Use and Impact of ICT on SMEs in Oman

Rafi Ashrafi and Muhammed Murtaza
Sultan Qaboos University, Oman
rafi@squ.edu.om
muhd.murtaza@gmail.com

Abstract: This paper presents the results of an exploratory study carried out to learn about the use and impact of Information and Communication Technologies (ICT) on Small and Medium Sized Enterprises (SMEs) in Oman. The study investigates ICT infrastructure, software used, driver for ICT investment, perceptions about business benefits of ICT and outsourcing trends of SMEs. The study provides an insight on the barriers for the adoption of ICT. Data on these aspects of ICT was collected from 51 SMEs through a survey instrument. The results of the study show that only a small number of SMEs in Oman are aware of the benefits of ICT adoption. The main driving forces for ICT investment are to provide better and faster customer service and to stay ahead of the competition. A majority of surveyed SMEs have reported a positive performance and other benefits by utilizing ICT in their businesses. Majority of SMEs outsource most of their ICT activities. Lack of internal capabilities, high cost of ICT and lack of information about suitable ICT solutions and implementation were some of the major barriers in adopting ICT. These findings are consistent with other studies e.g. (Harindranath et al 2008). There is a need for more focus and concerted efforts on increasing awareness among SMEs on the benefits of ICT adoption. The results of the study recognize the need for more training facilities in ICT for SMEs, measures to provide ICT products and services at an affordable cost, and availability of free professional advice and consulting at reasonable cost to SMEs. Our findings therefore have important implication for policy aimed at ICT adoption and use by SMEs. The findings of this research will provide a foundation for future research and will help policy makers in understanding the current state of affairs of the usage and impact of ICT on SMEs in Oman.

Keywords: Information and communication technologies (ICT), Small and Medium Sized Enterprises (SMEs), developing countries, Gulf Cooperative Council (GCC), Middle East, Oman

1. Introduction

Today organizations of all types are utilizing Information and Communication Technologies (ICT) around the globe, not only for cutting costs and improving efficiency, but also for providing better customer service. Governments too, around the world, are adopting ICT to provide better services to their citizens. The adoption of ICT by organizations requires a business environment encouraging open competition, trust and security, interoperability and standardization and the availability of finance for ICT (UNCTAD 2004).

Most of the large and international organizations in Oman have effective computer systems to efficiently conduct business. A number of large organizations have spent huge amounts of money on installing computer systems to support their business processes. However, the situation has not been the same with SMEs - similar to other parts of the world for various reasons (Parker and Castelman 2007), (Shiels et al 2003), and (Fink and Disterer 2006).

No studies have been carried out on this topic in any of the GCC countries. So why Oman? Authors believe that Oman is a country with unique features such as Oman is a developing country, an oil producing country but is neither as poor as some of the other developing countries nor as rich as other oil producing countries. It does not intensely depend on foreign labor as some of the other GCC countries and is expanding its small industrial base. With its small population and a large geographical area Oman has international standard grade roads to link all major cities of the country. Similarly education and health facilities are expanded to rural and remote areas. Telephone, land lines or mobile, and Internet services are available to more than 80% of the population. The female workforce represents 17% of the total workforce of Oman which is a very distinctive feature as compared to other Arab countries of the region. Oman has limited resources (monetary and human) and has to use these resources in an efficient way learning from the experiences of other countries. These and many other geo-political, social and other factors make Oman an interesting case to study in what aspects Oman is different or similar to other countries in ICT adoption for SMEs.

The government of Oman has taken various measures to diversify the economy for sustainable development of the country and one of the major steps is to transform Oman into a digital society. The adoption of ICT will have significant positive consequences on SMEs and consequently on the economy of Oman. There is a dearth of data and research about the size and contribution of SMEs towards Oman's economy. Therefore, through this research, we would like to learn about the effects and usages of ICT on SMEs in Oman and their current and future perceptions towards ICT. This study is based on the review of literature on the topic and the Net Impact Canada 2006 study (Illuminas 2006). We hope that the findings of this research will

Reference this paper as:
Ashrafi, R. and Murtaza, M. "Use and Impact of ICT on SMEs in Oman." *The Electronic Journal Information Systems Evaluation* Volume 11 Issue 3 2008, pp. 125 - 138, available online at www.ejise.com

provide a foundation for future research and will help policy makers in understanding the current state of affairs of the usage and impact of ICT on SMEs in Oman. We collected data on the usage and impact of ICT on Omani SMEs through a survey questionnaire of 51 randomly selected SMEs in Muscat, the Capital of Oman.

Definitions: It is important to note that the term "ICT" in context of this research refers to the wide range of computerized information and communication technologies. These technologies include products and services such as desktop computers, laptops, handheld devices, wired or wireless intranet, business productivity software such as text editor and spreadsheet, enterprise software, data storage and security, network security and others.

SME: There is no official definition of SMEs available. In this research, we have adopted the following definitions of SMEs. Businesses with less than ten employees as a Micro Enterprise, between ten and fifty as Small Enterprises, and between fifty to two hundred and fifty employees as Medium sized enterprises. This criterion is consistent with other similar studies (Kapurubandara et al 2006) and was used to identify and qualify SMEs for the purpose of this research.

In the next section we review selected literature on the areas related to the topic, followed by diffusion of ICT in GCC countries and Oman, objectives of the study and research design of the study. In the later sections we present findings of our study with conclusions, limitations and directions for future research. An earlier version of this paper was presented at and included in the proceedings of the 2008 International Conference on Information Resource Management (Conf-IRM) held at Niagara Falls, Ontario, Canada during May 18-20, 2008.

2. Literature review

Importance of SMEs: It has been widely recognized that small and medium enterprises (SMEs) not only play an important role in the economy of a country, but are crucial to the country's economic stability. In New Zealand SMEs make up more than 99% of all businesses and account for about 60% of employment. In the USA more than half of all the employment comes from firms with fewer than 500 employees (Baldwin et al 2001). In the UK, SMEs employ 67 % of the workforce (Lange et al 2000). In most EU member states SMEs make up over 99% of enterprises, 67% of jobs and 59% of GDP. In most countries SMEs generate a substantial share of GDP and a key source of new jobs as well as a breeding ground for entrepreneurship and new business ideas. The United States of America, UK, Japan, Australia, New Zealand, Canada and other developed, as well as developing, countries are making policies to facilitate the growth of SMEs. Realizing the importance of ICT New Zealand spend about 10% of her GDP on ICT, making it the top ranking country in the world (Clarke 2004). Estimates from the World Bank indicate that SMEs have contributed over 55% percent of GDP in OECD countries and between 60 to 70 percent of GDP in middle-income and low income countries generating 60 to 70 percent employment (Oman Economic Review 2007). The above facts show that SMEs play a very important role in the growth of economy of a country, and Oman is not an exception.

ICT Diffusion in SMEs: There are a number of studies that discuss adoption of Internet and e-business in SMEs in developed countries (Lucchetti and Sterlacchini 2004), (Love et al 2004), (Schubert and Leimstoll 2006 and 2007a, b), (Koellinger 2006), (Stroeken 2001), (Morikawa 2004), (Caldeira and Ward 2002), (Gregor et al 2004), and (Doczi 2002). Governments around the globe recognize the importance of adoption of ICT by SMEs and they have created special groups to study various aspects of ICT adoption in SMEs. Despite the importance of ICT and emphasis by various governments to encourage SMEs to adopt ICT, it has been reported that SMEs have been slow in adopting ICT for various reasons (Houghton and Winklhofer 2004), (Smallbone et al 2001), (Dawn et al 2002), and (Lawson et al 2003). We wanted to find out reasons for the slow adoption of ICT in Oman.

