

**WiMax Technology Adoption by SMEs in the
city of Jeddah, Saudi Arabia**



A Thesis Submitted for the Degree of Doctor of Philosophy

By

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DECLARATION

This thesis is an account of the research undertaken solely by Inam Abousaber. This work has not previously been accepted in substance for any degree and in not being concurrently submitted in candidature for any degree and it is the result of my own investigations. Some of the material contained herein has already been published or is under review by the following:

Signed*Inam Abousaber*.....

Date: 29 / 06 / 2012

Conferences

Abousaber, I. and Papazafeiropoulou, A. (2011). 'The Impact of Organisational Culture on WiMax adoption by Saudi SMEs', In *Proceedings of the European, Mediterranean & Middle Eastern Conference on Information Systems (EMCIS)*, May 372-386, Athens, Greece.

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Dedication

To the memory of my beloved father and brother (Naser Abousaber)

And

To my great mother

Inam Abousaber

London, 2012

ABSTRACT

This research focuses on developing a framework for Worldwide Interoperability for Microwave Access (WiMax) technology adoption by Small and Medium Enterprises (SMEs) in the Kingdom of Saudi Arabia (KSA). WiMax has emerged as a technology to overcome the limitations of traditional and existing broadband technologies and support a great number of organisations and consumers/citizens in providing a higher speed over substantial distances i.e. in areas that are difficult for wired infrastructure to reach. Despite all the interest in the types of broadband adoption as demonstrated by SMEs in several countries, there seems to be slow progress and lack of information supporting the decision making process for WiMax technology adoption by SMEs specifically in the context of KSA. This may illustrate that SMEs adopt WiMax technology solutions at a slower pace and make them characterised as laggards in terms of new technologies adoption. This research takes into consideration this literature gap and makes a step forward and investigates on WiMax technology adoption by SMEs in KSA with an organisational cultural view, vendors' commercialisation strategies and government policies by analysing the normative literature related to this research.

The data collection of this study was carried out in two phases including quantitative and qualitative approaches. The first phase of the research provided results indicated that, the Saudi SMEs who participated in this research are strongly dominated by clan culture and adhocracy culture. These cultures also have a positive impact on the Internet technologies adoption such as WiMax by SMEs. It is found that, the combination of clan and adhocracy cultures in Saudi SMEs is making them more likely to adopt latest Internet technologies. In the second phase, the results showed a wide difference in views among SMEs, WiMax vendors and government agencies involved in WiMax technology diffusion to SMEs in Saudi Arabia. Although WiMax technology started as an innovation that has the potential to be disruptive and could replace the widely diffused fixed wire line Internet connection, the research findings showed an interesting deviation from this path. In particular, the WiMax technology market analysis in Saudi Arabia highlighted the vendors' tendency to treat WiMax technology as a sustaining innovation. Research findings also indicated that, the Saudi government provided funds for Information and Communications Technology's diffusion in the country. However, the level of awareness displayed by SMEs is persistently low. Knowledge deployment, mobilisation, innovation directive and subsidy have been emphasised by SMEs as the most important government interventions that might have an impact on WiMax adoption by them. Finally, further important issues have been uncovered by the research such as taxation, experience exchange, herd culture/bandwagon, consumer right protection and customer service in relation to the adoption of WiMax by SMEs. The *perceived future prospect* of these additional issues has been considered as an influence on adoption of WiMax technology by SMEs. The findings of this research can be useful to guide analysts and researchers in determining critical aspects of the complex issues involved in technologies adoption, and lead to suggestions for further valid research.

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LIST OF ABBREVIATIONS

- ADSL - Asymmetric Digital Subscriber Line
- CITC - Communication and Information Technology Commission
- CVF - Competing Values Framework
- DSL - Digital Subscriber Line
- DTI - Department of Trade and Industry
- DTPB - Decomposed Theory of Planned Behaviour
- EEA - European Economic Area
- FDI - Foreign Direct Investment
- FWB - Fixed Wireless Broadband
- GDP – Gross Domestic Product
- ICT – Information and Communications Technology
- IDT -Innovation Diffusion Theory
- ISP - Internet Service Provider
- ITIF - Information Technology and Innovation Foundation
- ISDN – Integrated Services Digital Network
- ITU – International Telecommunication Union
- ISU - Internet Services Unit
- IEEE - Institution of Electrical & Electronics Engineering
- KSA – Kingdom of Saudi Arabia
- KACST - King Abdul-Aziz City for Science & Technology
- MAN - Metropolitan Area Network
- MCIT - Ministry of Communications and Information Technology
- OCAI - Organisational Culture Assessment Instrument
- OECD - Organisation for Economic Co-operation and Development
- PDA's - Personal Digital Assistants
- ROI - Return On Investment
- SCOT - Social Construction Of Technology

SME – Small and Medium Enterprises

STAR - Special Telecommunications Action for Regional Development

TAM - Technology Acceptance Model

TPB - Theory of Planned Behaviour

WECA - Wireless Ethernet Compatibility Alliance

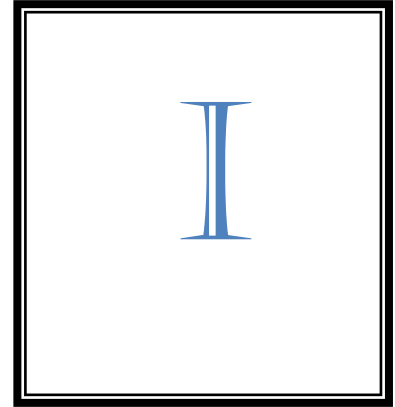
WEP - Wired Equivalent Privacy

WPA – Wi-Fi protected access

WLANs - Wireless Local Area Networks

Wi-Fi - Wireless Fidelity

WiMax – Worldwide Interoperability for Microwave Access



CHAPTER I: INTRODUCTION

1.1 Introduction to the Research Area

Adoption of Worldwide Interoperability for Microwave Access (WiMax) in the Small and Medium-Sized Enterprises (SMEs) is a new concept in many countries like Kingdom of Saudi Arabia (KSA). SMEs are considered as a substantial constituent of the global economy i.e. an imperative source of entrepreneurial skills, innovation and employment for the local, regional and national economic growth (European commission, 2007; Taylor and Murphy, 2004). According to the European Commission (2007), SMEs are enterprises that are based on fewer than 250 employees. According to Simpson and Docherty (2004) several definitions and conceptions related to SMEs are generated from the 1971 Bolton Committee Report. According to this report small firm is self-regulating organisation with very small market share.

Moreover, according to the European Commission (2007) SMEs are enterprises that are based on fewer than 250 employees. SMEs can be classified into micro, small and medium enterprises depending on the head count or annual turnover. Micro enterprises are defined as firms that have less than 10 employees. Small firms have between 10 and 49 employees an annual balance-sheet total not exceeding 10 million Euros while medium firms have less than 250 employees with a turn over not exceeding 50 million Euros (The DTI, 2004)

The author takes into consideration some perceptions theorised in the normative literature with a view to gain a better understanding of SMEs function. For example, Levy et al. (2001) report that SMEs are mostly regarded to be sceptical while taking risks and they are driven by customer needs. Similarly, Simpson and Docherty (2004) argue that the majority of small firms are owned by a single person signifying that most decision-making will rest on one person. On the other hand, Oni (2008) asserts that SMEs are by and large considered to be cynical while taking the decision to adopt new technologies. It is only relatively recently that SMEs have started using Information and Communication Technologies (ICT) but their technology and management capabilities are considered inferior (Caldeira and Ward, 2002). It is also opined that although electronic commerce (e-Commerce) is widely used in large firms for various purposes, its use amongst SMEs has not been impressive and persistence (Pool et al. 2006). The Observatory of European SMEs report (2003) therefore the need to build ICT-related capabilities and competencies among SMEs in Europe. The author argues here that due to such nature and size and slow pace in adopting technological solutions, SMEs may be unable to invest substantial sums of money on adopting technologies to support the prosperity of their business. This argument is also supported by Oni (2008), who reports that the decision to adopt certain technologies might depend on the varying sizes and nature of SMEs.

According to Levenburg (2005), most small firms are in the early stages of implementing their business functionalities electronically (i.e. electronic business or e-Business) and have focused on using the Internet to explore new sources while relying on simpler, easy-to-use technologies. However, the high prevalence of websites and the use of more sophisticated e-Business tools among the larger SMEs, shows that the larger SMEs are at advanced stages and more into e-Business. There are other issues of how SMEs decide whether or not they need to adopt new Internet technologies. For example, SMEs' decision to adopt Internet or not depends on the perceived benefit and relative advantage they might get. While it might not be possible to reap the profits of investing in a new technology immediately, the long-term effect could turn out to be immensely beneficial to the SMEs (Beckinsale and Levy, 2004). More SMEs could decide to adopt if they were aware of this. However, Saban and Rau (2005) suggest that resources are more of a deterrent to adoption rather than lack of knowledge. The various characteristics that have been discussed in this section have a major impact on the decision making processes in SMEs while adopting new Internet technologies. The recent innovative Internet technology—broadband—is being considered as the most significant evolutionary step since the emergence of the Internet (Dwivedi and Weerakkody, 2007). In the recent years broadband has raised the interest of several organisations and policy makers worldwide.

Aronsson et al. (2003) defines broadband as “anything with a bandwidth larger than 4Hz”. Firth and Kelly (2001) reported that the term broadband has no established definition and varies from country to country. The word broadband is actually a hybrid of two words, broad and bandwidth (Dobers, 2002). Broadband technology is an umbrella term, which covers varying high-speed access technologies including Asymmetric Digital Subscriber Line (ADSL), cable modems, satellite, and wireless fixed networks (Colombo et al., 2008; Sawyer et al., 2003). Broadband provides an ‘always on’ and faster Internet connection than dial up. It is an emerging technology that promises to improve Internet use. In the context of making use of this technology, broadband has been used for educational, financial and entertainment purposes. Its adoption may be influenced by a number of factors such as government policies, stakeholder interests, geography and demographics, cost and user benefits (Lee and Choudrie, 2002). Broadband has also been stated to have a significant impact on users' on-line habits (Dwivedi and Choudrie, 2003). In a different context, Stanton (2004) also investigated the factors affecting the adoption of the residential broadband, whereas, Choudrie and Dwivedi (2006) examined socio-demographic attributes of the household consumers of broadband technology.

Additionally, the cost of obtaining and maintaining broadband could be a hindrance to its adoption, as Zhang (2002) highlights broadband is slightly more expensive than narrowband. Conversely, a number of factors may contribute to whether or not and how broadband is being adopted in different countries. For example, Kim et al. (2003) researched broadband uptake in Organisation for Economic Co-operation and Development (OECD) countries and identified factors such as preparedness of a

nation and the cost condition of deploying advanced networks as the most possible factors to explain broadband uptake. In some countries there have been low broadband adoption rates. For example, Chang et al. (2003) researched the deployment of broadband in Australia. They identified areas that have been holding up broadband adoption in the country and pointed out areas where more attention is needed. Similarly, empirical analysis conducted into broadband adoption in the United States by Aron and Burnstein (2003) therefore opine that broadband availability and adoption in a state may be driven by facilities-based competition, demand and cost factors, but may not be associated with the availability of broadband services. Their research supports that broadband is beneficial to the economy. On the other hand, South Korea has a particularly high rate of broadband diffusion, which has sparked a lot of interest (Lee et al., 2003). In Singapore, aggressive investments in infrastructure contributed partly to the high broadband penetration (Ang et al., 2003).

In addition, there are several benefits that have been attached to the adoption and use of broadband and theorised in the normative literature. The benefits of its use (fast reliable connection, always on) are widely advertised and broadband diffusion is one of the items at the top of the agenda for technology related policies worldwide (Oni, 2008). Other benefits e.g. better links between SMEs and more information for decision making, greater access to external resources and expertise (Chappell et al., 2002), ability to compete with large firms (Oni, 2008), and productivity are also cited as some of the major benefits of broadband technology in SMEs (Lee, 2002).

In addition, to the aforesaid theorised conceptions, there are several benefits that have been attached to the adoption and use of broadband and theorised in the normative literature. Such as the constant fast reliable connection, and the widely advertised broadband diffusion which have been in the front burner of in technology related policies worldwide (Oni, 2008). Other benefits related to SMEs include among others better links between SMEs and more information for decision making, greater access to external resources and expertise (Chappell et al., 2002), ability to compete with large firms (Sandler and Bogg, 2001), and productivity is also cited as one of the major benefits of broadband technology in SMEs (Lee, 2002).

Since broadband also facilitates home-working, it saves both small and large organisations office space costs (BSG, 2004) and also facilitates the transformation of business transactions, making organisations more productive and innovative as they engage in e-Commerce and e-Business. In this context, SMEs may benefit from greater productivity if they adopt broadband and use it to access the Internet and conduct transactions. SMEs may experience growth from an increase in productivity resulting from greater process efficiency and improved information exchange (OECD, 2003). In addition, in delivering economic values broadband may improve the competitiveness of SMEs and act as it provides the capability to exploit business opportunities (BSG, 2004). However, as illustrated in

the earlier discussions, it is obvious that broadband has generated a lot of interest in different economies, yet there has been limited focus on its adoption by SMEs in the developing countries such as the case of KSA.

Dwivedi and Weerakkody (2007) highlighted that in KSA, broadband has taken a while to diffuse and slow progress has been noted towards its adoption. The author emphasises and states that this may be attributed to several reasons: (a) the relative adoption of new ICT reactively by SMEs in KSA compared to organisations in other sectors, (b) the reluctance to adopt new technologies due to lack of skilled staff, (c) KSA SMEs' lack of understanding and knowledge of WiMax broadband, (d) KSA SMEs' unpreparedness for technological transformations, (e) KSA SMEs' inability to react proactively to the constantly changing and evolving technologies around. SMEs may lack of insight and are mostly reluctant to adopt WiMax broadband but are being forced adopt in most cases. Concern for return on investments and the inability to assess these returns on investments may also have been responsible for the indecision on the extent of their investments. The adoption of WiMax broadband in KSA by SMEs may therefore have been hindered by these issues.

Therefore, the research presented in this thesis is concerned with the adoption of WiMax by Saudi SMEs. Various factors like organisational culture, vendor's commercialisation strategies and government policies related to adoption of WiMax technology in SMEs will be discussed in this research. To set the scene for the subsequent analysis of these factors, this chapter begins with an introduction to the research area. WiMax technology and current research on WiMax adoption by SMEs in KSA are discussed thereafter. The researcher has also mentioned the relevant literature including organisational culture, government policies and vendors commercialisation strategies. Moreover, motivation for WiMax adoption in SMEs is also indicated in this section, followed by an overview of the research methodology of this thesis. The aims and objectives of the research are presented next. Research contribution, thesis structure and conclusion have also been discussed in this section. The chapter ends by outlining the thesis structure to assist the reader in positioning each subsequent chapter within the overall research framework.

1.2 WiMax Technology

Wireless technologies have turned out to be critical in our modern society. As highly accentuated by several researchers – 'Wireless' is the future of broadband technology (Ganapati and Schoepp, 2008; Jindal et al., 2005). It certainly offers several advantages over the wired connections for Internet access such as greater mobility and flexibility, so that wireless devices can be used in the field for various purposes (Ganapati and Schoepp, 2008). Technologically, several types of wireless network

alternatives have emerged in the recent years such as Wi-Fi. Despite providing several benefits, there are yet still several limitations in terms of costs, management, and technical characteristics (Jindal et al., 2005; Rao and Parikh, 2003). Wi-Fi technology has certain limitations which Worldwide Interoperability for Microwave Access (WiMax) intends to overcome (Ganapati and Schoepp, 2008; Abichar et al., 2005; Vaughan-Nichols, 2004). According to the highlighted literature WiMax technology has advantages over the other existing broadband network such as enabling access anywhere, anytime and virtually on any device which based on the IEEE 802.16 standard. WiMax technology does not required fibre or leased line. Therefore, this technology is a high capacity network that provides fast Internet connections for backhaul applications (Ganapati and Schoepp, 2008; Jindal et al., 2005; Vaughan-Nichols, 2004).

