities, and do not wish to involve outside consultants or researchers on such projects unless absolutely necessary.

Finally, we engaged in a detailed set of discussions with an executive search firm, Atlas, headquartered in Hong Kong with offices in major cities in China. While Atlas employs less than 50 people across all its locations, it is nevertheless a successful enterprise, obtaining a large number of contracts in the headhunting business for senior executive positions, primarily in human resources. In the past, the various office locations have tended to work independently on contracts, though there is some communication between offices when candidates are being sought. This communication has generally been conducted via email, which is effective to a degree. There are also weekly videoconference meetings where all sites simultaneously connect to the Hong Kong office via expensive ISDN connections for 30-60 minutes of focused discussion.

However, there is an increasing awareness of a need for a more tightly integrated working environment that will enable employees across all locations to access common databases of curricula vitae, and indeed also to engage in rather more sophisticated knowledge management. Email is clearly inadequate for such levels of sophistication, but until recently, the issue of network reliability and stability has dogged this firm, as it has many others. The primary problem here is ensuring a reliable connection, at a reasonable cost, between multiple locations in China. Larger firms often set up their own dedicated lines, but this is financially impractical for Atlas. One of our first recommendations, which was accepted, was for Atlas to engage the services of a Network Services Provider (NSP) that specialises in the provision of services to smaller firms of this nature. We recommended a particular NSP, IXE, which offers both guaranteed network connectivity and server space for applications at its dedicated Hong Kong office. This outsourcing arrangement suited Atlas perfectly, enabling them not to hire additional IT staff, instead trusting IXE to handle both

servers and network arrangements. The new arrangements are generally invisible to the Atlas employees, but the dramatic reductions in access time, particularly from remote sites in China to the Hong Kong located databases, are much appreciated.

A second recommendation, which we are in the process of negotiating with Atlas at the time of writing, involves the establishment of more formalised knowledge sharing procedures. Employees in all offices recognised the need for a more sophisticated knowledge sharing arrangement that would channel best practices and industry research initiatives, as well as tips, tricks and other anecdotal references that are all grist to the mill of an executive head-hunter, through a more organised system, enabling online access in real time. This will be as much an organisational change initiative as it will be a knowledge management initiative, and discussions are still at a very preliminary stage.

5. Discussion

From our review of the literature, we expected that SMEs in Hong Kong would be well aware of the various virtual collaboration technologies open to them, and indeed that they would be making extensive use of these technologies in their distributed working environment. In reality, however, we were surprised to find that in many cases, while a low level of technology usage was present, there was little appetite for a more sophisticated level of usage. When we questioned these SMEs about their plans for future technology development, most offered little in the way of concrete ideas. It appeared that they were quite comfortable with their low-tech style of virtual work, that email and telephone contact were sufficient for their needs, and that a traditional "wait-and-see" attitude prevailed with respect to the use of technology. They all had desktop PCs, as well as email connectivity arranged through Internet Service Providers, but few were much more sophisticated than this. However, for the sophisticated few, the intricate interweaving of IT into the very fabric of their business resulted in a much higher degree of IT-dependence.

A number of questions, conjectures and directions for future research arise from our experiences to date. The relatively unsophisticated application of IT may in part be attributed to a lack of financial resources, and the associated sense of a lack of value that new technology would add to the bottom line. Taken together, these two factors contribute to the current level of IT being considered 'good enough'. Indeed, it is only fair to say that the existing technology applications, e.g., email, are providing a robust form of support that is appropriate given the nature of SME operations and contingencies (cf. Sivunen and Valo, 2006). When a new technology, such as VoIP, is recognized as being useful, relatively quick adoption can occur. More substantial problems emerge, however, when SMEs seek to integrate various technologies. Here, it is often the lack of cooperation among vendors and the unavailability of affordable consultation that leaves many SMEs frustrated and unable to achieve the benefits that technology might facilitate.