Barriers to ICT Adoption: Large organizations have enough resources to adopt ICT while on the other hand SMEs have limited financial and human resources to adopt ICT. (Duan et al 2002) identified lack of ICT skills and knowledge in SMEs as one of the major challenges faced by all European countries, particularly in the UK, Poland and Portugal, in their study. (Houghton and Winklhofer 2004) have reported a slow response of SMEs relating to adoption of ICT. (Shiels et al 2003) found that characteristics of the firm and industry sector are contributory factors to the adoption and exploitation of ICTs by SMEs. (Kapurubandara et al 2006) have categorized internal and external barriers that impede adoption of ICT by SMEs in a developing

country. The internal barriers include owner manager characteristics, firm characteristics, cost and return on investment, and external barriers include: infrastructure, social, cultural, political, legal and regulatory.

ICT Diffusion in developing countries: There are very few studies about ICT adoption in developing countries (Temtime et al 2003), (Mutula et al 2006), (Yeh et al 2007), (Ssewanyana et al 2007), (Kapurubandara et al 2006). (Lal 2007) investigating adoption of ICT in Nigerian SMEs, found that one of the major factors inhibiting ICT diffusion and intensive utilization is poor physical infrastructure. In developing countries some of the ICT adoption challenges include legal and regulatory issues, weak ICT strategies, lack of R& D, excessive reliance on foreign technology and ongoing weaknesses in ICT implementation (Dutta et al 2003).

3. ICT diffusion in Gulf Cooperation Council (GCC) countries and Oman

A recent market survey shows that GCC countries' current IT spending are $5 billion annually and are expected to be doubled by 2010. Oman is emerging as one of the region's strong and fast growing markets. Oman's IT market is expected to grow from $230 million in 2005 to over $400 million by 2010 (GulfBase 2008) and (Inno Vest Group 2008). Currently, the average ICT spending in the region are between 2% to 4% of GDP as compared to an average of 8% in developed countries. Also, PC penetration is below the world average. The highest growth rate of internet usage access over the past six years is an encouraging sign in the Middle East (Patel 2007). This shows that GCC countries including Oman have made strides in advancing the development of ICT sector yet they have to go a long way ahead to reach to developed world averages. Most of the ICT activities in these countries like in other developing countries are based on government's initiatives and policies.

3.1 Use of ICT in Oman:

An Arab Gulf country in the Middle East, Oman has a population of 3.1 million. According to a recent (UN 2008) report, among some of ICT adoption indicators, Oman has 12.22 Internet per 100 users, 5.06 PC per 100 users, 69.6 Cellular subscribers per 100 users, 10.65 main telephone lines, and 0.58 broadband per 100 users. Oman has a Web Index of 0.4849 and ranked 52 in the world, an Infrastructure Index of 0.1559, Human Capital Index 0.7659, and e-Government Index of 0.4691. Oman has an e-participation index of 0.2045 and rank 60 among the world. It is at the bottom of the list of the GCC countries appearing on most of the above mentioned ICT indicator indices. Realizing the importance of ICT for the economic development of the country, Oman's government has placed a great emphasis upon creating a digital economy as key drivers for the sustainable growth of the country. Oman is heavily investing in ICT as one of the building blocks to diversify the economy. In September 2003 Oman established Knowledge Oasis Muscat (KOM 2008), a technology park as one of the initiatives taken to help develop a knowledge-driven economy, attract investment, and to serve as an incubator for local start up companies in the ICT sector. Also, in 2006 the government of Oman created an Information Technology Authority (ITA 2008) for developing a national IT strategy, help facilitating and implementing an ICT infrastructure and overseeing the implementation of Oman's digital strategy. The government has encouraged private sector to open universities and technical colleges in order to increase ICT literacy in the country. Government of Oman has established a Sanad program to encourage entrepreneurship and develop SMEs by providing them necessary finance, guidance and training. From the private sector a number of organizations are contributing in the growth of SMEs. For example Shell has established a $10 million Intilaaqah Enterprise Fund to provide capital and on-going support for SMEs in Oman. Microsoft has signed a Memorandum of understanding with Ministry of Education to provide training in schools. Also, there are a number of other initiatives in place in order to transform Oman into a digital society. It is hoped that all these steps will increase diffusion of ICT in Oman in general including SMEs in near future.

According to an estimate of HSBC Middle East Bank there are only 15,000 to 20,000 SMEs in Oman generating only 10-20% employment (Oman Economic Review 2007). These estimates show that there is a significant potential for the SMEs in Oman to grow in terms of contribution to GDP and employment, and to be competitive at regional and international levels.

Since there is no data available or a study carried out on the impact of ICT on SMEs in Oman, we were interested to know about the present technological infrastructure, the reasons behind ICT investment, the restrictions and barriers for adoption of ICT, and the implementation methods and benefits of ICT investments. These aspects essentially formed the basis of our research.

4. Objectives of the study

Realizing the importance of SMEs for the economy of Oman and the impact of ICT on improving the performance of SMEs, data was collected on various aspects of ICT usage and utilization. The investigation took place during January and April 2008 and is the first step towards an exploratory study on learning more about the use and impact of ICT on SMEs in Oman. Through this study we aim to find answers to the following questions:

1. What is the level of usage of ICT in terms of ICT infrastructure, internet connection, IT staff and types of website used in SMEs?
2. What Enterprise software SMEs used?
3. What are the drivers for ICT Investment?
4. What percentage of budget is allocated to ICT?
5. What are long term business goals for investment in ICT?
6. How is competition among SMEs?
7. What are the barriers towards to ICT Investment?
8. What approach SMEs use to differentiate their business from competitors?
9. What are realities and perceptions about business benefits of ICT implementation?
10. What are out-sourcing trends?
11. What internal capabilities and processes SMEs have in place for managing ICT?

5. Research design

We performed the following tasks to conduct the research and determine the usages and effects of information and communication technologies in SMEs in Oman:

1. A questionnaire was prepared based on the review of current literature and the Net Impact Canada 2006 study (Illuminas 2006) to determine the usages, effects and perceptions of Omani SMEs towards ICT.
2. The questionnaire contained 22 questions related to business aspects of the organization, ICT infrastructure, use of internet, website, drivers for ICT investment, barriers to ICT adoption, competition, and benefits of ICT.
3. The questionnaire was distributed to a number of SMEs in Muscat area, the capital of Oman. Fifty one completed surveys were received from the companies who have adopted ICT. Those companies who do not use any form of ICT are not included in our study. The questionnaires were completed by the founder, general manager or accounts manager because of their ability and understanding of the issues investigated in the questionnaire. In very few cases more than one individual representing the enterprise filled out the questionnaire - this actually ensured preciseness.
4. Based on the 51 completed survey questionnaires, simple statistics were carried and logical inferences were made to determine the general usages and effects of ICT on SMEs in Oman.

6. Research findings

Based on our definition of SMEs, 41% of the respondents can be classified as Micro Enterprises (less than 10 employees), 41% as Small Enterprises (between ten and fifty) and 18% Medium sized Enterprises (between fifty and two hundred fifty). This shows that more than 80% of SMEs in our sample belong to Micro and Small Enterprises.