According to and Vaughan-Nichols (2004) WiMax has numerous advantages such as enhanced performance, security, speed and end-to-end Internet protocol-based networking over other Internet technologies. Vaughan-Nichols Ahson and Ilyas (2007) also highlighted that using WiMax technology give users both residential and business areas the ability to surf the Internet within 50km of service area with a single base station with a bandwidth of 75 Mbps.

The idea behind the WiMax technology to offer Internet services based on flexibility in architecture, high security, swift deployment, interoperability, portability, mobility, wider coverage and high capacity cost effective service (WiMax Forum, 2005). Flexibility is achieved with point-to-point, point-to-multipoint, and ubiquitous coverage where advanced encryption standard and triple data encryption standards have been used to maintain the high security service. Deployment can be done quickly in comparison to other wired Internet technologies because WiMax does not require external plant construction as wired broadband does. WiMax technology's subscribers could use this technology in different locations internationally due to the vendor-neutral standards which achieving the interoperability objective. Moreover, WiMax's subscribers have portability use the service as long as they registered in the system database and it provides advanced mobile services because WiMax technology has large geographic areas coverage. Finally, WiMax technology provides high speed bandwidth to end-users by using advanced modulation and channel bandwidth to improve the high capacity (WiMax Forum, 2005).

Despite all WiMax's advantages that mentioned above Lu et al. (2008) argues that the ability of WiMax technology to provide cost-effective solution is the most important issue for its success. Moreover, Abichar et al. (2005) points out that WiMax technology need to overcome many challenges before it is widely adopted because it is either distributed by governments or dedicated carriers. Also, Abichar et al. (2005) argue that WiMax technology requires high frequency radio which needs installation of additional antennas that making the cost of deployment considerably

higher than expected. Additionally, other technologies that are based on IEEE 802.20 mobile broadband technology such as cellular phones, PDAs, and laptops may create unforeseen competition for the mobile version of WiMax technology (Abichar et al., 2005).

Conversely, several researchers emphasise that WiMax broadband technology has the potential to serve in several ways that may overshadow the challenges to WiMax such as: (a) linking residential areas and businesses to core telecommunications networks worldwide, (b) WiMax closes the digital divide, (c) WiMax provides last-mile access to a broadband Internet Service Provider (ISP) utilising point-to-multipoint network and (d) WiMax provides high download limits (Shankar and Hegde, 2008; Yarali et al., 2007; Lu et al., 2007; Aytar, 2008). Having presented the discussions and analysis on the functionality and benefits of WiMax technology, in the next section the author takes a step forward and explores the adoption perspective of WiMax technology in the domain of SMEs and thereafter, specifically in the context of KSA.

1.3 Current Research on WiMax Technology Adoption by SMEs in KSA

As this literature review is concerned about WiMax broadband technology adoption by SMEs in the context of KSA, the author deems important that there is a need to have some background information about KSA. Literature indicates that the Internet is a relatively new technology in the region of KSA and King Abdul-Aziz City for Science & Technology (KACST) pioneered and commenced the Internet service in 1997 (Dwivedi and Weerakkody, 2007). KACST has issued several policies and formal procedures for Internet usage by both public and private organisations. These policies include settings plans for spreading the Internet all over the Kingdom users and having training programs for KACST's employees.

According to Dwivedi and Weerakkody (2007) Saudi Arabia had limited options for Internet connectivity. Only three main types of Internet access were available in the country including dial up, DSL broadband and satellite. Further study by Numair and Masarweh (2010) reported that, more Internet connections have been introduced in the country. They said that WiMax has softly launched in Saudi Arabia in 2007. Subsequently, the WiMax service has been strongly provided by WiMax vendors in the Saudi telecommunications market in 2010. Three operators have commercially offered telecom services over WiMax networks in all major cities in Saudi Arabia. Even though with the introduction of new Internet connection such as WiMax technology, the options remain limited in comparison to the developed and ICTs leading countries such as UK and South Korea (Oh et al., 2003).

Literatures discussed that SMEs in KSA can play various important roles as both suppliers and buyers. For example SMEs can act as sellers, subcontractors or suppliers in KSA (Looney, 2004). SMEs can also play a big role in reducing the unemployment in KSA by creating new low cost jobs. Report has confirmed that with the huge ICT market opportunities, many Saudi are working for SMEs taking up the ICT roles (MENA Business Reports, 2003). According to Ismail (2004) 93% of the total organisations in Saudi Arabia are SMEs. In 2011, although SMEs represented almost 90% of total enterprises in KSA their contribution to GDP was only 33% with 25% contribution to the job market (SUSRIS.com, 2011).

According to Ismail (2004) SMEs in Saudi Arabia are still affected by the digital divide which holds them from improving their business in comparison to large organisations. Adopting ICTs technologies could be very expensive for SMEs due to their limited financial and human resources. A techno-economic model has been presented by Smura (2005) to analyse 3.5 GHz WiMax-based network deployment to provide SMEs with fixed wireless Internet. Based on In-Stat/MDR report, Schoolar and Fischer (2004) estimated that between 2003 and 2007, the fixed wireless broadband would grow from \$558.7 million to more than \$1.2 billion because of the introduction of standardised WiMax technology. Angelov and Rao (2006) reported a research conducted by The Yankee Group that in 2003, only 21% of American users were using broadband while 51% of businesses in the USA had adopted broadband technology. Out of the 51% of those businesses, 90% were large organisations while 35% were SMEs. Therefore, WiMax technology could be a great opportunity for SMEs in the future.

Despite the research that examines WiMax technology adoption from the organisational culture, government policies and WiMax vendor's commercialisation strategies perspective have not yet been undertaken by SMEs and specifically in the context of KSA. Therefore, this research aims to explore the reasons for the slow uptake of WiMax technology by Saudi SMEs in Jeddah based on organisational cultural, government policies and WiMax vendors' strategies. The research will thereby seek to identify organisational culture types, government policies and WiMax vendors' commercialisation strategies that have impact on the WiMax technology adoption by SMEs. The research also attempt to examine why and how the identified organisational cultural types, government policies and WiMax vendors' strategies affect SMEs towards the adoption of WiMax technology in KSA. There are relatively few research studies that have examined WiMax technology adoption from the organisational cultural perspective, government policies and vendors' commercialisation strategies perspective (*i.e.* in SMEs) in general, however, from the researcher's best knowledge no such research has been undertaken in Saudi Arabia while this research was in progress.

1.4 Motivation for WiMax Adoption in SMEs

The primary aim of this research was to investigate the factors that affect the adoption of WiMax technology by SMEs in the KSA. WiMax has emerged as a technology to overcome the limitations of traditional and existing broadband technologies and support a great number of organisations and consumers/citizens in providing a higher speed over substantial distances i.e. in areas that are difficult for wired infrastructure to reach (WiMax Forum, 2005). WiMax technology is intended to be used to cover the rural areas where there is no infrastructure where SMEs operate.

Recent research in broadband technology adoption mainly focuses on broadband services for home uses, while there is little emphasis on the adoption of WiMax by SMEs and specifically in the context of KSA. Focus in the research of broadband has been in various areas including: broadband content, costing, government policies, educational and entertainment benefits (Oni, 2008). Moreover, research on WiMax technology focus on its developments, deployments, benefits of use, challenges, evaluation, adoption issues in healthcare and education. For example, the features of WiMax technology and its use in health services have been studied by Tseng and Chen (2007).

The uptake of the broadband is not as high in Saudi Arabia as other countries (Dwivedi and Weerakkody, 2007). While many studies focused on the broadband adoption in the developed and ICTs leading countries such as South Korea, limited studies have been conducted to understand the reasons behind the slow uptake of broadband in developing countries such as Saudi Arabia. For example, the factors that have impact on the adoption of broadband in the KSA have been investigated by Dwivedi and Weerakkody (2007). However, they have investigated the broadband adoption from the consumers' perspective. Yet the factors that affect the Internet technologies adoption such as WiMax technology by SMEs have not been examined widely. This is giving a motivation for the researcher to investigate the WiMax technology adoption and its usefulness and explore the reasons behind the slow adoption of this technology by SMEs in KSA.

Despite all the interest in the types of broadband adoption as demonstrated by SMEs in several countries, there seems to be slow progress and lack of information supporting the decision making process for WiMax technology adoption by SMEs specifically in the context of KSA. This may illustrate that SMEs adopt WiMax technology solutions at a slower pace. This research takes into consideration this literature gap and makes a step forward and investigates WiMax broadband adoption by SMEs in KSA with an organisational cultural view, vendors' commercialisation strategies and government policies by analysing the normative literature related to this research. In doing so, the organisational culture assessment instrument will be employed in this research to determine the dominant organisational culture type that might have an impact on the adoption of WiMax technology

by SMEs. Moreover, the study will explore the diffusion of WiMax technology by SMEs through government policies and vendors' commercialisation strategies. The research will apply the key dimensions in the institutional theory framework and the theory of disruptive innovation in order to investigate the WiMax technology adoption by SMEs.

As mentioned earlier, limited research has been done on the organisational culture, government policies and vendors' commercialisation strategies with regards to WiMax technology adoption by SMEs. Since research in the area of WiMax broadband adoption by SMEs is limited, this research could be of benefit to a number of groups. The possible beneficiaries of this research include policy makers, SMEs and researchers. A detailed study examining the WiMax broadband by SMEs could help policy makers in decision-making concerning the KSA government's input in aiding broadband adoption and IT in general. It could also benefit SMEs as it could aid in deciding whether or not they need to adopt WiMax technology and how it could improve their businesses. Additionally, it could benefit researchers involved in SME or adoption studies. Therefore, this research is attempting to answer the following research question:

***Research Question:** How do the organisational cultural profile, government policies and vendors' commercialisation strategies influence WiMax adoption by SMEs in the context of KSA?*

1.5 Research Aims and Objectives

Shipton (2001:2) states that, choosing the right research design depends upon the research questions. Every research should be unique in its objectives and questions. It should exploit the best and appropriate research method. For this reason, this chapter begins with presenting the research questions of this study.

The main objective of this study is to explain the association between adoption of WiMax by SMEs in the Kingdom of Saudi Arabia and organisational culture on one hand and also the government policies and vendors strategies. Specifically, this study aims to answer the following questions:

***Q1:** What is the impact of the organisational culture on the adoption of WiMax technology by SMEs in Saudi Arabia?*

***Q2:** What is the impact of the WiMax vendors' commercialisation strategies on adoption of WiMax technology by SMEs in KSA?*

Q3: *What is the impact of Saudi government policies on WiMax technology adoption by SMEs?*

In order to achieve these aims, the objectives of this research are outlined as below:

- **Objective 1:** *To critically review the WiMax literature and understand the area with a particular focus on SMEs in the context of KSA.(chapter 1, chapter 2)*
- **Objective 2:** *To investigate the organisational cultural profile in relation to WiMax technology adoption in SMEs in KSA.(chapter 2,4)*
- **Objective 3:** *To investigate the vendor's commercialisation strategies and the government policies those might have impact on WiMax adoption by SMEs in KSA. (chapter 2,5)*
- **Objective 4:** *To propose a conceptual model for WiMax adoption in SMEs and apply it in specific geographical context of KSA. (chapter 2,6)*

1.6 Introduction to Methodology

This study aims to examine the impact of organisational culture, vendors' commercialisation strategies and government policies on WiMax adoption by SMEs in KSA. From the different kinds of research approaches, the researcher has selected positivism and post-positivism as the philosophy of this research. According to Newby (2010) research philosophy is important for any research for directing it in right way and research philosophy could be positivism and post-positivism and based on the working procedures it could be varied. Positivism is a philosophy which is generally used for quantitative research (Newby, 2010). Oliver (2010a) mentioned that positivism research is related to quantitative research and statistical data are involved in this research philosophy. According to Cryer (2006) this research philosophy is intended to evaluate quantitative data and statistical proven results are shown. On the other hand post-positivism research philosophy is related to subject matter. According to Johnker and Pennink (2010) in the post-positivism research philosophy, data are interpreted by applying theory and this research philosophy is generally used for social researches.

A structured survey questionnaire is used in the first stage of the research to identify the dominant organisational culture of SMEs that might have an impact on the adoption of WiMax technology. In the second stage of data collection the researcher has used in-depth interviews with semi-structured interview questions to assess the government policies and vendors' commercialisation strategies that might have an impact on the WiMax technology adoption by SMEs. Both primary and secondary data

including books, journals and online sources are used by the researcher. Research methodology is discussed in the third chapter of this research.

1.7 Research Contribution

The research aims to demonstrate the use of organisational culture assessment instrument (OCAI) and some attributes from the Institutional theory and the theory of disruptive innovation for an in-depth examination of the WiMax technology diffusion phenomenon by Saudi SMEs. The research involves a theoretical and an empirical investigation of issues faced by SMEs in the WiMax technology diffusion process and will lead to the development of a set of framework for the examination of WiMax adoption by SMEs. The model that will be developed will be useful to all relevant stakeholders/decision-makers that are interested in the adoption of WiMax technology. The direct beneficiaries of this research's result will be the managers/owners of SMEs in KSA, who are faced with day-today problems and decisions on IT adoption in general and WiMax technology in particular. In terms of theoretical contribution, this research contributes to organisational culture framework, the Institutional theory and the theory of disruptive innovation. It extends the theoretical knowledge on WiMax technology adoption process and acceptance. It will be the first study to examine the WiMax technology adoption by SMEs in Saudi Arabia. Moreover, this research will make further contributions by providing fine-grained analysis of the organisational culture of Saudi SMEs in Jeddah. It is one of the first empirical studies to link the institutional theory and the theory of disruptive innovation to the organisational culture framework in relation to the WiMax technology adoption by SMEs in the context of KSA. The costs and failure of adopting WiMax technology by SMEs are high and this research will investigate issues of importance to SMEs in Saudi Arabia particularly beneficial to IT managers in a global world, and, especially for those who manage IT in Saudi Arabia.

1.8 Structure of the Thesis

The more clearly anybody can identify the patterns that are popular in a particular field, the sooner they can decode that tacit rule about writing. Every field has a template, a formula, a method for planning, for reviewing the literature, for citing sources, for presenting analysis, for writing and revising the research study and for conducting the research defence. Understanding the format or formats that are acceptable in this research field is essential to writing a useful outline (Single, 2009). The author divided the thesis into seven chapters in order to outline the structure of the thesis. Each

chapter of the thesis provides various important issues for this research. The thesis outline is explained in this section with a brief summary of each chapter (**Figure 1.1**).

Figure 1.1 Thesis Structure

CHAPTER I	• INTRODUCTION
CHAPTER II	• LITERATURE REVIEW
CHAPTER III	• RESEARCH METHODOLOGY
CHAPTER IV	• QUANTITATIVE FINDINGS
CHAPTER V	• QUALITATIVE FINDINGS
CHAPTER VI	• DISCUSSION
CHAPTER VII	• CONCLUSIONS AND FURTHER RESEARCH DIRECTIONS

Chapter 1 presents an introduction to the research study with an explanation of the aim and objectives of the study. The author also clarifies the reasons behind choosing this topic. Background of the research and rationale is given in this chapter.