The use of IT applications such as Website, email, instant messenger and VoIP is primarily focused on replacing the existing applications such as catalogues, postal mails and long distance telephone calls. Thus, the SMEs focus on cost cutting rather than additional value creation that the new technologies could harness. Higher value creation technologies such as ERP and CRM, as well as knowledge management, can only be found in more IT-dependent SMEs.

The IT applications that most SMEs have deployed also have the characteristic of shortening the communication time lag between offices (instant messenger and email) or the time to delivery between them and their clients (Website and Web service). They tend to use free and easy-to-use applications such as consumer level instant messengers, which rely on

public infrastructure, i.e. they do not need to maintain and setup the communication servers themselves. The reliability and security of these applications are not known to be a major concern. We can see the need for corporate communication policy to address questions arising about the use of these applications that rely on public infrastructure. What kind of instant messenger can they use? In what scenarios can they use instant messenger to communicate with clients? How can they most effectively use their email service? Interestingly, more IT-dependent SMEs are becoming more aware of the reliability of their online services, deploying more reliable Internet connections between their offices and setting up their own email servers.

It is certainly valid to ask how generalisable these findings are, both within and beyond Hong Kong. Hong Kong is notoriously risk adverse and not particularly known for technological innovation. However, once a technology is proven effective, Hong Kong can be quick to adopt. It is somewhat paradoxical that, despite our findings with respect to low-tech virtuality, the penetration of mobile devices in Hong Kong exceeds 122% and usage extends to a wide variety of business applications. In this sense, Hong Kong leads much of the world and Hong Kong's SMEs are no exception. SMEs increasingly rely on smart phones for both communication and data support. There is thus the opportunity for SMEs to 'leapfrog' (Davison et al., 2000) traditional use of technology through the ubiquitous use of mobile applications. Future research needs to investigate this conjecture further.

A variety of mechanisms exist (or could be introduced) to catalyze SME technological innovation in Hong Kong and beyond. Some mechanisms, e.g., trade shows, introduce SMEs to opportunities and even provide special 'SME IT Clinics'. Other mechanisms include government funding schemes for collaborations between industry and academia as well as government-backed loan guarantees to encourage banks to lend money to SMEs for technological innovation projects. Educational offerings, including work-study programmes for undergraduate students as well as targeted management courses, can help promote and implement technological innovations in SMEs. Finally, technology is becoming ever more affordable and available to SMEs from Application Service Providers, notably in the Open Source community. The Internet is playing an important integration role as applications of all types provide more interface commonality.

Ultimately, however, innovation in SMEs is not easy. SMEs are notoriously strapped for resources in terms of both personnel and funds and there is often little in the way of help. Banks are hesitant to lend money to SMEs and SME owners have little time to explore the various technological options. Hiring outside expertise is often seen as an unaffordable luxury with questionable added value. In the end, SMEs come and go in the general fabric of organizations. Some are born (or re-incarnated) as technical innovations open up niche opportunities, only later on to become stale through lack of sustained innovation, eventually disappearing.

6. Conclusions

SMEs constitute an important segment of most economies, in Hong Kong and elsewhere. These firms often have limited financial and human resources which might enable them to take advantage of new technological developments so as to enhance their competitive advantage. Paradoxically, however, it is precisely these small firms that have most to gain from the deployment of new technologies, not least virtual technologies, given that they are typically players in global supply chains with very little bargaining power. If they were to apply IT so as to enhance their communication and collaboration with other supply chain partners, ideally on a cooperative basis, they could be in a position to ensure their continued

survival in a fast-changing world where little is constant. In this brief investigation into the technologies used by a selection of SMEs in Hong Kong, we find that for the most part, firms are content with what they have, and possess little in the way of a proactive spirit that drives them to seek out new technology applications. Exceptions do exist, however, and these exceptions are generally very successful in their application of technology. Making the transition from a low-tech firm to one that leverages technology more effectively is by no means an easy thing to do. It is likely to have profound impacts on the way the firm operates and on the organisational culture. Enhancing the communication and collaboration between the far-flung offices of SMEs and their partners, suppliers and/or clients/customers is one way to set about making this transition – and a wealth of technologies exist to make this possible, if firms dare to try.

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