Table 1: Types of SMEs based on number of Employees

Types of SMEs	Percentage
Micro Enterprises	41
Small Enterprises	41
Medium Sized Enterprises	18

6.1 ICT usage

We investigated IT infrastructure, Internet connection type, IT staff, usage of enterprise software, and type of website used as a measure for ICT usage.

6.1.1 ICT infrastructure

Figure 2 shows that desktop, laptop or handheld computers are used by 100% of the surveyed SMEs. The reason is that our sample is based on only those SMEs who have adopted some form of ICT in their business (e.g. computers). During our survey we noticed that a large number of Micro Businesses (we estimate 80% or more) do not use any form of ICT. It is not surprising as in the UK, 30% of micro businesses do not use computers at all (Pritchard 2006). The reason seems to be the older generation of Owner/Manager who are not used to ICT and/or are low educated foreign labor force (with no or little knowledge of ICT). Business productivity software such as Microsoft Word, Excel and PowerPoint were used by 82% of the surveyed firms. About 67% of the firms use enterprise software such as CRM, Inventory Management, E-Commerce or ERP. Wired computer network solutions such as servers, routers and firewall were utilized in 45% of the SMEs. Data storage and security solutions (such as file servers, storage area network or web-based storage) were used by 25% of the surveyed firms, and wireless networking technologies (such as access points and wireless routers) and network security solutions by only 14% of the organizations surveyed.

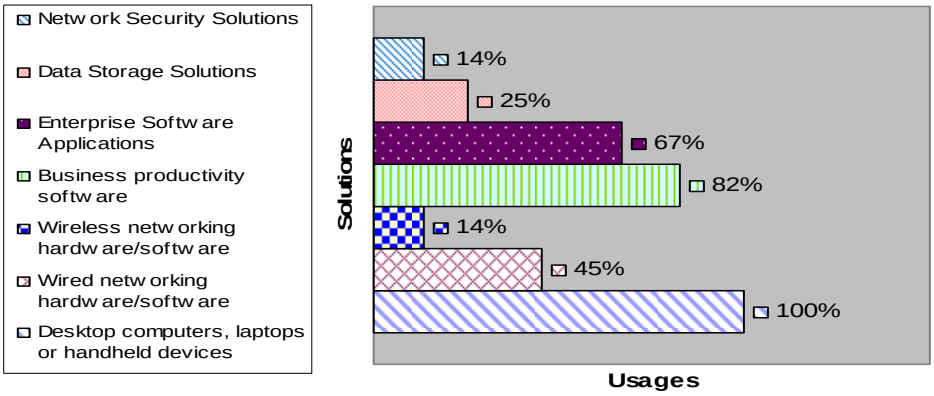

Figure 1: ICT infrastructure

6.1.2 Internet connection type

The type of internet connection in organizations largely indicates the required bandwidth and frequency or purpose of usage. In Oman the SMEs have shown no reluctance in subscribing high-speed broadband internet connection. This might be because of the relatively lower costs and higher speeds as compared to the dial-up, but nevertheless, business heavily used internet as indicated by the surveyed enterprises. Overall, 86% of SMEs in our survey used Internet. Figure 2 shows that 49% of the respondents use high speed broadband (ISDN, ADSL, DSL), 35% use dial up connection, 2% use Satellite and 16% have no internet connection. This is consistent with other studies. In a recent survey of SMEs in the UK, 78% of SMEs use Internet in their business (Harindranath et al 2008).

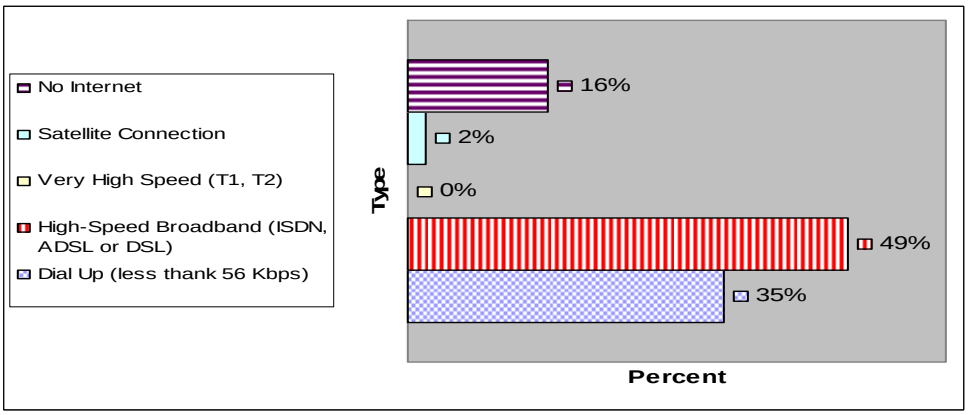

Figure 2: Type of Internet connection

6.1.3 IT staff

One may assume that small and medium sized enterprises often lack the supporting workforce needed, such as IT staff, for the quality and quantity of the required support; the expertise of such staff are too little and

basic. However some do have a special IT department with multiple supporting staff. The decisive factors that determine the existence of such staff in SMEs around the world are the size of the firm and more importantly the relative complexity of the adapted ICT solutions. The same is the case with SMEs in Oman as around 65% of the surveyed firms do not have full-time IT staff (similar to 63% SMEs in Canada), and 35% of the firms have IT/IS departments with full-time IT staff.

Usage of enterprise software

Investment in ICT infrastructure enables businesses to take advantage of the large number of different technologies available in the market. No matter how small the business and how basic the infrastructure, businesses always look to automate and computerize the essential business functions to save costs and time and to eliminate the need for support staff. Almost 84% of the surveyed firms use finance and accounting enterprise software such as Tally and Peachtree. It was found that even some of the smallest family run businesses used such software. Inventory management software is being used by 69% of the firms and 31% of the enterprises use customer relationship management (CRM) software as illustrated by Figure 3.

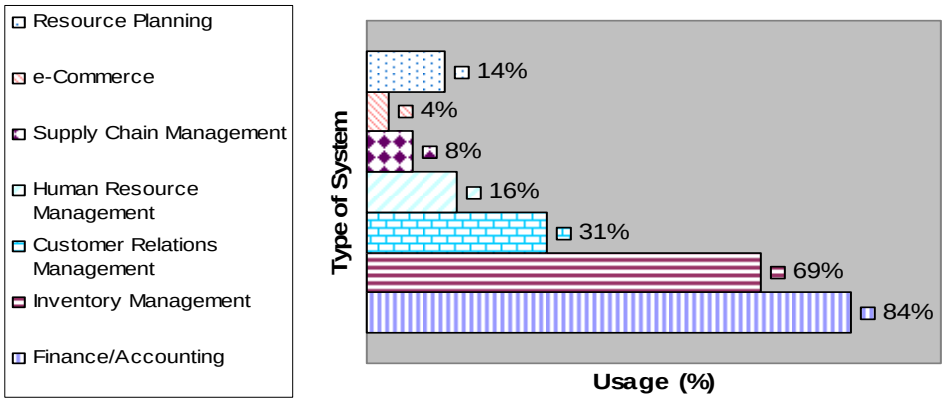

Figure 3: Enterprise system usage

It was observed that organizations that invested in enterprise software are of medium size, in terms of the size of workforce or annual turnover within the SME category, or they are micro enterprises with high inventory turnover. For example, one small retail business run by a single person (owner) used enterprise software for automating accounting, inventory and customer related business processes. Figure 3 shows that a majority of SMEs in Oman are utilizing basic Enterprise software such as finance/accounting and inventory management in their businesses.