Chapter 2 explains the review of the literature of the study including organisational culture, government roles and policies and vendors strategies for the adoption of WiMax technology in SMEs in Saudi Arabia.

Chapter 3 presents research methodology used when collecting data for the study. It explains methods and techniques applied for the methodology. It also describes the conducted quantitative survey and qualitative interviews for the research study.

Chapter 4 gives information about data analysis and survey results that were gathered from the survey. Descriptive statistics are analysed by using statistical distribution and key analyses calculated after the survey is analysed and discussed by the author.

Chapter 5 gives information about data analysis and interview results gathered from the interviews of government representatives and managers of SMEs organisations.

Chapter 6 discusses the outcomes the author has gained during the research and it will be discussed based on the data analysis and provided literature review.

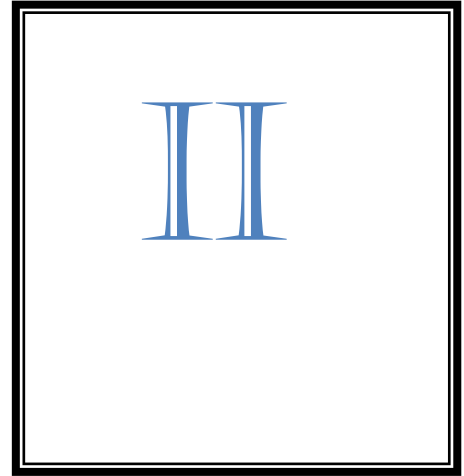
Chapter 7 provides the conclusion and recommendations for adoption of WiMax technology in SMEs and further research ideas will be mentioned in this chapter.

All chapters contain the aims and objectives of the study and a brief introduction to each chapter in order to provide advanced information to the reader. There are also conclusions after all chapters.

1.9 Conclusion

In conclusion, the author presented the aim and objectives in this first chapter of the thesis. The objectives related to chapter 1 were explained by the author. A brief overview of the study was given in this chapter as well. The reason behind choosing the topic was introduced under the motivation of the research heading. The structure of the thesis was explained finally in the chapter just before this conclusion.

In the next chapter of the research study, an academic review of the literature will be presented and theoretical information will be provided by the author. The adoption of WiMax technology in SMEs in Saudi Arabia and theories related to organisational culture, government policies and WiMax vendors' strategies will be explained in chapter 2.



CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

There has been little academic attention paid to the adoption of wireless broadband such as WiMax by SMEs as highlighted in chapter 1. SMEs are the most vital segment of the corporate landscape. They are considered to be the engine of future economic growth. With their own nature and characteristics, SMEs' attitudes vary when it comes to adoption of new technologies such as WiMax. Having said that, there are many explanations as to why SMEs may decide to adopt new technology. Yet, the adoption of the new technology by SMEs is not simple and straightforward.

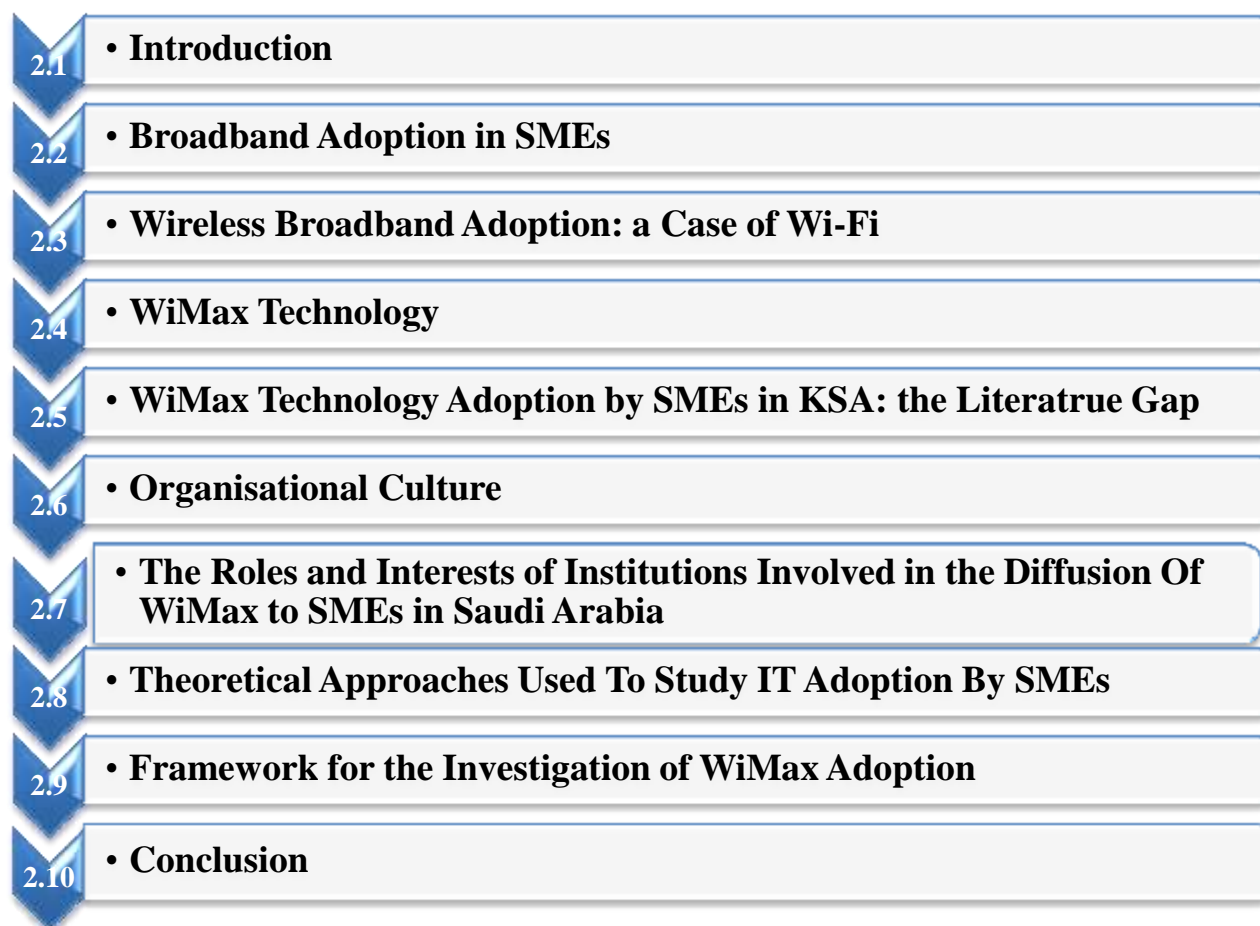
Despite all the interest in the types of broadband adoption as demonstrated by Small and Medium Enterprises (SMEs) in several countries, there seems to be slow progress and lack of information supporting the decision making process for broadband (in this case WiMax) adoption specifically in the context of the Kingdom of Saudi Arabia (KSA). The author takes into consideration this literature gap and makes a step forward and investigates on WiMax broadband adoption by SMEs in KSA and analyses the normative literature related to this research study. In doing so, Section 1 initiates the underlying debate on the characteristics of SMEs, broadband in general and specifically broadband adoption and its importance in SMEs. The arguments presented in this section assist in building an understanding towards broadband adoption in SMEs.

The author moves forward with the demonstrative knowledge acquired from Section 1 and further utilises it to explore and comprehend wireless broadband adoption in Section 2. In this section, the author presents the evolution of wireless broadband networks such as Wi-Fi, discusses on its benefits and existing limitations of Wi-Fi. The author proposes wireless broadband adoption: A case of Wireless fidelity in Section 3.

This section highlights the functionality and importance of WiMax technology. In Section 4, taking into consideration the limitations of wireless broadband technology the author highlights the WiMax technology and its various applications and advantages and in section 5 the researcher (a) highlights the gap in the normative literature with regards to WiMax adoption in SMEs and specifically in the context of KSA and (b) presents the factors affecting the process for WiMax technology adoption decision. Thereafter, Section 6 presents the theoretical approaches adopted in the context of SMEs, for example theories related to the adoption of new technologies by SMEs and theories related to government policies and also vendor strategies. The motivations to conduct research in this area (i.e. WiMax broadband adoption by SMEs in KSA) with a cultural view will be delineated and interpreted in section 6 while the importance of the government role in WiMax technology adoption will be presented in section 7. Moreover, the vendors' strategies and its impact on WiMax technology

adoption by SMEs in context of KSA will also be presented in the section 7. The theoretical approaches used to study IT adoption by SMEs will be discussed in section 8. The framework guiding the research will be presented in section 9 while summarising the conclusions in section 10. **Figure 2.1** presents the structure of this chapter.

Figure 2.1 Structure of chapter 2



2.2 Broadband Adoption in SMEs

Literature indicates that SMEs are considered as a substantial constituent of the global economy i.e. an imperative source of entrepreneurial skills, innovation and employment for the local, regional and national economic growth (European commission, 2007; Taylor and Murphy, 2004). According to the European Commission (2007), SMEs are enterprises that are based on fewer than 250 employees. According to Simpson and Docherty (2004) several definitions and conceptions related to SMEs are generated from the 1971 Bolton Committee Report. According to this report small firm is self-regulating organisation with very small market share.

SMEs can be classified into micro, small and medium enterprises depending on the head count or annual turnover. Micro enterprises are defined as firms that have less than 10 employees. Small firms have between 10 and 49 employees an annual balance-sheet total not exceeding 10 million Euros while medium firms have less than 250 employees with a turn over not exceeding 50 million Euros (The DTI, 2004). SMEs represented 99% of all organisations in the European Economic Area (EEA) making 75 million jobs (European commission, 2007). In the United Kingdom (UK) in particular, as at 2006, according to the Office for National Statistics (2007) 99.3% of all enterprises in the UK were small enterprises, 0.6% were medium-sized and 0.1% were large. SMEs accounted for 58.9% employment and 51.9% of the sales turnover generated in the country. Evidently, these statistics indicate that SMEs perform a vital role in the continuous development of several economies. SMEs in Saudi Arabia too, play a vital role in the industrial and economic growth. According to Ismail (2004) 93% of the total organisations in Saudi Arabia are SMEs making the viability, growth and competitiveness of SMEs critical to Saudi's economy as a whole. SMEs are frequently mentioned as creators of new products and innovators in adopting and using information technology.

The author also takes into consideration other perceptions theorised in the normative literature with a view to gain a better understanding of how SMEs function. For example, Levy et al. (2001) report that SMEs are mostly regarded to be sceptical while taking risks and they are driven by customer needs. Similarly, Simpson and Docherty (2004) argue that the majority of small firms are owned by a single person signifying that most decision-making will rest on one person. On the other hand, Oni (2008) asserts that SMEs are by and large considered to be cynical while taking the decision to adopt new technologies. It is only relatively recently that SMEs have started using Information and Communication Technologies (ICT) but their technology and management capabilities are considered inferior (Caldeira and Ward, 2002). It is also opined that although electronic commerce (e-Commerce) is widely used in large firms for various purposes, its use amongst SMEs has not been impressive and persistence (Pool et al. 2006). The Observatory of European SMEs report (2003) therefore the need to

build ICT-related capabilities and competencies among SMEs in Europe. The author argues here that due to such nature and size and slow pace in adopting technological solutions, SMEs may be unable to invest substantial sums of money on adopting technologies to support the thriving of their business. This argument is also supported by Oni (2008), who reports that the decision to adopt certain technologies might depend on the varying sizes and nature of SMEs. Literature demonstrates that not too many researchers have examined the adoption of Internet technologies and use by SMEs in the developing countries (e.g. in the case of this research KSA). The author argues here that as a firm transforms and develops its capacity, it could be expected that the need for different Information Systems (IS) supporting Internet technological solutions will be recognised.

According to Levenburg (2005), most small firms are in the early stages of implementing their business functionalities electronically (i.e. electronic business or e-Business) and have focused on using the Internet to explore new sources while relying on simpler, easy-to-use technologies. However, the high prevalence of websites and the use of more sophisticated e-Business tools among the larger SMEs, shows that the larger SMEs are at advanced stages and more into e-Business. There are other factors about how SMEs decide whether or not they need to adopt new Internet technologies. For example, according to Beckinsale and Levy (2004), SMEs' decision to adopt Internet or not depends on the perceived benefit and relative advantage that they might get. While it might not be possible to reap the profits of investing in new technology immediately, the long-term effect could turn out to be immensely beneficial to the SME.

Sandler and Bogg (2001) demonstrate that the use of Internet could put SMEs on a platform where they are able to compete with larger companies. More SMEs could decide to adopt it if they were aware of this. However, Saban and Rau (2005) suggest that resources are more of a deterrent to adoption rather than lack of knowledge. The various characteristics that have been discussed in this section have a major impact on the decision making processes in SMEs while adopting new Internet technologies. Literature indicates that the emergence of the recent innovative Internet technologies such as the broadband is seen as an important evolutionary step and provides fast and constant access to a variety of new services and applications to the benefits of the consumers in both lifestyles and productivity. In the recent years, broadband has raised the interest of several organisations and policy makers worldwide, mainly due to its impact and role in modernising economies and societies.

Aronsson et al., (2003) defines broadband as "anything with a bandwidth larger than 4Hz". Firth and Kelly (2001) reported that the definition of broadband varies from country to country with no particularly established definition. The word broadband is actually a hybrid of two words, broad and bandwidth (Dobers, 2002). Broadband technology is an umbrella term, which covers varying technologies for high speed access such as Asymmetric Digital Subscriber Line (ADSL), cable

modems, satellite, and wireless fixed networks (Colombo et al., 2008; Sawyer et al., 2003). Broadband provides an 'always on' and faster Internet connection than dial up. It is an emerging technology that promises to improve Internet use. In the context of making use of this technology, broadband has been used for educational, financial and entertainment purposes. Its adoption may be influenced by a number of factors such as government policies, stakeholder interests, geography and demographics, cost and user benefits (Lee and Choudrie, 2002). Broadband has also been stated to have a significant impact on users' on-line habits (Stanton, 2004; Dwivedi and Choudrie, 2003). In a different context, Stanton (2004) also investigated the factors influencing the adoption of the residential broadband, whereas, Choudrie and Dwivedi (2006) examined the socio-demographics of broadband household consumers.

Further research examining the benefits of broadband in relation to the cost of broadband services was also subsequently carried out (Yaiche et al., 2000; Falkner et al., 2000). The cost of obtaining and maintaining broadband could be a hindrance to its adoption, as Zhang (2002) highlights that broadband is slightly more expensive than narrowband. Conversely, a number of factors may contribute to whether or not and how broadband is being adopted in different countries. For example, Kim et al. (2003) researched broadband uptake in Organisation for Economic Co-operation and Development (OECD) countries and identified factors such as preparedness of a nation and the cost condition of deploying advanced networks as the most common factors to explain broadband uptake. In some countries, there have been low broadband adoption rates. For example, Chang et al. (2003) researched the deployment of broadband in Australia. They identified areas that have been holding up broadband adoption in the country and pointed out areas where more attention is needed. Aron and Burnstein (2003) therefore opine that broadband availability and adoption in a state may be driven by facilities-based competition, demand and cost factors, but may not be associated with the availability of broadband services. Their research supports that broadband is beneficial to the economy. On the other hand, South Korea has a particularly high rate of broadband diffusion, which has sparked a lot of interest (Lee et al., 2003). In Singapore, aggressive investments in infrastructure contributed partly to the high broadband penetration (Ang et al., 2003).

In addition to the aforesaid theorised conceptions, there are several benefits that have been attached to the adoption and use of broadband and theorised in the normative literature. Such as the constant fast reliable connection, and the widely advertised broadband diffusion which have been in the front burner of in technology related policies worldwide (Oni, 2008). Other benefits related to SMEs include among others better links between SMEs and more information for decision making, greater access to external resources and expertise (Chappell et al., 2002), ability to compete with large firms (Sandler and Bogg, 2001), and productivity is also cited as one of the major benefits of broadband technology in SMEs (Lee, 2002). Since broadband also facilitates home-working, it saves both small

and large organisations office space costs (BSG, 2004) and also facilitates the transformation of business transactions, making organisations more productive and innovative as they engage in e-Commerce and e-Business. In this context, SMEs may benefit from greater productivity if they adopt broadband and use it to access the Internet and conduct transactions. SMEs may experience growth from an increase in productivity resulting from greater process efficiency and improved information exchange (OECD, 2003). In addition, in delivering economic values broadband may improve the competitiveness of SMEs and act as it provides the capability to exploit business opportunities (BSG, 2004). However, as illustrated in the earlier discussions, it is obvious that broadband has generated a lot of interest in different economies, yet there has been limited focus on its adoption by SMEs in the developing countries such as the case of KSA.

A literature analysis conducted by Oni (2008) illustrates that in 2004, although 68% of UK SMEs connected to the internet, the connections were done using different methods. Most of the SMEs used narrowband (65%) followed by broadband (37%), and narrowband un-metered service users (32%), ISDN users (23%), narrowband metered service users (21%) and users not sure of connection type (6%) (Ofcom, 2004). More recently, in 2006, 77% of SMEs were connected to the Internet while 62% of SMEs used broadband for their Internet connection. Its use was higher among larger SMEs with 50-250 employees, 70% of which use broadband for their Internet connection (Ofcom, 2007). These statistics provide information on the number of SMEs that have adopted broadband. However, there is limited research on broadband (specifically worldwide interoperability for microwave access or WiMax) adoption by the SMEs in the context of KSA. For example, Dwivedi and Weerakkody (2007) highlighted that in KSA, broadband has taken a while to diffuse and slow progress has been noted towards its adoption. The author emphasises and states that this may be attributed to several reasons including: (a) the relative adoption of new ICT reactively by SMEs in KSA compared to organisations in other sectors, (b) the reluctance to adopt new technologies due to lack of skilled staff, (c) KSA SMEs' lack of understanding and knowledge of WiMax broadband, (d) KSA SMEs' unpreparedness for technological transformations, (e) KSA SMEs' inability to react proactively to the constantly changing and evolving technologies around. SMEs may lack of insight and are mostly reluctant to adopt WiMax broadband but are being forced adopt in most cases. Concern for return on investments and the inability to assess these returns on investments may also have been responsible for the indecision on the extent of their investments. The adoption of WiMax broadband in KSA by SMEs may therefore have been hindered by these issues.

Taking into consideration the knowledge acquired in this section, the researcher discusses on wireless broadband adoption specifically highlighting Wi-Fi, its benefits and limitations in the following section.

2.3 Wireless Broadband Adoption: a Case of Wireless Fidelity (Wi-Fi)

Literature indicates that wireless broadband technologies have not only revolutionised and impacted communications in the developed world over the past few decades; they also offer opportunity to “leap-frog”, ensuring that developing countries could move to and start at the forefront of communications (Pentland et al., 2002; Lehr and McKnight, 2003). It is however important for the developing countries/markets to choose the technology that best matches their needs as there are several distinct wireless technologies used to provide connectivity in the past three decades, in different countries e.g. dial-up, DSL broadband, radio communication devices, wireless local loop, satellite/VSAT. However, in this section the author discusses on a much recent mature wireless broadband technology adopted in several organisations i.e. Wi-Fi, also known as Institution of Electrical & Electronics Engineering (IEEE) 802.11b (Yen and Chou, 2001). Growth in the Wireless Local Area Networks (WLANs) can be traced to the creation of 802.11 which is the IEEE technical standard enabling high-speed mobile interconnectivity. A new rate standard for WLANs, viz. 802.11b, also known as Wi-Fi was IEEE ratified after sustained efforts by the WLAN Standards Working Group (Yen and Chou, 2001). This standard was certified by the Wireless Ethernet Compatibility Alliance (WECA) (Molta, 2002). The 802.11a and 802.11b standards were both approved by the IEEE to provide for data rates up to 54 Mbps at 5-GHz frequency. Another standard rate 802.11g with an even higher data rate operating on the same frequency as 802.11b was also recently introduced. However 802.11b standard is the most widely deployed standard and most referenced in recent normative literature (Rao and Parikh, 2003).

Wi-Fi is considered to be a viable and practicable broadband technology for wireless local area networking applications in both business and home environments (Houlston and Sarkar, 2005; Pentland et al., 2002). Wi-Fi is regarded as one of the most popular technologies for has been made to conform to IEEE standard as 11 Mbps WLANs. Wi-Fi therefore stands out as a technology that attracts much interest within the flat hi-tech landscape in the last few years (Broatch 2003). Business and domestic users have continued to adopt Wi-Fi which is revolutionising wireless networking. This has thus established a significant base for laptops computers and Personal Digital Assistants’ (PDAs) internet connection enabled by Wi-Fi, with mobile phones also catching up with the trend (Ko et al., 2006; Broatch, 2003; Pentland et al., 2002). There is however some basic drawbacks with Wi-Fi such as limited range which is being addressed by new extensions such as the Wi-Fi mesh networks. These new extensions enable Wi-Fi coverage to metro scale areas as several access points share a common backhaul connection. The new system also enables relatively high bandwidth wide-area connectivity with significant price and performance advantage (Ko et al., 2006; Lehr and McKnight, 2003).

Wi-Fi broadband technology has experienced rapid transformation both in applications and as the subject of normative literature. Such rapid growth of Wi-Fi is clearly illustrated by two surveys conducted in the US (Houliston and Sarkar, 2005). For example, the trend shows wide adoption and use with 47% growth rate within two years – 2001 to 2003. Cisco's report of 2001 indicates that only 10% of US organisations were using Wi-Fi in 2001 while AirMagnet report of 2003 shows 57% of organisations using Wi-Fi in 2003. Furthermore, while the growth rate in Europe has been hindered and much slower due to competition from the High Performance Radio LAN (HiperLAN) (Houliston and Sarkar 2005), the Asia-Pacific region have had the fastest growth rate largely due the rapid uptake in Japan and Korea. Several benefits can be identified from these surveys and others reported in the wireless broadband literature. For example, Gartner Research identified two potential benefits of Wi-Fi technology; namely, cost reductions and improved productivity (Redman, 2003). Some of the cost savings offered by Wi-Fi are also illustrated in a case study of McDonald's in New Zealand (Smith, 2003). Other benefits reported by Jindal et al. (2005) are that Wi-Fi: (a) requires less regulatory controls in many countries using the unlicensed portion of the broadcast spectrum, (b) enables the building of a more dynamic network and frees the attachment of network devices to cables, (c) enhances the production of reliable and bug-free Wi-Fi products, (d) encourages competition amongst vendors which has helped in bringing down prices, (e) it enables mobility while being connected to the Wi-Fi network.

Wi-Fi wireless networks promises free access to information, computing resources and connectivity, just as much as ubiquitous computing infrastructures offer to users but with a higher cost (Jindal et al., 2005). Unlike Wi-Fi networks, ubiquitous computing infrastructures also come with issues such as coverage that is fragmented, unequal bandwidth sharing, free riders, and lower reliability and security (Rao and Parikh, 2003). However despite the rapid growth of Wi-Fi wireless broadband networks to date, literature still indicates that there are significant number of limitations and challenges the network must address to become a reliable mode of all Internet access. An instance is the use of 2.4 GHz spectrum by 802.11g and 802.11b standards of WI-FI wireless technology (Jindal et al., 2005). The overcrowding of the 2.4 GHz spectrum with other devices may have a drag on its performance. Similarly, Rao and Parikh, (2003) also report several concerns related to Wi-Fi such as bandwidth crunch, security consciousness, network integration and group dynamics. Other devices that use microwave frequencies which may result in low performance are some types of cell phones. The fairly high power consumption of the standards and devices also makes battery life span and heat a major concern. The configuration of Wi-Fi has also been a concern for many, it uses Wired Equivalent Privacy (WEP) protocol for protection, although breakable and sometimes difficult to configure.

Newer wireless solutions have thus been introduced to provide support for the superior Wi-Fi protected access (WPA) protocol which implements the 802.11i protocol aimed at a better configuration and security scheme. Wi-Fi networks with a typical Wi-Fi home router using 802.11b or 802.11g of a range of 150 feet (46 m) indoor and 300 feet (92 m) outdoors are reported to have limited range. Surveys conducted by Houliston and Sarkar (2005) also highlighted several limitations attached to Wi-Fi such as: weak security – one of the main challenges in Wi-Fi technology, uncertainty over plethora of Wi-Fi standards, lack of expertise – while creating a small Wi-Fi network is relatively simple, however, setting up a large-scale Wi-Fi network requires some expertise that wired network engineers are not likely to possess, inconsistent performance and business value. Taking into consideration the limitations of Wi-Fi wireless broadband technology, the author proposes the use of Worldwide Interoperability for Microwave Access (WiMax) technology that enables access to broadband, anytime, anywhere through any device and discusses on its functionality and benefits in the next section.

2.4 WiMax Technology

As highly accentuated by several researchers, ‘Wireless’ is the future of broadband technology (Ganapati and Schoepp, 2008; Jindal et al., 2005). It certainly offers several advantages over the wired connections for Internet access such as greater mobility and flexibility, so that wireless devices can be used in the field for various purposes (Ganapati and Schoepp, 2008). Technologically, several types of wireless network alternatives have emerged in the recent years such as Wi-Fi. Despite providing several benefits, there are yet still several limitations in terms of costs, management, and technical characteristics with regards to Wi-Fi (as discussed in Section 2.3). Literature highlights that a plethora of proponents are advocating the use of WiMax to overcome the limitation of Wi-Fi technology – yet another wireless broadband technology which is based on point-to-multipoint wireless networking standard that is evolving (Ganapati and Schoepp, 2008; Abichar et al., 2005; Vaughan-Nichols, 2004). WiMax is based on IEEE 802.16 standard which enables wireless broadband access anywhere, anytime and through any device. WiMax is opined a wireless communication technology with a promise of high data rate communications and business and consumer wireless broadband services on a scale as large as the Metropolitan Area Network (MAN) (Abichar et al., 2005). WiMax eliminates expansive leased line or fibre alternative and therefore regarded as an ideal backhaul applications’ broadband technology (Ganapati and Schoepp, 2008; Jindal et al., 2005; Vaughan-Nichols, 2004).

Literature indicates that WiMax has numerous advantages that are also the driving force behind opting for WiMax broadband technology such as: improved performance and robustness, Internet protocol-based end-to-end networking, secure mobility, and broadband speed for voice, data and

video (Ahson and Ilyas, 2007; Vaughan-Nichols, 2004). WiMax is a Wireless Metropolitan Area Network (WMAN) technology providing broadband wireless connectivity that is interoperable to fixed, portable and travelling users that are in the service range of 50km (Ahson and Ilyas, 2007). Other benefits include: provision of high rates of broadband connectivity up to 75Mbps to users in hundreds of residential and business areas with a single base station thereby removing the need of direct line-of-sight communication to base (Ahson and Ilyas, 2007). Vaughan-Nichols (2004) also argue that WiMax offers a standardised technology with its open approach which allows for economies of scale through the standardisation of large quantities of products and components.

The development of WiMax standard is argued to be based on some fundamental objectives (WiMax Forum, 2005). The objectives are follows: (a) flexible architecture which supports several system architectures including the point-to-point, point-to-multipoint, and ubiquitous coverage, (b) high security which supports advanced and triple data encryption standards, (c) WiMax QoS – for dynamic optimisation of traffic it carries, (d) quick deployment with little or no external plant construction, (e) multi-level service agreement between the service provider and the end-user, (f) interoperability standards that allows end-users to use their subscriber station in any locations and with any service providers, (g) portability – having similar characteristics with current cellular systems, having the ability to identify itself, and determine the nature of the link with the base station, and then negotiates its transmission characteristics accordingly, (h) provision of higher mobile environment that allows for mobility, (i) dramatically brings cost down based on the use of low-cost and mass-produced chipsets required for an open, international standard, (j) wider geographic coverage areas, (k) capability of handling non-line-of-sight operations, and (l) provision of significant high capacity bandwidth.

It is therefore argued that the success of the WiMax network depends on its ability to provide efficient existing and potential services' solutions at reasonable low cost, and not just on its salient features and technical characteristics (Lu et al., 2008). Although WiMax technology faces several stiff challenges with suggestions that much of the radio spectrum needed to be deployed, has already either been given out by governments or reserved by the carriers for other purposes (Abichar et al., 2005). It is also argued that deploying wireless technology may be relatively costly when the service is offered at higher radio frequencies requiring additional antennas to cover same service area. Therefore new technologies such as WiMax are given the available frequencies which are usually the higher ones while the more desirable lower spectrum ranges are left for other uses.

Abichar et al. (2005) also opine that the mobile version of WiMax may be facing major challenges from IEEE 802.20 mobile broadband technology, also designed for high-speed, wireless, IP-based connectivity to devices such as cellular phones, PDAs, and laptops, and operates in the 500 MHz to

3.5 GHz range. However, the potentials of WiMax to serve in several ways strongly positions it to overshadow the challenges such as: (a) worldwide linking of residential areas and businesses to core telecommunications networks (Shankar and Hegde, 2008), (b) huge promises to offer a digital divide solution (Yarali et al., 2007), (c) provision of last-mile access to a broadband Internet Service Provider (ISP) through the WiMax point-to-multipoint network (Lu et al., 2007), (d) provision of fast Internet access through higher download limits offered by WiMax operators (Aytar, 2008).

Having presented the discussions and analysis on the functionality and benefits of WiMax technology, in the next section the authors takes a step forward and explores the adoption perspective of WiMax technology in the domain of SMEs and thereafter, specifically in the context of KSA.

2.5 WiMax Technology Adoption by SMEs in KSA: Presenting the Literature Gap

As this literature review is concerned about WiMax broadband technology adoption by SMEs in the context of KSA; therefore the author deems important the need for some background information about KSA. Research shows that the Internet technology is relatively new in the region of KSA and is pioneered by King AbdulAziz City for Science & Technology (KACST) in 1997 (Dwivedi and Weerakkody, 2007). KACST has placed several policies and formal procedures for using the Internet in association with relevant public and private organisations. The foundational layout and design of the new network for information transfer in the Kingdom was well laid and staff to handle the network was also trained. There are three Internet access types available in the region of KSA namely: (a) dial up, the most common Internet access, (b) DSL broadband, and (c) satellite, which is comparatively expensive but not as popular. This indicates the slow diffusion and newness of internet in KSA which started with dial up connections, then the adoption of broadband, satellites and recently WiMax connections providing better data communication services to its citizens. Numair and Masarweh (2010) reported that, WiMax has softly launched in Saudi Arabia in 2007. Subsequently, the WiMax service has strongly provided in the Saudi telecommunications market in 2010. Three operators have commercially offered telecom services over WiMax networks in all major cities in Saudi Arabia. However, the number of Internet connections is still relatively poor in spite of broadband technology as compared to other developed countries such as the UK as well as leading broadband users like South Korea (Oh et al., 2003). Website filtration in the region may have been responsible for the poor connectivity which has consequently slowed than expected broadband adoption in the region of KSA.