6.1.4 Types of website used

Unlike SMEs in developed countries, the SMEs in Oman have not managed to utilize and use commercial websites. Results shows that only 2% of the firms have commercial websites which helps them reach new customers. As for informational websites, 27% of the surveyed enterprises run websites which simply introduce the business and publish their contact information. About 73% of the businesses had no website, the main reason was lack of internal staff and high maintenance costs in the long term. This shows that SMEs are not fully utilizing Internet.

This shows that ICT usage within SMEs who have adopted ICT is relatively moderate in common technologies (such as desktop, laptop, productivity software etc) but limited in the more sophisticated technologies such as wireless, data storage and network security solutions (in those companies who have adopted ICT). About 86% of surveyed SMEs use Internet but only 27% have a website and only 2% have commercial website. Also, 65% do not have full time ICT staff. The results seems to be very similar to other studies (Illuminas 2006) and (WestFocus 2007)

6.2 Investments in ICT

Many of the decision makers in small and medium firms are not always aware of relevant ICT that could revolutionize their business. This in itself is a barrier to ICT investment. As for those enterprises that have already invested and are willing to continue, what really encourages them to do so? And what is the proportion of their investment? Also, what is the nature and true reason behind their investments? We have used amount of budget dedicated to ICT, drivers for ICT Investment, number of competitors, long term ICT

investment goals and organization's strategy for competitive advantage as key elements to learn about reasons for ICT investment.

6.2.1 IT budget

Figure 4 shows that 70% of the SMEs assign less than 10% of their annual budget to ICT investment, only 2% of the firms invest between 10% and 20%, and 8% of the surveyed firms assign greater than 40% of their budgets to ICT.

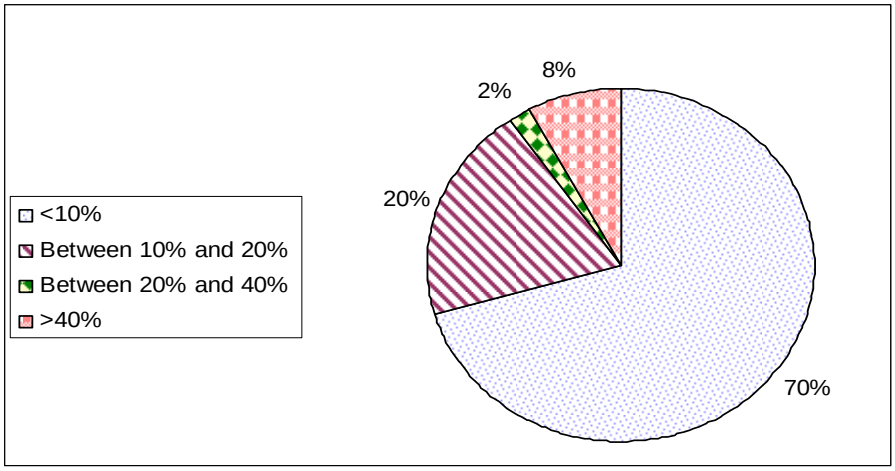

Figure 4: Proportion of budget assigned to ICT

6.2.2 ICT investment drivers

Regardless of the relative proportion of budget invested in ICT certain stimuli exist that encourage and push decision makers in SMEs to invest in ICT. The main driving forces for ICT Investment are to provide better and faster customer service (65%), and to stay ahead of competition (69%). These findings are in consistent with WestFocus that found three biggest perceived benefits of ICT usage were keeping up with the competition, faster response to customers and improved quality. Figure 5 shows stimuli for ICT investments in SMEs.

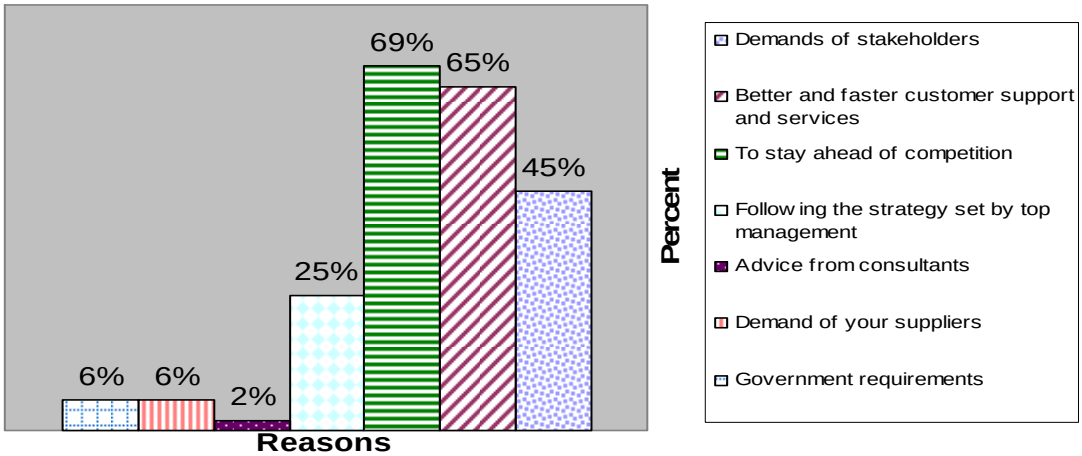

Figure 5: ICT investment drivers

6.2.3 Number of competitors

Most of the business decisions are based on the competition in the market. Figure 6 shows that 50% of the enterprises have more than twenty direct competitors. About 16% of SMEs have between ten and nineteen competitors, 16% between five to nine competitors and 14% have between one to four competitors. This shows that there is reasonably strong competition among SMEs in Oman, and perhaps that is one of the main reason that SMEs would like to be more competitive by adopting ICT.

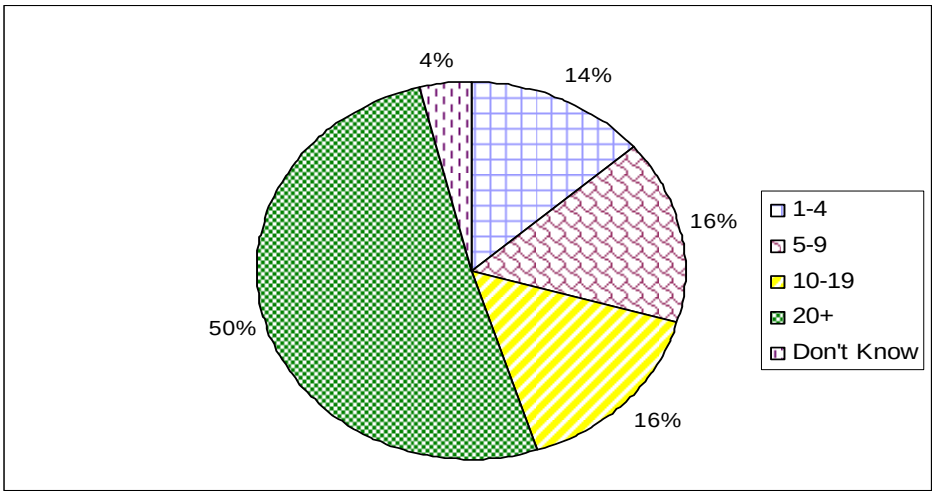

Figure 6: Number of direct competitors

6.2.4 Long term goals for ICT investment

Most of the surveyed firms' long-term plan with regards to their ICT investment was to increase their market share, grow their sales revenue and cut costs and expenses. About 86% of the firms expect to increase sales revenue, 67% expect to increase their market share and about 55% expect to cut costs as shown in figure 7.