On the other hand, it is argued that SMEs in KSA have potentials to play a number of key roles such as: (a) sales of their finished goods, (b) presenting themselves as subcontractors for or (c) supplying

raw materials to larger multinational enterprises (Looney, 2004). These potentials have enabled the creation of large number of jobs at relatively low costs. The ICT job market for example looks positive in Saudi Arabia as many positions are filled by Saudis working for SMEs (MENA Business Reports, 2003). SMEs in KSA currently represent almost 93% of total enterprises accounting for about 24.7% of total employment (Ismail, 2004). However, access to technology, a product of the digital divide has still remained a significant concern and challenge to SMEs in KSA (Ismail 2004). The need to improve technological networks' access to international standard is therefore a major concern but could be very costly and too much to bear for many SMEs. Smura (2005) therefore presented a model for techno-economic analysis of WiMax networks which was applied specifically for 3.5 GHz WiMax-based network deployment which provided fixed broadband services for SMEs. Reports however show that the Fixed Wireless Broadband (FWB) market will grow from \$558.7 million in 2003 to more than \$1.2 billion by the end of 2007 (Schoolar and Fischer, 2004). One major reasons of the increase is the introduction of standardised WiMax technology. Report also shows the adoption of internet by diverse groups in the West, just 21% of homes and 51% of businesses in the United States had broadband access in 2003. Among the businesses, almost 90% of large enterprises and only 35% of SMEs have broadband access. This clearly identifies the SMEs as a future opportunity for WiMax (Angelov and Rao, 2006).

WiMax broadband adoption has been examined widely from the organisational, cultural, government and vendors perspectives in different countries but has not been specifically carried out in the context SMEs in KSA. This research therefore aims to fill this gap and to explore the slow and low rate of the adoption of WiMax broadband in KSA in terms of the impact of cultural profile of organisations, government policies and vendors strategies. The research will thus seek to identify organisational cultural profile of SMEs, government policies and vendors' strategies and how they affect SMEs adoption of WiMax broadband in the region of KSA. Few research studies have examined WiMax broadband adoption from the organisational cultural perspective, government strategies and vendors strategies (i.e. in SMEs) in general, however, to the best of the author's knowledge and understanding no such research has been undertaken in the region of KSA. The author therefore briefly discusses the available normative literature in the area and outlines the theoretical base of this study.

The literature on adoption discussed hereafter provides discussions of organisational cultural factor, government policies and vendors strategies that drive the adoption of broadband deployment, in SMEs in general and particularly in developing countries such as KSA which is minimal. Adoption and diffusion of the Internet (broadband) globally is occurring at vastly different rates between the developed and developing countries partly due differences in GDP (Maitland, 1998). However, several other factors such as: bandwidth availability (Hahne, 1997), pricing (Cronin, 1996), telecommunications market structure (Paltridge, 1996), may also have contributed to the differences.

Although these factors highlight the variance in Internet (broadband) diffusion and adoption among countries, important factors that still remain include organisational culture, government policies and vendor's strategies.

Literature illustrates a significant amount of research conducted on organisational culture, specifically in the recent years the literature on organisational culture in business organisations has been prolific (Martin, 2002). Several researchers highlighted that culture is a vital factor that influences the diffusion and adoption of Internet (broadband) (Travica, 2008; Cronin, 1996; Cunningham, 1995). Organisational culture has been described as one of the unique characteristics that differentiate successful firms from others (Coopers and Lybrand, 1996). Understanding organisational culture is therefore vital to success in business and is regarded as an important task for leaders. Its impact on planned growth, productivity, the adoption of new systems, and change management in the organisation makes it very significant. It is also seen as a controlling factor in adopting changes and its successful implementation in organisations (Van den Bosh et al., 1999). Its importance is even more prominent in today's rapid transformation of economies, globalisation and the increasing collaboration and joint ventures among organisations. Organisational culture therefore may have a crucial influence on organisation's performance and ability to transform (Wilkins and Ouchi, 1983).

Three main factors namely public sector actions, private sector actions and the socio-cultural environment factors, have also been identified as factors contributing to the high rate of broadband adoption in South Korea (Lee et al., 2003). This shows that studies have been carried out to understand deployment of broadband in the developed world such as South Korea, no such similar studies have focused upon developing countries in terms of WiMax adoption by SMEs in the context of KSA in relation with the organisational culture, government policies and WiMax vendors' strategies. This can be attributed to the slow infrastructure development by SMEs in KSA and the low adoption rate which has provided motivation to conduct an exploratory study with the aim of understanding the perception of SMEs regarding WiMax broadband adoption and its usefulness in KSA. The author takes into consideration the organisational culture, government role and vendors' strategies factors and discusses these in the following sections.

2.6 Organisational Culture

Cultures change, but they also stay the same (Hatch, 1993). Over the last few decades, several researchers have studied the evolution of cultures, documented and theorised the stability and changes (e.g. White 1959). Hofstede (1980) defines organisational culture "as the values, attitudes, beliefs and behaviours that represent an organisation's working environment, organisational objective, and

vision”, others have however defined culture in terms of ideologies, basic beliefs and common values shared by the society which forms their collective will (Sackmann, 1992). Others have also suggested that culture involves more openly expressed, observable cultural artefacts such as norms and practices of the people and society (DeLong and Fahey, 2000), symbols (Burchell et al., 1980), as well as language and ideology that identifies the people (Pettigrew, 1979). Although there are many definitions of culture, Twati and Gammack, (2006) highlight the characteristic features of organisational culture as holistic, based on tradition, and socially built. Culture therefore can be expressed at various levels and manifesting in all ramifications of organisational life such as beliefs and values. Organisational culture therefore expresses practices based on common values and beliefs, which guides members’ attitudes and behaviour in the organisation (Hofstede, 1980).

Literature illustrates that the research on organisational culture have a lesser life span e.g. the interest in organisational cultural perspective started with the term organisational climate, in 1960 then further developed in the late 1970s and early 1980s (Twati and Gammack, 2006). Chai and Pavlou (2004), report that organisational culture is considered as a moderating factor while taking the decisions for accepting and adopting IS. Similarly, various other studies theorise the failures of planned organisational change that ignored the importance of organisational culture (Twati and Gammack, 2006). For example, 75% of re-engineering and technology adoption efforts have failed (Cameron and Quinn, 1999). Organisational culture may therefore be a factor in organisational success, while effective leadership forms the basis of the creation and management of organisational culture (Twati and Gammack, 2006). Schneider (2000) asserts that comprehending organisational culture is vital for managers because of its influence and impact on management learning and strategic development. The author considers the organisational cultural theories (Allaire and Firsirotu, 1984) for understanding the cultural factors (such as artefacts, espoused values and basic underlying assumptions) influencing WiMax adoption by SMEs in KSA.

Literature indicates that culture is considered the foremost complex attribute in organisations that helps in transforming enduring organisational change and performance in their services (Schein, 1992). The organisational model presented by Schein (1992), enlightens culture from the observers viewpoint i.e. described by three cognitive levels of organisational culture such as:

- Artefacts: surface objects such as dresses, traditional buildings, badges of other objects which can be easily differentiated, but can be difficult to comprehend;
- Espoused Values: artefacts that lie beneath intentional strategies, goals, and philosophies; and
- Basic Assumptions Values: assumptions and values representing the core of a culture at largely unconscious level and are hard to discern.

These levels provide the key to understanding organisational life and behaviour and they represent fundamental assumptions structuring the different levels and perspectives of human existence and characteristic nature (Schein, 1992). Schein (1992) therefore asserts that a strong organisational culture is typically considered as a conventional force.

Mallak et al. (2003) also accentuate that a strong culture means enhanced performance but may impact the propensity of organisations to adapt to transformation. The employees of SMEs may meet the introduction of WiMax in a strong organisational culture, like the Arabic culture, with some resistance to change. Therefore, it is vital to know the culture type of the organisations in the region of KSA before starting the adoption process of WiMax. Cameron and Quinn (1999) therefore opine that because organisational culture is complex with broad set of unclear factors, it is difficult and almost impossible to include every factor in its analysis for the purpose of adoption.

Literature also highlights that organisations are either people-oriented or task-oriented (Twati, 2006). Organisations that are people-oriented may adopt a wide decision-making structure. This influences the introduction of a flat organisational structure with a characteristic feature of a low power distance. On the other hand, task-oriented organisations are likely to adopt a more centralised decision-making process, which is likely to lead to a more hierarchical organisational structure, or a high power distance structure. The type of organisation, if it is task-oriented would aid the adoption and implementation of new technology such as WiMax, which if they helped to accomplish tasks faster and more efficiently would be accepted and implemented. In contrast, if the organisation is people-oriented then it would accept the technology slowly or may even resist the change to new technology because it could be seen as a threat to the people. The other factor deals with the relation between organisational culture and technology: there is a difference between organisations characterised as a technology-oriented culture and others that are a more traditionalist culture. The technology-oriented culture organisations are more likely to adopt modern technologies such as WiMax, than the traditionalist culture which will be more conservative in adopting WiMax (Alvesson, 2002). The literature points to lots of research studies on organisational culture and how they have affected adoption of technology which are measured differently according to the disciplines and backgrounds of researchers. In the next section, the author discusses some of the many determinants undertaken to measure the organisational culture.

2.6.1. Measuring Organisational Culture

To better understand the concept of organisational culture, several studies were explored in order to measure and map organisational culture. Literature theorizes several research studies regarding organisational culture. For example, researchers like Cameron and Quinn (1999), Trompenaars and

Hampden-Turner (1998), Schein (1990) conducted these studies based on their interest and discipline, and therefore came up with different measures and dimensions of organisational culture. Furthermore, there are different manifestations of culture as enhanced and influenced by the differences in societal and organisational culture and the various roles they play (Hofstede, 1991). Hofstede (1991) therefore developed six dimensions that assist in understanding different kinds of organisational cultures. These are: process versus results; employee versus job-oriented; parochial versus professional; open versus closed system; loose versus tight control; and normative versus pragmatic. Hofstede's (1991) organisational culture dimensions were influenced by his conceptualisation of societal culture. He also claims that, whereas societal culture resides more and is better expressed in values and less in practice, organisational culture is expressed more in practice and less in values. Therefore, while measuring values using those dimensions may be satisfactory for societal culture, using them to measure organisational culture that resides more in practice may be problematic. From this it can be concluded that using Hofstede's (1991) organisational culture dimensions may not provide considerable indication of the differentiations between societal and organisational values and beliefs held by employees of the organisation. Thus, Hofstede's work is more suitable for measuring societal organisational culture rather than organisational culture.

Conversely, Trompenaars and Hampden-Turner (1998) also reported that organisational culture can be measured on seven dimensions similar to Hofstede's conclusions. However, Trompenaars and Hampden-Turner's (1998) dimensions are similar to those of Hofstede, as they are an amalgamation of measuring societal and organisational cultures. Even though they claimed that they were measuring organisational culture by surveying senior management executives in different organisations, it revealed that in reality they were measuring a combination of societal and organisation culture. The survey instrument they developed did not evidently outline between the two forms of culture. This may be a vital reason as to why their research resulted in seven dimensions of culture. These different dimensions of culture have therefore necessitated numerous perspectives to examining organisational culture. The author therefore will attempt to seek out an appropriate instrument that may be adapted to measure the influence of organisational culture on the adoption of WiMax technology.

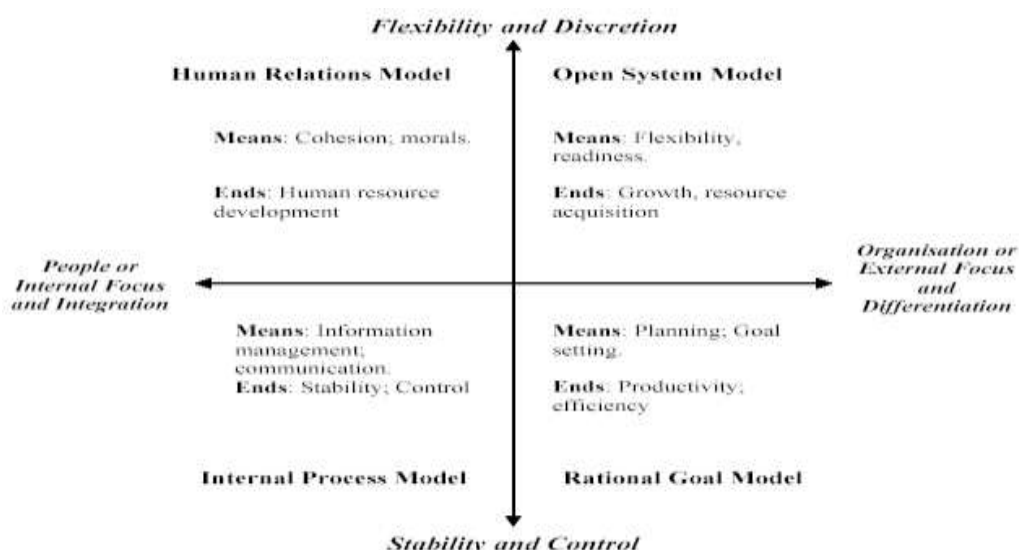
Based on the objectives and purpose of this research, a suitable instrument to measure the influence of organisational culture on the adoption of WiMax, chosen is the Organisational Culture Assessment Instrument (OCAI), developed by Cameron and Quinn (1999). It is based on a theoretical model known as the "Competing Values Framework" (Quinn and Rohrbaugh 1981; Quinn and Cameron 1983). The framework x-rays the organisational cultural - internal or external focus and the nature of the culture in terms of how flexible, individualistic, and stable it is. The framework is also based on six organisational culture dimensions forming four types of dominant organisational culture types: (a)

hierarchy, (b) clan, (c) adhocracy and (d) market. It is argued that these four culture types help to identify the organisational culture profile based on the cultural characteristics of organisations (Cameron and Quinn 1999). The OCAI is discussed in Section 2.8.1. The following section discusses on Competing Values Framework (CVF).

2.6.2 Overview of Competing Values Framework

The CVF is considered to be useful in supporting, organising, and recognising a broad array of organisational phenomena (Quinn and Rohrbaugh, 1981). Cameron and Quinn (1999) claim that in utilising a suitable framework, it needs to be based on empirical evidence, be able to summarise precisely the reality being depicted, and be capable of composing and classifying the majority of the dimensions being considered. It needs to also be aligned with a classification system that is well known which helps in organising and classifying values and beliefs of individuals on what makes for a good organisation, and the ways they deal with information. Cameron and Quinn (1999) concluded through their theoretical and empirical findings that the CVF meets all of these requirements. The CVF theory suggests three value dimensions such as the organisational structure, organisational focus, and the means-end range, that instigate the conceptualisations of organisational efficacy that can further be utilised to organise the established and often paradoxical models of effectiveness. **Figure 2.2** demonstrates the three value dimensions identified by Quinn and Rohrbaugh (1981).

Figure 2.2 Computing Values Framework



Source: adapted from Quinn and Rohrbaugh (1981)

These value dimensions are:

- Organisational structure dimension: its focus is on flexibility and stability and therefore helps in distinguishing values and activities that highlights the flexibility and adaptability of an organisation's and those that highlights its control and stability.
- Organisational focus dimension: focuses on organisation's leaning, comparing organisations' interest in internal and integrating issues involving comfort and employee development, with organisation's emphasis on external and differentiating issues, such as its development and growth or its relation with outside entities.
- Means-end range which reflects on the organisation's objectives such as productivity or human resource development, and the means these objectives are accomplished including goal setting or enhancing confidence.

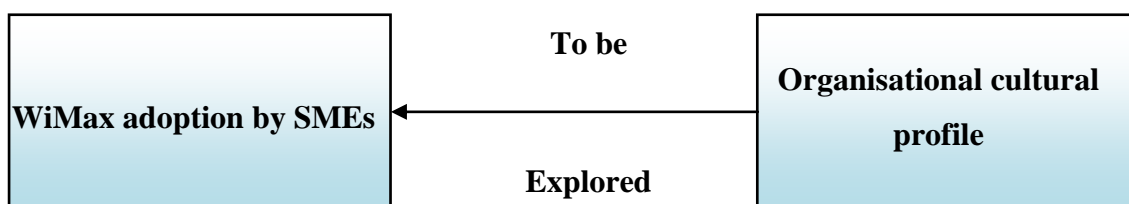
Quinn and Rohrbaugh (1981) utilised these value dimensions to organise four theoretical models of organisational effectiveness which are: (a) internal process model, (b) human relation model, (c) open system model, and (d) rational goal model (Cameron and Quinn, 1999). These four main clusters explain the main values on which decisions about organisations are made. As Cameron and Quinn (1999) clarify, what is noteworthy about these four values is that they represent opposite or rival hypotheses. Each range points out the main values at the opposite ends from the beginning of the range to the end of the range, that is, people (internal focus on members and technologies) versus organisation (external focus on the organisation within an environment), and control versus flexibility. The dimensions thus create conflicting quadrants that are also opposing on the diagonal.

As highlighted in Figure 2.2, the upper left quadrant identifies the Human Relation Model, which identifies values that emphasise people, whereas the lower right quadrant, the Rational Goal Model, identifies values that emphasise a control focus. Similarly, the upper right quadrant, the Open Systems Model, indicates values that emphasise flexibility focus, whereas the lower left quadrant, the Internal Process Model, reflects control values. This framework (Figure 2.2) is constructive in organising and comprehending the four organisational culture types. These four culture types serve as the basis for the Organisational Culture Assessment Instrument (OCAI). This model is highly cited in the normative literature and repeatedly used in measuring organisation culture. The reliability of this model of culture was used to develop a standardised diagnostic tool, the OCAI (Cameron and Quinn, 1999), will be used in this research to examine the organisational culture in SMEs in the region of KSA in order to explore the adoption of WiMax technology. The model has not been used to measure the dominant organisational culture type of Saudi SMEs in relation to the adoption of WiMax

technology (**Figure 2.3**). Therefore, this research will focus on WiMax adoption and endeavour to bridge this gap by attempting to answer the following research question:

Research Question 1: *What is the impact of the organisational culture on the adoption of WiMax technology by SMEs in Saudi Arabia?*

Figure 2.3 **Impact of OC on WiMax technology adoption by SMEs**



2.7 The Roles and Interests of Institutions Involved in the Diffusion of WiMax Technology to SMEs in Saudi Arabia

For economic development, SMEs is going to be enforced to adopt Internet technologies because of technological development in the business organisations. Moreover, some developed countries and their policy makers are trying to increase their awareness regarding updated technologies like WiMax (Acs, 1992). Regional development and various innovative activities could prove instrumental for supporting the SMEs improvement and for this reason policies should be devised and updated. WiMax diffusion policies could be helpful for SMEs for achieving their aims comparatively faster and it could be helpful for removing some obstacles in the way of SMEs and regional isolation could be linked by allowing growth exchange of information via WiMax (Storey, 1994). The improvement and implementation of technological innovation like using WiMax in the small and medium size enterprises could bring some new opportunities for Saudi Arabia and it could be helpful for accumulation of skills and knowledge of staffs related to SMEs (Storey, 1994). From both demand and supply sides the innovation development process could focus on various factors- like production, creation and diffusion of any innovation are considered in the supply side whereas implementation of innovation and adoption are considered in the demand side (Choudrie and Ghinea, 2005).

In the meso and macro-economic levels, diffusion works at higher rate than adoption. In the adoption levels there are mainly four elements namely innovation, communication channel, social system and time. For information technology in the SMEs these factors are considered important. According to Dierckx and Stroeken (1999), using actor oriented social construction of technology (SCOT) and economically oriented scenario methods strategies application for WiMax could be varied.

A number of researchers and governments have shown interests in studying Internet and e-business adoption by SMEs in developed countries (Lucchetti and Sterlacchini, 2004; Love et al., 2004; Schubert and Leimstoll, 2006 and 2007). Governments globally identify the importance of ICT adoption by SMEs and have thus created special groups to carry out various studies on the different aspects of ICT adoption by SMEs. Government's efforts have therefore been to encourage the adoption of ICT by SMEs but these efforts still see slow adoption rate due to several reasons (Houghton and Winklhofer, 2004; Smallbone et al., 2001; Dawn et al., 2002; Lawson et al., 2003). According to most of these studies for institutions intervention and technological diffusion, some roles in a particular sector in a particular country are required for making the newly adopted technology effective and the roles and interests of institutions involved in the flow of WiMax in particularly SMEs in Saudi Arabia are discussed below.

For labour limiting information technology plays an important role and it is not only the attraction of productivity gain but it could also be used for selecting semi-skilled staff in particular and labour in general. Because of various social and economic effects Arab Gulf States are trying to control foreign labour flow and in this fact the advent of electronic commerce and Internet could be used as most effective catalyst for adoption of organisations and individuals for achieving their competitive advantages (Harris and Davison, 1999). A research done by Yavas et al. (1992) indicates that small and medium size enterprises are accelerated by the acceptance of updated communication technology like WiMax in Saudi Arabia. Recently Al-Khaldi and Wallace (1999) have done a research on the technological attitude on small and medium size trading and according to their research co-workers, facilitating conditions and various management supports systems are involved for updated technology adoption and good results are found from those organisations where contemporary technologies are implemented appropriately.

Updated technologies could be pessimistic or optimistic for developing countries and apologetic and critical views could be forced and changed because of technological diffusion. Slow diffusion of information technology in developed countries could lead high costs, poor infrastructure, social factors, language barriers and fast diffusion of technology could lead various concise set of potential contributions and it could accumulate different disciplines and innovations like WiMax and it could affect small and medium enterprises most (Baskerville and Pries-Heje, 2001). Adoption of WiMax in

the SMEs in Saudi Arabia could be one of the most important potential contributions of modern communication technology. In information technology there are a number of layers are involved and it could be individual or organisational (Linton, 2002).

1. The organisational layer of information technology use consisting of individual users and organisational bodies

According to Pfeffer (1981) organisation means sharing benefits and meanings and it is generally built by ritual, symbolism and by language. How to identify important information, to cope with problems and managing changes are learnt by individuals. According to this definition symbols and language boundaries no longer work and both exogenous and endogenous forces like cooperative ventures, corporate mergers, telecommunication and contracted workforces are used for redefining and resetting boundaries among them.

Information systems are designed to support organisational functions and it could be used for computing value, defining conceptual functions of technology and follow routines for completing any transaction (Rao et al., 2006). Completing any task effectively and efficiently could be helpful for individuals and these interfaces could be personalised and customised by organisations and in this system own processes, own formulas, brands and definitions are used (Wilkins and Swatman, 2006). Because of cooperative ventures for sharing processes and data, various problems could arise and it could be due to conflicting processed and meanings. For sharing any similar type of activities in any market area or to be a part of the value system institutional and organisational layer are involved (Grandona and Pearson, 2004) and it is briefly discussed in this study.

2. The industry layer consists of stakeholders and organisations sharing part of the value system, same role, or market area

Terrestrial microwave, submarine cables and mixture of satellites are used for international communication network in Saudi Arabia. For Sea-Me-WE3 and FLAG Jeddah is pointed in the Saudi Arabia and this country is known as the home of Arab set. Around 1566 Mbps Internet bandwidth was recorded by the end of 2004 and by March 2003 number of DSL subscribers became 3000. The government of Saudi Arabia also has a stake in the proposed Sea-Me-WE4 cable 12 where three tiers Internet services were available. The first layer of Internet was the ISPs whose duty was to provide Internet facilities to government, general public and private sectors and they would provide services through dialup, ADSL and leased lines (ESCWA, 2011).

ISPs are generally collected international link via national backbone at the Internet services unit (ISU). In the second layer of Internet connection various regions are interlinked in the kingdom and it

is generally operated by STC. The third layer is responsible for connecting the national backbone to the global link. ISU operates the international link and this link is responsible for passing all global traffic to the kingdom. The ISU with bandwidth 930mbps currently operates a six STM-1 link (ESCWA, 2011). The industry layer of the technology sector is with mainly two layers and those are the institutional layer and the regulatory layer.

3. The environmental layer of two sub regions: the institutional layer and the regulatory layer

A larger part of the global economy is consisted by SMEs and these are competitive enough and for surviving in the competitive market they rapidly change their various environmental issues and it is one of the important collaborative networks of enterprises. Institutional layer is used for technical innovation and it is generally introduced and used by various firms and in this layer interaction between supply and demand are processed. For applying effective mechanisms at national, regional and local level this layer could be implemented. Regulatory layer is unique and could not be replaced by others (Karjalainen and Kemppainen, 2008).

For controlling and expanding SMEs and related technology governmental role could be used as an important fact and government of any country could be the pioneer for adopting technology like WiMax in the small and medium enterprises and the role of government specially Saudi Arabia has been considered in this study.

2.7.1 The Government Role in Technology Adoption by SMEs

Governments globally have big responsibilities, power and great potentials in facilitating and encouraging the adoption of ICT by organisations. The government is also a substantial part of the national economy, and a demonstration of their belief in ICT by adopting ICT in their business activities of procurement and construction has had a major impetus to the rollout of new technologies throughout the economy. However, the benefits of government ICT adoption and efficiency of the computerised business activities are questioned. The adoption of new technology may be simple, but exploiting the benefits of the technology involves effective governance, management, organisational and behavioural changes which are almost always complex (Asian Development Bank et al., 2004). Governments such as the Malaysia government have made attempts to encourage technology use in organisations by issuing policy statements insisting on the use of its e-procurement system by all the 35,000 government suppliers (Utusan Malaysia, 2008). Nearly all suppliers (e-procurement users) have registered with e-procurement, but only less than 18,000 electronic catalogue items have been uploaded to the system (Leatham, 2003). This shows the lack of exploitation of the technology for maximum benefits.

The national e-government projects in the Kingdom of Saudi Arabia (KSA) a rich developing country in the Middle Eastern region, started in 1998 (Sahraoui et al., 2006; Abanumy et al., 2005) which have been significantly transformed between 2005 and 2008 and have focused on big cities like Riyadh, Mecca and Madinah (UN, 2008).

Considering the size and population of KSA with an area of approximately 2,250,000 square kilometres (about 870,000 square miles) in the Southern-Eastern region of Asia (MEP, 2008), e-government brings a lot of benefits to the country while taking away the burdens of travelling trauma and costs from the people (Huang and Bwoma, 2003; Al-Shafi, 2007). Conversely, using e-government services does not need a physical contact that demanded by traditional services. Moreover, the cost of providing traditional government services could be reduced by using the e-services and Internet technologies (Reffat, 2003; Huang and Bwoma, 2003).

Level of broadband adoption could be varied depending on the countries. According to the information technology and innovation foundation (ITIF) report Saudi Arabia is not one of the thirty nations that show higher ranking of broadband adoption (2008). Only 38.1% of the Saudi populations are using Internet (ITU, 2010). Consequently, it could be mentioned that a number of factors are responsible for slow adoption of broadband technology in the Saudi SMEs. As mentioned earlier organisational culture profile is one of the important factors that has an impact on the WiMax adoption by SMEs in Saudi Arabia. There are also some factors which are considered to be important for WiMax adoption by SMEs such as government policies.

In various countries such as South Korea and the UK the government policies are playing a big role in adopting technologies (Oni, 2008). According to Oni (2008) strategies such as the development of broadband market, promoted efficient and innovative supply arrangement and encourage effective use of broadband services will help to promote investment in new technologies such as WiMax. Many researchers have investigated government policies for technology diffusion (Lee et al., 2003; Choudrie et al., 2003; Choudrie and Papazafeiropoulou, 2007). According to their recommendations for adoption of broadband technologies in most countries there are some constraints in demand and supply sector.

Different initiatives have therefore been taken by the government in Saudi to facilitate ICTs and e-government adoption and diffusion. An e-government program was established in 2005 by the regulating authority the Ministry of Communications and Information Technology (MCIT) in conjunction with two other institutions, the Ministry of Finance and the Communication and Information Technology Commission (CITC). One major initiative of the e-government programme

was the 'Yesser' project- (www.yesser.gov.sa), designed to manage the implementation of the e-government program. The objectives of the project were as follows:

- Enabling the public sector to enhance productivity and efficiency.
- Providing for individual and business customers in KSA with efficient and cost effective services.
- Enhancing good increasing return on investment (ROI).
- Providing timely and highly accurate information required in business transactions (MCIT, 2012)

Additionally, governments in the European Union and SE Asia have also initiated policies to enhance the ICTs adoption by SMEs such as the UK and Singapore (Kendall et al., 2001; Luntati, 2000). In such countries, policy guidelines and websites have been developed to provide SMEs with the relevant information about the opportunities from the Internet (Lunati, 2000). They also provide SMEs with necessary funds and training programmes to help them improve their businesses. Similarly, in Saudi Arabia, in 2006, the government established a "Kafalah" program to encourage banks to finance the SMEs (SUSRIS.com, 2011). These policies have however been a success and have particularly enhanced changes in attitudes among SMEs in KSA. According to Nugent and Yhee, in Korea, the commercial sources guidance is valued more than the government. Although in Singapore, the existing knowledge of the owner plays a big role in driving ICTs adoption by SMEs (2002). The success of ICT adoption by SMEs is however dependent on the attitude of the managerial and operating level personnel in the voluntary use of information technology but however managers resistance to computer systems have also been a major problem (Attewell and Rule 1984; Davis, 1993; Harris and Davison, 1999).

The business community has been given the opportunity by broadband for a fast and easy way of exploiting the widely advertised Internet and broadband diffusion, and this has also become a top agenda in technology policies globally. As a result, there has been some provision of government initiatives aimed at improving broadband adoption by SMEs in the UK such as increased spending on technology and telecommunications (DTI, 2004). SMEs vary in size and nature depending on their area of business. In the same way, their attitudes differ when it comes to the adoption of new technologies. In some cases, SMEs are keen to accept new technologies while in other situations they are not (Kalakota and Robinson, 2001; Lawson et al., 2003; Merlin, 2004). There are many reasons why SMEs may decide to adopt new technologies but the diffusion of new technologies to SMEs is not always straightforward and simple.

Economic development of any country is influenced by SMEs because the number of large enterprises is very less than SMEs. Several researchers have described that social changes, economic development and information technology is correlated to each other. The different ways of communication and gathering information is very useful in SMEs and it is used by the worldwide SMEs (World Bank, 2004). As the growth of the nation is affected by the growth of SMEs, the advancement of technology plays an important role in SMEs and nation especially Internet. The use of Internet has changed the way of business and replaced the traditional way of business; as a result information technology is used by most of the enterprises because it makes the work faster, cheaper and increase productivity. In Saudi Arabia the uses of information technology is affecting the development of SMEs because it is adopted by most of the modern business (OECD, 2004a).

The introduction of new technologies are not only contributing in businesses but also playing an important role in development of society because it is now used for the purpose of education, gathering information about anything or developing the economy of the nation (Looi, 2004). The society is becoming more knowledgeable than ever and information technology helps to increase that by providing the essential data from around the world. In the latest technological environment the people are becoming more selective about the product or services they want to use. Therefore, the SMEs need to use the technology which can help the organisation to produce the desired quality product in cheaper price than competitors to compete in the market. The SMEs also need to utilize their resources like human resources, raw materials and capital in an innovative way to increase productivity. The advertisement of the products is also influenced by the latest technology to attract the customers (Ramsey et al., 2003). The development of SMEs is vital for the development of the global market by providing goods and services to the customers, maintaining the employment cycle, and developing the economy of the nation (Kaibori, 2001). Some strategies, plans and policies of the Saudi Arabian government are discussed briefly in this section of the study.