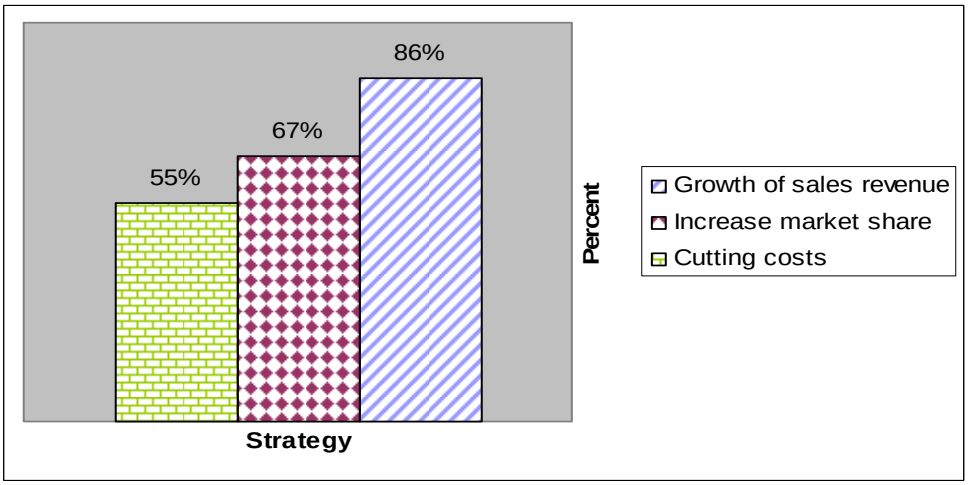

Figure 7: Long term plans

The above results show that Omani SMEs have strong competition and are devoting a reasonable percentage of their budget to ICT in order to provide better and faster customer service. Also to realize benefits of ICT investment, SMEs expect to increase sales revenue and market share as well to reduce costs. Most of the SMEs aim to provide highest quality products and services to their customers as well as establishing long term relationships with customers. (Harindranath et al 2008) also found increasing sales and reducing costs as main reasons for investing in ICT.

6.3 Competitive strategy

A common way of achieving business goals is to differentiate one's business from the competition. The surveyed SMEs have chosen the approach of providing the highest quality products and services (80%) to their customers as the principal method for differentiating as well as establishing long-term relationships with customers (47%), as illustrated in Figure 8.

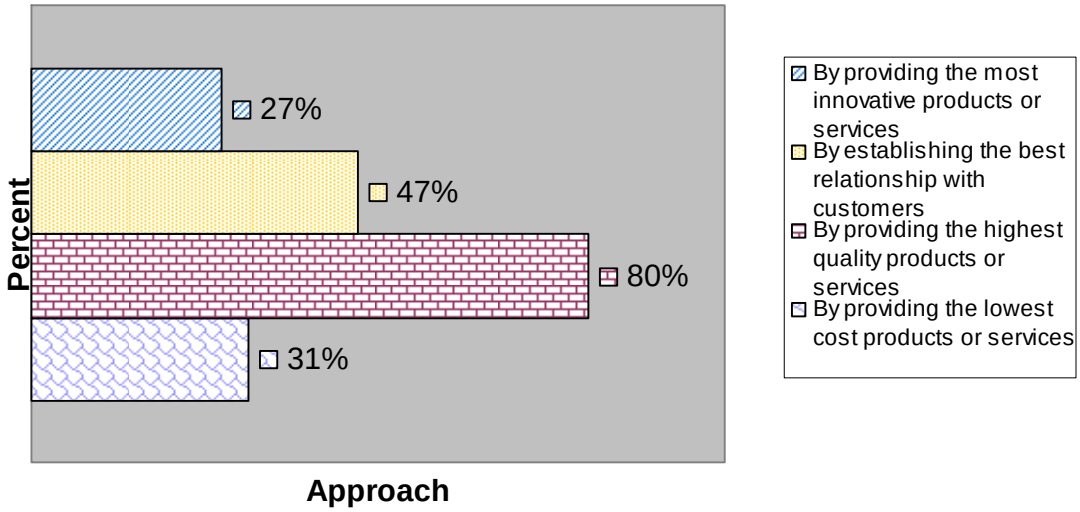

Figure 8: Approaches to achieve competitive advantage

6.4 Barriers to ICT investment

While some of the SMEs in Oman are clearly aware of ICT and its benefits, there exist certain restrictions and barriers to ICT investment. Figure 9 shows that 75% of the firms feel that a lack of necessary internal skills is a major barrier. This is consistent with other studies that SMEs do not have enough human resources (Wymer and Regan 2005). There has been a recent increase in technological colleges and the general investment by the Omani government in the ICT industry to overcome shortage of IT staff. About 63% feel that the monetary costs of ICT solutions and implementation are too high. (Harindranath et al 2008) also identified cost as the single most factor threatening future investment in ICT. Almost 63% of the decision-makers within the surveyed firms feel that there is not enough information available at their disposal about relevant and effective technologies. This finding also confirms findings of (Harindranath et al 2008), (Chibelushi 2008) and (WestFoucs 2007) study who found concerns over costs and uncertainty over the business benefits-followed by a lack of internal expertise. This shows that there is a need for free advice and relevant information for SMEs. Of the respondents, 31% feel they simply have no time to implement the projects. About 47% of the firms are uncertain about retaining their ICT investment and 18% of the managers feel there is not enough support from the top-management in the firms. Other barriers identified include: government regulations and requirements (6%), and bad experiences in the past (8%). A few of the firms also complained about lack of infrastructure in certain areas in the country. One business specifically complained about the unavailability of internet access in some of the areas far away from Muscat, the capital of Oman. Figure 9 shows some of the main barriers to ICT adoption of SMEs in Oman.