1. The strategies and policies of national information society

The seventh five-year development plan is formed by the Saudi Arabian government which provides a clear picture about the ICT role in the development of the economy and science. ICT is also contributing a lot in the development of the society (ESCWA, 2011).

2. Sectoral plans for building the information society

The Ministry of Planning and the Kings City for Science and Technology (KACST) has established a National Plan for Technology and Science. This is a long term plan which started in 2000 and estimated finishing time is 2020 which consists some implementation policies and seven objectives (ESCWA, 2011).

3. Progress towards fulfilment of national policies and strategies

The main aim of the government is to create an information society by introducing latest technologies but some of the observers of Saudi Arabia think that the new technologies take time to be adopted by the society or market that is why the process slows down (ESCWA, 2011).

As well as having the ability to advance individual small and medium sized enterprises, broadband and specifically WiMax can also benefit the wider economy (Maitland, 1998). The principles behind this notion apply to all areas of business in any country and every industry. That is, the more successful the companies are the more money they produce and this in turn boosts their industry on a national level. Businesses which are developing and making more profits generate more economic flow. This has a positive knock-on effect on their nation's economy. Therefore, it is in the interest of a country's economy that there are as many successful businesses as possible. As has been previously noted, small and medium sized enterprises account for around 93% of the Kingdom of Saudi Arabia's total enterprises and 24.7% of its total employment (Looney, 2004). It therefore goes without saying that the success of small and medium sized enterprises is of paramount importance for the wider success of the country's economy.

With this in mind, it is clear to see how governments, as well as businesses, would have their own motivations with regards to the adoption of WiMax in small and medium sized enterprises. For any government, one of the main aims when leading a country is to maintain a stable economy and to enable it to grow as much as possible. Therefore, it is in their interest that companies advance and develop. Thus, the adoption of broadband services is something which would be taken into detailed and thorough consideration by a nation's government. Indeed, Fife et al (2008) offer a number of reasons why governments are motivated to adopt national broadband network services. An up-to-date technological infrastructure can 'enhance productivity by providing intelligent networks that can accommodate the converging voice, data and electronic commerce applications' (p. 261). The technological world develops at an extremely fast pace; in order for countries to be able to contend in business at an international level, it is important for them to remain at the forefront of these advances. The vast majority of the modern world's business relies on the use of the Internet and so if countries do not have a strong online infrastructure in place, they are likely to fall behind and be seen as less relevant on a global business level.

Broadband is crucial for maintaining this 'intelligent network' as it provides wide reaching access for a large number of users. WiMax, in particular, is instrumental to improved communication channels and provides access to a converging voice and a wealth of data. It enables wireless broadband access anywhere, anytime and on almost any device. This means that it provides a far greater level of

convenience than wired Internet connections or indeed other wireless technology. Speed and availability of Internet access is important for companies to be able to sustain a competitive advantage over other organisations. If, for example, the Internet connection cuts out and cannot be reconnected for the rest of the day, which will have detrimental effects on the efficiency of that day's work. Valuable hours will be lost and subsequently money will be lost as well. For small and medium sized enterprises in particular, it is likely that they will rely on one network for all of their business. Therefore, if the network does not work, the whole business will be affected (Beckinsale and Levy, 2004). In contrast, larger businesses may have backup systems which can be used if one network fails to connect.

Companies which are based on data processing, management, logistics and telecommunications rely heavily on fast Internet network connections. Research has shown that when advanced information and telecommunication technology is combined with a stable economy and an auspicious regulatory system, this has had an express positive effect on Foreign Direct Investment (FDI) (Fife et al, 2008). FDI has been a major economic and government motivation as it has grown to be the largest and most stable source of private capital inflow in most developing countries and transition economies which also accounts for nearly 50 per cent of total capital inflow. (1998, p. 204). FDI accounts for all long term investments being fulfilled between two countries. Advanced telecommunications channels have meant that nations can communicate and carry out transactions easily on an international level. Subsequently, global exchanges and international investments have taken on a much more dominant role in business. As these ventures rely overwhelmingly on unlimited wireless broadband technology, this provides another motivation for governments to employ WiMax and to encourage SMEs to adopt the technology. With over half of a country's capital gained through FDI, governments cannot afford to miss out on these transactions.

As has already been stated by Moran (1998), FDI is particularly important for developing and transitioning countries. The Kingdom of Saudi Arabia falls under this category. As they only acquired Internet access on a wide level relatively recently, adopting WiMax will facilitate more foreign investments coming into the country. This could enable Saudi Arabia to experience a 'leap – frog' effect in terms of its position within the global market. A number of research projects have provided empirical evidence that there is a positive correlation between investment in telecommunications and economic growth (Indjikian and Siegel, 2005). These findings include case studies of China and India, among other countries, and have shown that improved IT communications have helped their productivity and growth.

As well as having beneficial effects on the nation's economy, the deployment of WiMax networks can enable the emergence of e-governments. So called online governments provide a form of digital

interaction between a government and a nation's citizens. E-governments are integral to the social and political development of a country as they enhance the ability of the local communities to participate in democratic activities. Moreover, access to information and the nature of participation which affords the people to provide input in public debate to political decision-making and policy formulation, are the hallmarks of e-participation and responsible citizenship (Bohlen, 2005). Therefore, efficiency and transparency can be improved by employing this technology. A more efficient government which is more communicative and accessible will certainly lead to greater public trust in the government. Subsequently this could result in its gaining more public support for future political decisions and policies. It is unquestionably in the best interest of a government to be espoused by the public. Providing greater communication networks, which are enabled through WiMax, will indeed garner support from the public.

The issue of the government's motivation for SMEs to adopt WiMax in Saudi Arabia is one which faces a number of conflicting challenges. As previously mentioned, broadband Internet and WiMax networks in particular can lead to great economic advances for any nation. Indeed, in many developed countries which have taken on the technology, there has been a jump in economic growth as well as advances in communication and other social benefits. Research has shown that SMEs play an extremely important part in KSA's business output, and so it would follow that they should take advantage of the potential benefits of WiMax. These factors are certainly motivating for the government of Saudi Arabia. Furthermore, there is empirical evidence which shows that for developing or transitional countries, the ICT systems can be highly advantageous by allowing them to perform an economic 'leap frog' effect, whereby they move up the economic ladder very quickly. There is no doubt that this is an attractive prospect for the leaders of any nation. Furthermore, Fife et al.(2008) showed that the adoption of broadband led to greater opportunities in terms of foreign direct investment, which is highly financially beneficial.

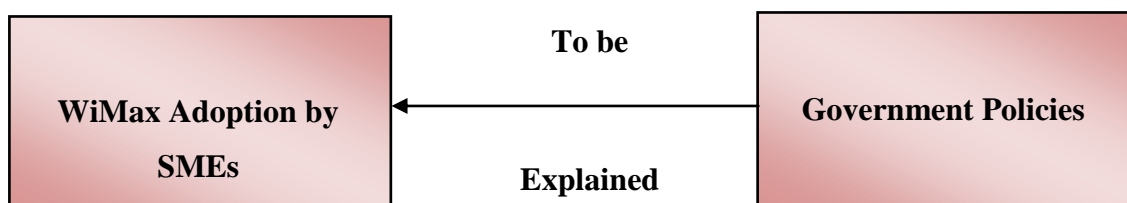
Given the plethora of potential benefits, the main barrier against the adoption of WiMax in Saudi Arabia is perhaps the government itself. With the country's long standing tradition for regulation and censorship, it is unlikely that its governing body would be willing to suddenly allow the free flow of information via broadband, which would be fully accessible by the public. Indeed, this is a process of transition which is likely to occur more slowly. Therefore, the government of KSA is in rather a unique position whereby it would benefit hugely from SMEs being able to use WiMax; however, this would also conflict with many of the country's long standing traditions.

The improvement and implementation of technological innovation, like using WiMax in the small and medium size enterprises, could bring some new opportunities for Saudi Arabia and it could be helpful for accumulation of skills and knowledge of staff related to SMEs (Storey, 1994). From both demand

and supply sides the innovation development process could focus and various factors like production, creation and diffusion of any innovation are considered in the supply side whereas implementation of innovation and adoption are considered in the demand side (Choudrie and Ghinea, 2005). Therefore, King et al. (1994) framework of institutional factors in information technology innovation will be used to investigate the role of government in adoption and diffusion of WiMax among small businesses. **Figure 2.4**

Research Question 2: *What is the impact of the government policies on the adoption of WiMax technology by SMEs in Saudi Arabia?*

Figure 2.4 **Impact of government policies on WiMax technology adoption by SMEs**



2.7.2 Technology Providers' Strategies

For technological development in any particular business area some particular strategies are followed. In most of the cases small and medium size enterprises are affected by new technological strategies especially by communication tools like WiMax technology. Technologies in small and medium type business have been improved but in the Saudi Arabia it is not still widely available in the SMEs (Constantiou and Kautz, 2008). In some researches some particular areas are identified considering the Arabian community and general communication tools requirements and WiMax is considered as important business communication tools for improving the business policies and business improvements. Area of relevance is also included in the technological strategies and it could help any business to go forward (Rao and Angelov, 2005).

The introduction of a disruptive or a sustaining technology in a market offers opportunities and raises challenges for both established firms and new entrants. For example, established firms may not be able to protect their market shares and maintain their customer base in the long run if they fail to recognise the difference between sustaining and disruptive technologies. However, a disruptive

technology evolves through different stages and its widespread diffusion is not guaranteed, as it depends on market dynamics and specific strategies adopted by market players (Myers et al., 2002). Moreover, forecasting the diffusion of disruptive technologies is not straight forward as it is surrounded by uncertainty depending on specific characteristics and maturity levels of the served markets (Linton, 2002). A thorough review of the researchers' debate about the predictive power of the disruptive innovation theory is offered by Danneels (2004).

It is difficult to identify disruptive technology in advance because of its strange characteristics. Disruptive technologies are usually only identified after their effects are known and the benefits are seen with hindsight (Jones and Smith, 2005). Walsh et al. (2000) emphasised that disruptive technologies have to mature over a period of time to evolve from an innovation to a useable product. Christensen and Bower (1995) refers to disruptive technologies as innovations, however, not all innovations are disruptive. To clarify the difference between innovations and disruptive technologies the following characteristics (Christensen, 2000: xviii) can be listed:

- “The disruptive technologies are cheaper when procuring and implementing the product;
- The disruptive technologies are simpler to ensure that the consumer will be able to use the technology without intensive training;
- The disruptive technologies are smaller than expected which indicates the advancement of the technology;
- The disruptive technologies are more convenient to use to limit the effort when using the technology
- Disruptive technology usually does not propose greater profits, but it would add value to lower margins.
- Disruptive technology is also described as technology, which has a characteristic of “radical change”. Radical change technology implies technology, which requires very different technological capabilities.”

Disruptive technologies have the tendency to unexpectedly provide different functionality resulting in the displacement of current technologies or sustaining technologies which are part of the mainstream system architecture used in the organisation (Christensen, 2000). There are some disruptive technologies that have replaced sustaining technologies in information technology environment. For example, Internet Protocol Suite has replaced Networks that are proprietary or fixed-configurations; Minicomputers has replaced the mainframe computers. Moreover, Wi-Fi (Wireless Networking) has replaced Standard Network Infrastructures (Patki, 2006).

Moreover, disruptive technology can provide functionality that is new and not available in the market. Innovative technologies such as VoIP, WiMax technology and Bluetooth that, while not necessarily displacing other technologies, provide functionality that have the potential of disrupting the technology currently used by businesses (Patki, 2006). Disruptive technology enables businesses to implement technology on reduced costs. Patki (2006) provides a scenario where WiMax was implemented on the island of Mauritius. By using WiMax rather than broadband, the costs have been reduced and this has made technology affordable for private as well as business users on the island.

As with any business, the providers of broadband and more specifically of WiMax technology will want to sell as much of their product as possible so as they are able to generate as much revenue as possible. However, as has been explored in this investigation so far, there are a number of obstacles that the vendors would have to face in their attempt to sell WiMax technology to SMEs in the Kingdom of Saudi Arabia. Firstly, the cultural and traditional factors which, according to disruptive innovation theory, would have to be overcome (Christensen et al., 2004). Vendors would have to liaise with the government to persuade them that not only would the adoption of their broadband networks be beneficial for the country's economy in the long term, they would also have to ensure that heightened access to a wider range of information for the public would be favourable. Given that the country only gained widespread Internet access relatively recently and is steeped in centuries of tradition, this may be a hard task.

Another factor which must be taken into consideration by technology providers is one of the key dimensions in the theory of disruptive innovation (Lindsay et al., 2009). The installation of WiMax technology in SME's in KSA would require a substantial overhaul of existing systems. In other words, it would be very disruptive to the existing market. This may be seen as a difficult obstacle for WiMax providers; when an existing network is already in place, it seems logical that manufacturers would find it more difficult to convince consumers to change it completely, particularly when doing so would be expensive. This is further exacerbated by the fact that owners of SMEs in KSA are often reluctant to take financial risks and even when they are, they may well find it difficult to acquire a loan from the banks. Nonetheless, Lindsay et al assert that, according to the theory of disruptive innovation, providers of WiMax may have an advantage because of this necessity to overhaul an existing system (2009). Indeed, 'the prospective innovator can recognise opportunities and position innovation in ways that add a "disruptive" advantage. The business leaders can use the theory of disruptive innovation to proactively avert external threats while nurturing opportunities for further growth (Lindsay et al., 2009, p. 221). WiMax providers may be faced with initial difficulty in persuading SMEs in KSA to adopt their innovative technology (Schooler and Fischer, 2004). The fact that the technology is indeed innovative and new may make it more appealing. Furthermore, once they begin to become more established in KSA, according to the theory of disruptive innovation, it is

more likely that they will experience longevity, as a costly commitment to their installation will have been made and companies will be unwilling to spend more money (Christensen et al., 2004). In addition, taking hold of the market quickly and with an open approach could enable manufacturers to reach economies of scale by building up large quantities of products and components to one standard. This would allow the manufacturers to save money.

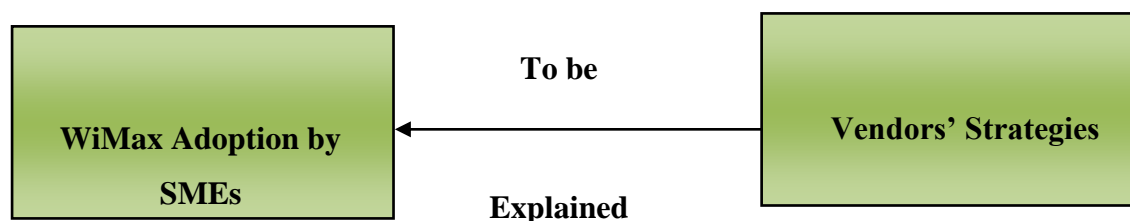
Another aspect which should be taken advantage of by the providers of broadband and specifically of WiMax in KSA is the fact that because the technology is so sporadically used in the country, specific providers could place themselves at the forefront of the network and establish themselves as a market leader. While the market is still relatively new, different vendors can certainly take advantage of this opportunity. This should play an important part in vendors' marketing strategies. Indeed, effective marketing is hugely important for the success of WiMax providers. Because WiMax is more expensive than other types of broadband, as it is offered at higher radio frequencies which would require additional antennas and so on, vendors have the challenge of highlighting the advantages of its deployment over the disadvantages (Shankar and Hedge, 2008). The IEEE 802.16 standard enables access anytime, anywhere on the scale of the Metropolitan Area Network, a much greater geographical area than other broadband services. As many SMEs are still restricted by dial up and wired Internet connections, the fact that expansive leased line or fibre alternatives are eliminated with WiMax, is hugely beneficial, particularly when it means that less space is needed which saves costs; it even makes it possible for employees and managers to work from home. It is important that these benefits be highlighted in vendors' marketing strategies if they are to be successful in overhauling an existing system. Consumers must become aware that the overhauling is necessary; the current system is outdated.