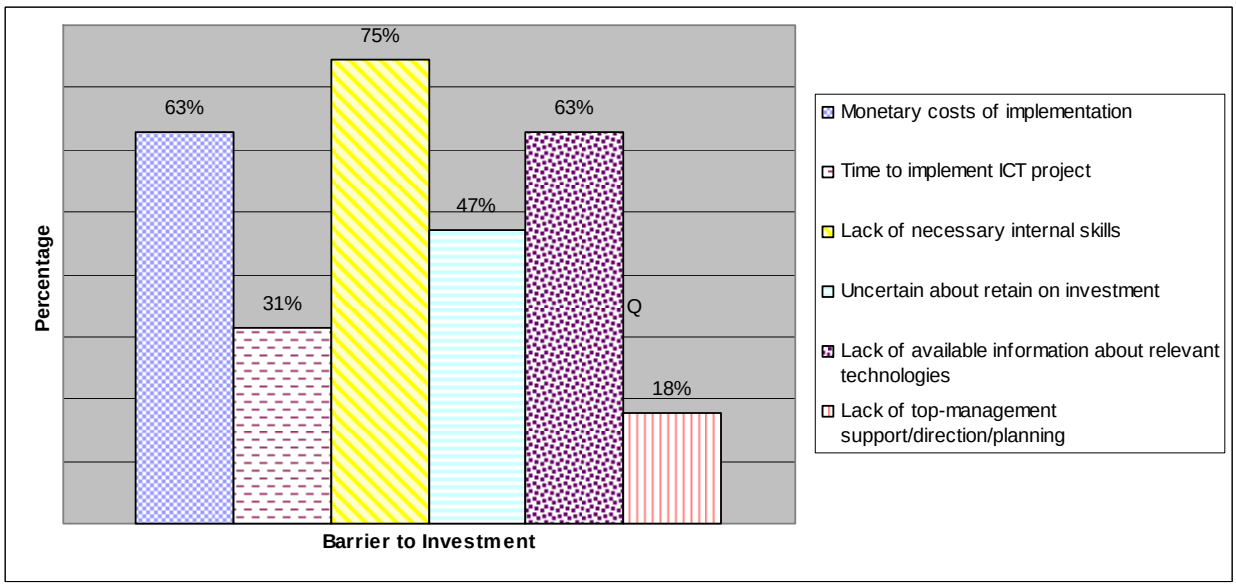

Figure 9: Barriers to ICT investment

6.5 Realization of business performance improvements

We solicited opinions about the actual and expected benefits of ICT investment in improving the business in a series of questions.

Table 2 shows that only 27% SMEs have realized business impact beyond their geographical area. The reason is that only 27% of SMEs have website. It is worth noting that 80% have realized reducing costs due to ICT, while 53% have improved revenue and 57% have an impact on customer relationship due to ICT. Almost all of the SMEs are more positive of future expected benefits of ICT implementation and investment. This shows that those SMEs who have adopted ICT have realized benefits due to ICT and are very positive in continuing to invest and harvest those benefits. (Harindranath et al 2008) also found that of the SMEs were satisfied with their ICT investment and perceived their ICT investment as offering good value for money.

Table 2: Actual and expected business performance improvements due to ICT

Impact of ICT	Actual Business Performance		*Expected Business Performance*	
	Yes	No	Yes	*No*
Beyond their geographical area	27%	73%	41%	*59%*
In cutting costs	80%	20%	84%	*16%*
On revenue	53%	47%	55%	*45%*
On customer relationship	*57%*	*43%*	*67%*	*33%*

6.6 ICT implementation and outsourcing

One of the solutions to solve the problem of unavailability of internal skills many organizations have the option of "outsourcing" their ICT related work. Therefore, what we know as outsourcing has become one of the most common practices performed by almost all organizations, both private and public, small and large, in order to remain competent within their fields of business or work.

6.6.1 Proportion of activities outsourced

Majority of the SMEs that participated in this research outsourced a portion of their ICT activities and work. Figure 21 shows that 57% of SMEs outsourced more than 50% of their activities, 14% outsourced between 10 and 25 percent of their activities, and 14% outsourced less than 10% of their ICT activities. This relates to the shortage of IT staff, lack of internal skills, lack of relevant information and guidance on relevant technology solutions and high costs of ICT mentioned earlier sections. (Harindranath et al 2008) study who found that 50% of the firms in their survey used external consultants in ICT matters.

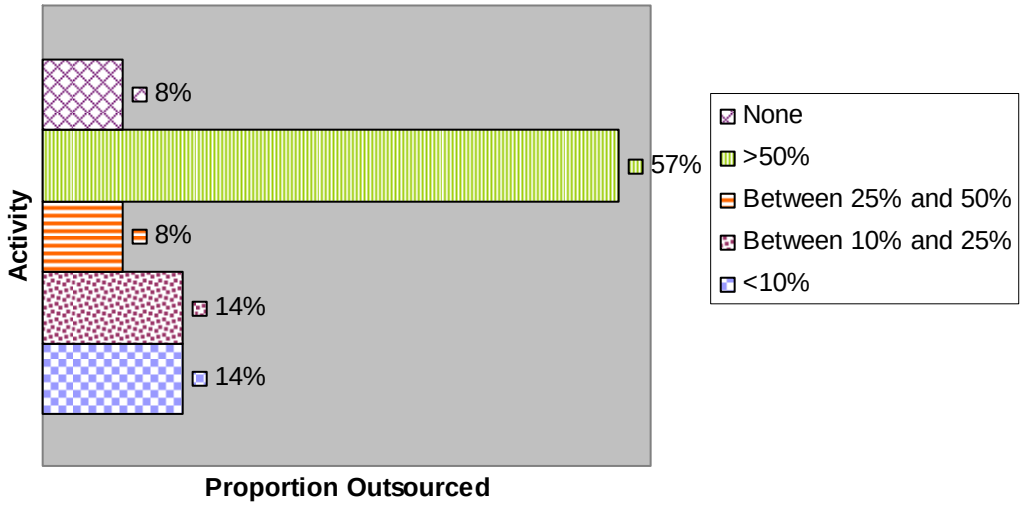

Figure 10: Proportion of ICT activities outsourced

6.6.2 Resources used for ICT implementation

It is important to know what ICTs were adopted and used within SMEs, but it is also important to know which internal or external resources were used to implement these technologies. Most of the enterprises surveyed used internal resources to implement basic technologies such as the installation and setup of desktop or laptop computers, data storage hardware or business productivity software. As the technologies become more sophisticated, like the use of enterprise software applications, wireless networking or the use of mobile phone applications, the firms tended to use external resources. Figure 22 shows that 33% organizations use internal resources for Desktop or laptops, as well as 24% for data storage solutions and 24% for business productivity software. About 59% of the SMEs outsourced more sophisticated technologies such as enterprise software applications. Also, it seems that some of the organizations lack internal capacity for basic technologies such as Desktop or laptops (47%), business productivity software (41%) and data storage (35%), as they used outsourcing for these activities

A number of firms use both internal and external resources to implement some of the technologies. It was observed that SMEs often use external resources to initially implement the technology, and then tend to use internal resources to maintain and upgrade the implemented technologies.

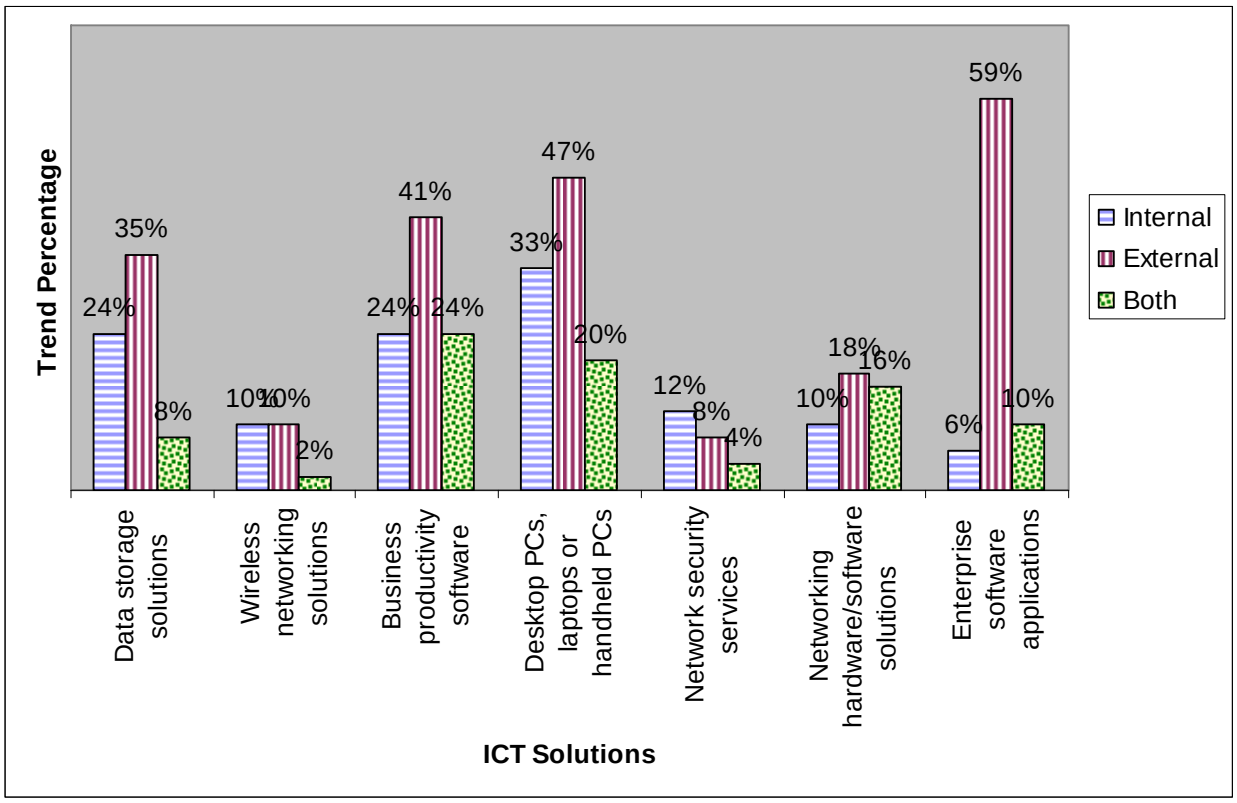

Figure 11: Resourcing trends – Internal vs. external

This shows that most of the SMEs lack skills and resources in Computers, ERP, Business software, data storage and network solutions. They look for external help in almost all areas of ICT. This emphasizes need for ICT training for SMEs. (Harindranath et al 2008) and (Chibelushi 2008) also found that lack of ICT expertise as one of the main barrier in their study.

7. Conclusions

We found that ICT usage within SMEs in Oman is moderate in common technologies, but limited in the more sophisticated technologies such as wireless, data storage and network security solutions. It was noticed that Omani SMEs are taking a comprehensive approach to their ICT investment focusing on both strategic and operational aspects of their business. The results of our study show that Omani SMEs are making reasonable investment in ICT and that there is a modest competition among the SMEs. The main driving forces for ICT investment was to provide better and faster customer service, to stay ahead of competition and following top management strategy. The competitive strategy for the majority of SMEs was to provide high quality products and services to their customers and to establish long term relationships with customers.

Nearly half of the respondents have realized business benefits of ICT adoption such as better customer relationships, increase in revenue and in reducing costs. Two thirds of the respondents are very positive about increasing their business performance in the future.

With regard to barriers to ICT investment, three fourths of the firms feel that a lack of necessary internal skills is a major barrier. More than half of the respondents feel that the costs of implementation are too high. Lack of availability of relevant information and advice on suitable and effective technologies is also one of the major barriers. Other barriers include SMEs having no time to implement ICT projects, lack of top management support, bad experience in the past and government regulations and requirements. These findings are consistent with other studies e.g. (Harindranath et al 2008). This emphasizes the need for more training facilities in ICT for SMEs, measures to provide ICT products and services at an affordable cost, and availability of free professional advice and consulting at reasonable cost to SMEs. Our findings therefore have important implication for policy aimed at ICT adoption and use by SMEs.

More than half of the participants outsourced over 50% of their activities. This can be related to lack of in-house capabilities in ICT identified as a major barrier. These results also confirm findings of (Harindranath et al 2008) and (Chibelushi 2008) and re-emphasize the need of ICT training for SMEs.

Overall, it seems that only a small number of SMEs in Oman are aware of the benefits of ICT adoption. The findings of our research show that the SMEs lack necessary ICT knowledge and skills and mechanism to find and receive advice and support. There is a need for more focus and concerted efforts on increasing awareness among SMEs on the benefits of ICT adoption in order for SMEs to be more productive and competitive. Also, there is a need for providing affordable ICT products, services, solutions and relevant professional advice for SMEs. There is a need for government and professional trade organizations (such as Chamber of Commerce and Industry) to address the gaps and issues identified in this study. The findings of this research will provide a foundation for future research and will help policy makers in understanding the current state of affairs of the usage and impact of ICT on SMEs in Oman.

8. Limitations of the research and directions for future research

This study was a preliminary exploratory study to learn about a few selected aspects of ICT adoption in a GCC country, Oman. There are number of issues such as legal, regulatory, interventions from the government, just to name a few, in the adoption of ICT that needs further investigation. A detailed study should take a more comprehensive approach considering a wide range of areas of ICT adoption. These results are based on a small sample of 51 SMEs, out of that 80% belongs to Micro and Small enterprises. Data was collected from SMEs who use some form of ICT in their business. Those organizations that do not use computers were excluded from the study. Our conservative estimate is that currently, more than 80% of Micro businesses do not use any form of ICT for reasons mentioned earlier in the paper. The results show a general trend and practices of the use and impact of ICT on SMEs in Muscat, the Capital of Oman. The results should be interpreted or used with these perspectives in consideration. A larger sample is needed to further validate these trends.

References

Baldwin, J.R., Jarmin, R.S., and Tang, J. (2001) "*The Trend to Smaller Producers inManufacturing in Canada and the US*", Statistics Canada Working paper.

Caldeira, M.M., and Ward, J.M. (2002) "Understanding the Successful Adoption and Use of IS/IT in SMEs: an Explanation from Portuguese Manufacturing Industries", *Information Systems Journal*, Vol. 12, No. 2, pp 121-152.

Chibelushi, C. (2008) "ICT industry challenges in adopting ICT: a case study from the West Midlands, UK", in *proceedings of the 2008 International Conference on Information Resource Management*, May 18-20, Niagara Falls, Canada.

Clarke, J. (2004) "Information Systems Strategy and Knowledge-based SMEs in the Australian Biotechnology Industry: Does IS need to reorient its Thinking?" *15th Australian Conference on Information Systems*, Hobart, Australia, 1-3 December.

Dawn, J., Podonik, P., and Dhaliwal, J. (2002) "Supporting the E-business Readiness of Small and Medium-Sized Enterprises: Approaches and Metrics", *Internet Research* Vol. 12, No. 2, pp139-195.

Doczi, M. (2002) "*Information and Communication Technologies and Social and Economic Inclusion*", Information technology Policy Group, Ministry of Economic Development, Manatu, Ohanga, NZ, March.

Duan, Y., Mullins, R., Hamblin, D., Stanek, S., Sroka, H., Mavhado, V., Araujo, J. (2002) "Addressing ICTs Skill Challenges in SMEs: Insights from three country investigations", *Journal of European Industrial Training*, Vol. 26, No. 9, pp. 430-441.

Dutta, S., and Coury, M, E. (2003) "ICT Challenges for the Arab World", Chapter 8, in Dutta, S., Lanvin, B. & Paua, F. (ed.) "*The Global Information Technology Report 2002-2003: Readiness for the Networked World*", World Economic Forum/Oxford University Press, New York, pp116-131.

Fink, D. and Disterer, G. (2006) "International Case Studies: To what extent is ICT infused into the Operations of SMEs?", *Journal of Enterprise Information Management*, Vol. 19, No. 6, pp 608-624.

Gregor, S., Fernandez, W, Holtham, D, Martin, S, Vitale, M, & Pratt, G. (2004) "*Achieving Value from ICT: Key Management Strategies*", Department of Communications, Information Technology and the Arts, ICT Research Study, Canberra.

GulfBase (2008) "GCC Common market set to enrich ICT sector" [online] http://www.gulfbase.com/site/interface/NewsArchiveDetails.aspx?n=49939 [11 March 2008]

Harindranath, G., Dyerson, R. and Barnes, D. (2008) "ICT Adoption and Use in UK SMEs: a Failure of Initiatives? *The Electronic Journal Information Systems Evaluation* Vol. 11, No. 2, pp. 91-96.

Houghton, K.A. and Winklhofer, H. (2004) "The Effect of Website and E-commerce Adoption on the Relationship between SMEs and Their Export Intermediaries", *International Small Business Journal*, Vol. 22, No. 4, pp. 369-388.

Illuminas (2006) "Net Impact Canada 2006", [online], http://www.netimpactstudy.com/ca/ {20 March 2008]

Inno Vest Group (2008) "The Technology Small and Medium-Sized Enterprises (SMEs) in Middle East Region"**,** [online], http://www.theinnovestgroup.com/43.html [12 March 2008]

ITA (2008), "Information Technology Authority, Oman" [online] http://www.ittf.gov.om/english/about_ita.html [15 March 2008]

Kapurubandara, M., and Lawson, R. (2006), "Barriers Adopting ICT and E-commerce with SMEs in Developing Countries: An Exploratory Study in Sri Lanka", CollECTeR '06, 9 December, 2006, Adelaide, [online], http://www.collecter.org/archives/2006_December/07.pdf [13 March 2008]

Koellinger, P. (2006) "*Impact of ICT on Corporate Performance, Productivity and Employment Dynamics*", Special Report No 01/2006, European Commission Enterprise & Industry Directorate General, Berlin.

KOM 2008, Knowledge Oasis Muscat [online] http://www.kom.om/ev.htm [12 March 2008]

Lal, K. (2007) "Globalization and Adoption of ICTs in Nigerian SMEs", *Science, Technology Society*, Vol.12, No. 2, pp217-244.

Lange, T., Ottens, M., and Taylor, A. (2000) "SMEs and Barriers to skills development: A Scottish Perspective", *Journal of European Industrial Training*, Vol. 24, No. 1, pp. 5-11.

Lawson, R., Alcock, C., Cooper, J., Burgess, L. (2003), "Factors Affecting the Adoption of Electronic Commerce Technologies by SMEs: An Australian Study", *Journal of Small Business Enterprise and Development* Vol. 10, No. 3, pp. 265-276.

Love, E.D., Irani, Z., Edwards, D.J. (2004), "Industry-centric Benchmarking of Information Technology Benefits, Costs and Risks for Small-to-Medium Sized Enterprises in Construction", *Automation in Construction*, Vol. 13, No. 4, pp. 507-524.

Lucchetti, R. and Sterlacchini, A. (2004) "The Adoption of UCT among SMEs: Evidence from an Italian Survey", *Small Business Economics* Vol. 23, No. 2, pp.151-168.

Morikawa, M. (2004) "Information Technology and the Performance of Japanese SMEs", *Small Business Economics* Vol. 23, No. 3, pp.171-177.

Mutula, S.M., and Brakel, P. (2006) "E-readiness of SMEs in the ICT Sectors in Botswana with Respect to Information Access", *The Electronic Library*, Vol. 24, No. 3, pp.402-417.

Oman Economic Review, 2007, "SME Forum – Making Life Easy", [online]. http://www.oeronline.com/php/2007_dec/sme_forum.php [8 March 2008]

Parker, C.M., and Castelman, T. (2007) "New Directions for Research on SME-eBusiness: Insights from an Analysis of Journal Articles from 2003 to 2006", *Journal of Information Systems and Small Business*, Vol. 1, No. 1/2, pp. 21-40,.

Patel, F. (2007) "The Arab business world's ICT opportunity", *Arabian Business World* (23 August 2007).

Pritchard, S. (2006) "How can so many businesses cope without computers" *Financial Time London* (19 Sep. 2006).

Schubert, P., and Leimstoll, U. (2006) "The Importance of ICT: An Empirical Study in Swiss SMEs" in *19th Bled Conference eValues*, Bled, Slovenia, June 5-7.

Schubert, P., and Leimstoll, U. (2007)a "Importance and Use of Information Technology in Small and Medium-Sized Companies", *Electronic Markets*, Vol. 17, No. 1, pp. 38-55.

Schubert, P., Fisher, J., and Leimstoll, U. (2007)b "ICT and Innovation in Small Companies" *15th European Conference on Information Systems*, St. Gallen, Switzerland, 1226-1239, 7-9 June.

Shiels, H., McIvor, R., and O'Reilly, D. (2003) "Understanding the Implications of ICT adoption: Insights from SMEs", *Logistics Information Management*, Vol.16, No. 5, pp. 312-326.

Smallbone, D., North, D., Vickers, I., and Roper, S. (2001) "Innovation and the Use of Technology in Manufacturing Plants and SMEs: An Inter-Regional Comparison", *Proceedings 24th ISBA National Small Firms Conference: Exploring the Frontiers of Small Business* (Hinckley, Leicestershire: ISBA), pp. 289-308.

Ssewanyana, J., Busler, M. (2007) "Adoption and Usage of ICT in developing Countries: Case of Ugandan Firms", *International Journal of Education and Development using ICT*, Vol. 3, No. 3, [Online] journal, available at http://ijedict.dec.uwi.edu/viewarticle.php?id=349 [March 13 2008]

Stroeken, J.H.M. (2001) "The Adoption of IT by SMES: The Dutch Case", *Journal of Enterprising Culture*, Vol. 9, No. 1, pp. 129-152.

Temtime, Z.T., Chinyoka, S.V., Shunda, J.P.W. (2003) "Toward Strategic Use of IT in SMEs: A Developing Country Perspective", *Information Management & Computer Security* Vol. 11, No. 5, pp. 230-237.

UN (2008) "*E-Government Survey 2008, From e-Government to Connected Governance*", Doc # ST/ESA/PAD/SER.E/112, United Nations, New York

UNCTAD (2004) "*ICT as an Enabler for Growth, Development and Competitiveness*", Plenary session, June 17, [online], http://www.unctadxi.org/templates/Event____69.aspx [13 March 2008]

WestFocus (2007) "Abandon Heroes –ICT Adoption and Use in SMEs" [online] http://www.westfocus.org.uk/SiteManager/UserFiles/downloads/14_Abandoned_Heroes_Project_Report_final.doc [5 June 2008]

Wymer, S.A. and Regan, E.A. (2005) "Factors influencing e-commerce adoption and use by small and medium businesses" *Electronic Markets*, Vol. 15, No.4, pp. 438-453.

Yeh, Quey-Chen, and Chang, A, J-T (2007) "Proliferation of Computers among Taiwanese SMEs", *International Journal of Entrepreneurship and Innovation Management*, Vol. 7, No. 1, pp 51-73.