The number of Internet users in the Saudi Arabia grew from around 1 million in 2001 to an estimated 9.8 million, 38.5% of the population, by the end of the 2009. The number of broadband subscriptions grew from 64,000 in 2005 to almost 2.75 million (10.8% of the population) by the end of 2009. This represents an increase of over 100% from year-end, 2008. While most of the growth during 2009 was contributed by wireless broadband (especially mobile broadband), DSL still represents over 47% of the Kingdom's broadband connections. Household broadband penetration stood at around 32%, that is, 32 broadband connections for every 100 households. The rapid increase in Internet and broadband use is driving IT spending by businesses and households; however, as broadband availability still remains a constraint in some areas local IT companies see this as a major challenge. As for its impact on purchasing patterns, growth in wireless broadband is now encouraging traditional desktop buyers, especially households and small and medium-sized enterprises (SMEs) to buy portable notebook computers (SUSRIS.com, 2011).

Although SMEs constitute over 90% of the businesses in the Kingdom as mentioned earlier, they account for just over half of total IT spending. SMEs have continued to increase their spending on IT during 2008 and 2009; however, spending levels still remain relatively low (SUSRIS.com, 2011). Technologies provider's strategies are related to disruption innovation and disruptive innovation could be helpful for technology providers. Therefore, the theory of disruptive innovation factors by Christensen et al (2004) will be used in this research to investigate vendors' commercialisation strategies on adoption of WiMax technology by SMEs in KSA. **Figure 2.5**

Research Question 3: *What is the impact of the WiMax vendors' commercialisation strategies on adoption of WiMax technology by SMEs in KSA?*

Figure 2.5 Impact of vendors' strategies on adoption of WiMax by SMEs



2.8 Theoretical Approaches Used to Study IT Adoption by SMEs

Literature indicates that several researchers have employed various theoretical approaches while conducting research studies on ICT use by SMEs. For example, Papazafeiropoulou (2002) conducted a study on electronic commerce (e-Commerce) diffusion in the context of SMEs by using the Stakeholder Theory (ST) and Innovation Diffusion Theory (IDT). Santarelli and D'altri (2003) used the diffusion model to measure the diffusion of e-Commerce among SMEs. Kendall et al., (2001) and Mehrtens et al., (2001) also employed the diffusion model in their research studies on e-Commerce and e-Business adoption in the context of SMEs. In addition to these theories, literature illustrates that other theories have also been used such as the resource-based theory. For example, Caldeira and Ward (2003) highlighted the use of resource based theory for explaining the success with the adoption and use of ICT in SMEs. Daniel et al., (2002) conducted a research on e-Commerce adoption in the UK deployed a stage model to investigate the phenomenon. Moreover, the Technology Acceptance Model (TAM) (Davis, 1989), Theory of Planned Behaviour (TPB) (Ajzen, 1991) and the Decomposed Theory of Planned Behaviour (DTPB) (Taylor and Todd, 1995) are other theories that have dominated

the IS research literature where individual adoptions have been examined. These theories are typically applied when considering individual adoption, whereas this research study focuses on the adoption of WiMax by SMEs in the context of KSA within cultural context, government policies and vendors strategies.

Of the theories that have been mentioned and used in the study of acceptance of technologies, one of the most frequently used is the TAM. This theory is presented by Davis (1989) and states that an individual's behavioural intention to use a technology is determined by two factors: perceived usefulness and perceived ease of use (Gardner and Amoroso, 2004). TAM is one of the most influential research models in studies of determinants of IS/IT acceptance. There is another theory that has been much cited in the normative literature such as the organisational cultural theory. The notion that organisations may have specific cultures is found scattered in a vast array of publications on strategy and business policy, on organisational behaviour and theory (Allaire and Firsirotu, 1984). Although the absence of a solid theoretical grounding for the concept of organisational culture has been frequently discussed in the normative literature, nevertheless, limited research is conducted in bringing within the limits of the management in SMEs and organisational cultural types, and the relevant factors related to the organisational culture types that may influence the decision making process for WiMax adoption by SMEs specifically in the context of KSA. The author takes into consideration the organisational culture assessment instrument and discusses in the following section.

2.8.1 The Organisational Culture Assessment Instrument

As mentioned earlier, culture is a vital factor in the continuing success of organisations and mediates organisational changes, it is also important to map and to be able to measure and investigate the vital leading organisational culture type. The OCAI based on the above theoretical model (the CVF), is usually used to describe and categorise the different types of cultures in organisations. It basically recognises two dimensions which are further divided into four main quadrants (types of cultures) (Cameron and Quinn 1999). **Figure 2.6** highlights the four quadrants that form the competing values. These dimensions are focused on two sides, the flexibility and discretion versus stability and control on one side, and internal focus and integration versus external focus and differentiation on the other side.

Figure 2.6 The Organisational cultural Profile



Source: Cameron and Quinn (1999)

The resulting CVF is set out in Figure 2.6, with each quadrant representing a different type of organisational culture.

- The hierarchical culture based on a bureaucratic and official process and values tradition, places more emphasis on stability, teamwork, and agreement while focusing more on internal than external issues and values steadiness and control over flexibility.
- The clan culture highlights extensive family-life features characterised with shared values, beliefs, goals, unity and participation. This type of culture is concerned with internal issues and values flexibility and carefulness rather than looking for stability and control.
- The term market in the market culture is not the same as the marketing function, but rather refers to an organisation that functions as a market itself. This culture values steadiness and control, but in addition focuses more on external environments rather internal issues. The external environment is viewed here as threatening and thus searches for threats and opportunities and at the same time looks for competitive advantage and profit.

- The adhocracy culture is concerned with external issues and places more values on flexibility and carefulness rather than looking for stability and control. This culture is characterised by originality, creativity, risk taking and entrepreneurial focus.

These four types of cultures serve as the basis for the OCAI and have been chosen in this research to measure types of organisational cultures in SMEs in the region of KSA because it is an instrument that is sensitive to creative and innovative aspects of organisational power. The OCAI also generates a mutual language and attitude among all employees at every level of an organisation, including features that are associated with organisational performance. It also examines the relationship between organisational culture and desirable outcomes such as organisational effectiveness, organisational strategies, processes, and decision-making style. The OCAI assist the organisations in determining its dominant orientation based on the four culture types. **Figure 2.6** highlighted each type of culture. Having discussed the OCAI, the next section will examine the institutional theory that has been used to assess the government policies that have an impact on the WiMax adoption by SMEs.

2.8.2 Institutional Theory

According to this theory, staying in a social framework of norm, assumptions and values organisation operates various behaviours and organisational alternatives are prescribed (Oliver, 1997; Scott, 2000) and it is considered in the institutional context (Oliver, 1997). Some external institutions like regulatory structures, rules and agencies have been explored and some other organisations have been included within the same industry.

Globalisation has therefore introduced changes in the ways businesses are conducted and have made the information infrastructure strategic assets for regional development (Gillespie et al., 1995). The evaluation of supply-oriented programmes such as STAR (Special Telecommunications Action for Regional Development) revealed that the demand for new IT services was lower than expected after the improvement of the IT infrastructure, especially in the case of SMEs. Therefore, supply-oriented policies must be complemented by policies to encourage IT demand. This is based on the view that demand for IT must be stimulated by way of assisting small firms to cope with the difficulties in assessing costs and benefits of IT. Stimulating demand may not be easy particularly with firms that constitute a universal bloc and are as heterogeneous as the SMEs (Rogers, 2003).

It is opined that SMEs are faced with challenging isomorphic pulls from local and global organisation fields as financial markets involving competitors and customers become more global in scope thereby involving the firms as members of a global organisation field even as the firm can still identify with actors in its local economy (Linton, 2002). This implies that the greater the global organisation field

pull, the greater likelihood of overseas export by the firm. Furthermore SMEs' propensity to export may be positively enhanced as the firm continues to operate in a global field. Moreover the organisation field's orientation may also affect the choice of direct or indirect export mode (Corrocher, 2003). But this view from the resource dependency argument may differ from that of institutional theory which views actions leading to isomorphism as not necessarily efficient.

Although Internet technologies such as broadband, almost and always tend to move firms from localisation to globalisation, the role of the national governments is still considered important in the design of strategies and formulation of national vision towards National Information Infrastructure (Department of Trade and Industry (DTI), 1998). The role of the government in information technology diffusion has been examined in different studies; one notable study was by King et al. (1994) where the role of the government and other institutions in IT innovation diffusion were observed. The study opined that governments have clearly stated programmatic IT objectives, but the mechanisms used for the mobilisation of government vision and leadership appear to be inefficient. This could be due to the improper assessment of the involvement of institutions in the IT diffusion process. The use of this framework for the research analysis is inspired by the criticism of the UK's programmatic statements by the OECD. More specifically, OECD analysts criticised the goal of the UK government as being concrete, too general and less informative on the use and benefits of its broadband (OECD, 2002).

Institutional theory may therefore be used to the nature of government intervention of information technology diffusion highlighting the influence of demand–pull and supply–push forces (King et al., 1994). Supply push forces are derived from the benefits and attractions of the innovative product while Demand pull forces are the collective need for the innovation and willingness of potential users to use the innovation. It is also argued that governments' intervention could be the use of influence or persuasive power within its responsibility. The use of regulation is viewed as direct or indirect intervention to influence behaviour. A combination of the two modes of intervention and the two types forces, therefore formed the base for the six main institutional actions, described as: knowledge building, knowledge deployment, subsidy, mobilisation, standard setting and innovation directive (King et al., 1994). In the technological sector institutional theory is related to the technology provider's strategies and it would be discussed briefly in next section.

2.8.3 The Theory of Disruptive Innovation

Diffusion of innovation theory one of the foremost IS theory, seek to explain the path of innovation and reasons behind innovation adoption in a given societal context over a period of time (Rogers, 2003). It is argued by rational diffusion theorists that the rate of adoption of some innovations are

affected by some characteristics of the innovations but this argument do not take into account the complexity of some of the innovations (Rogers 2003; Moore and Benbasat, 1991; Agarwal and Prasad, 1998; Lyytinen and Damsgaard, 2001).

However, the diffusion process of information system innovations can also be viewed in other perspectives (Cooper and Zmud, 1990; Edquist, 1997; Baskerville and Pries-Heje, 2001). Others have taken perspectives with more emphasis on particular areas of interest without any theory explaining the effect of the technologies' particularities (Jones and Myers, 2001). Moreover, a systematic study of the phenomenon which explored radical innovations particularly in internet computing was offered by Lyytinen and Rose (2003a). The approach classifies the different types of innovations and their disruptive impact in the organisational context. Nevertheless, their focus on the business segment, and the high-end market, was without exploring the impact of low-end disruption in the market. Meanwhile, Christensen's theory (1997, 2006) focuses on both key players' strategies and the consumer behaviour and thereby views the diffusion of innovation research differently. Particularly this theory explores the innovation's commercialization strategies of the market players, both established and new entrants firms in relation to the existing market segments.

The service performance of a low-end disruptive innovation therefore can at least guarantee its successful introduction to the market (Christensen, 1997). Irrespective of the low price offer of the low-end disruption, its lower performance compared to existing solutions makes it unattractive to the mainstream market (Govindarajan and Kopalle, 2006). Disruptive innovation is one of the latest invented theories of the last decade and it was first used by Clayton Christensen and it investigated some radical innovations which were in incumbent's position in any particular industry. Key dimensions and strategies of disruptive innovation are as follows:

2.8.3.1 Key dimensions for competition in disruptive innovations

Something should be discussed before explaining the dimensions of disruptions and it could be explained considering the light-bulb industry's disruption in the industry of the candle and it could also be included the disruption of desktop's computer in the mainframe computer company. Some researchers like Anderson and Tushman (1990) has shown that there could be two subgroups of disruption and those are process discontinuities and product discontinuities and these are important for spin-off companies or initiating new entrants (Hamel, 2000) and these are associated with growing environmental unrest and these are also responsible for market uncertainty. For disruptive innovation, some facts like radical and effective way of providing services or products and significant product substitute should be considered carefully. WiMax in the SMEs in Saudi Arabia could be used as an

important marketing tool and it is a new dimension in the small and medium size enterprises (Schoolar and Fischer, 2004).

The ease of use dimension is therefore related to the convenience and the cost of low-end disruption strategy (Christensen et al., 2004; Schmidt and Druehl, 2008). Firms attempt to take on the ease of use dimension having received assurance on functionalities and reliability of the product that offered added value to consumers. Price competition therefore seems to be an important signal of low-end disruptive strategy in the ease of use dimension. Values may be created for the vendors if their specific needs for convenience, customisation and pricing are met. Convenience relates to the flexibility of product use (Christensen et al., 2004; Schmidt and Druehl, 2008) while flexibility is related to how the innovation can work well with other communications services irrespective of the underlining network effects (Katz and Shapiro, 1994). SMEs may wish to adopt WiMax technology but they may not be willing to change their existing hardware/software. Thus, for WiMax technology to take off, compatibility with existing hardware/software which will reduce the importance of critical mass for WiMax technology diffusion is crucial. It is argued that by this, the consumers will not lose the benefits of their existing hardware/software effects as they switch to the new service (Mahler and Rogers, 1999). In addition, compatibility may reduce WiMax technology vendor's interest, focus and investments channelled at attracting new customers from the existing operator's installed market base (Shapiro and Varian, 1998). This research elaborates on convenience and issues affecting it in the case of WiMax technology by looking at vendors' perceptions of compatibility, flexibility, advantages of WiMax over other Internet technologies and quality of the service.

Business success most of the time depends on the pricing policies of any particular organisation (Sueyoshi et al., 2010). So, pricing of WiMax could be an important factor that might hinder SMEs from adopting the technology in Saudi Arabia or vice versa. The WiMax could be expanded faster in KSA if the service providers offer a good service with a similar price as DSL.

Users are usually satisfied and perceive good potential business opportunities when there are guaranteed improvements on convenience and customisation to generate revenue by serving the undershot segment (Christensen et al., 2004). This research focuses on the issues of price in the case of WiMax technology by examining vendors' perceptions of cost of the services, awareness of consumers' need of low price, policies to attract consumers such as economic packages or bundles and awareness of other competitors as discussed earlier.

Customisation therefore examines the fitness and how the product meets up the needs of individual customers' jobs (Christensen et al., 2004). WiMax technology presents bases for direct comparison with other Internet technologies giving the consumers the opportunity compare the new and the old

with the underlying switching costs (Klemperer, 1987). For example, the value of customisation may fall where consumers find it difficult to use the new technology, but require special training. It becomes more complicated where the consumers are not familiar with computing technology and there is large incompatibility between WiMax technology and existing experience with other Internet technologies. The diffusion process in the residential market may thereby be slowed down by the high switching costs experienced by consumers (Varshney et al., 2002; Corrocher, 2003). Customisation of WiMax service is mostly focused on meeting the consumers' requirement and expectations in terms of their technology and infrastructure needs required to aid access to the services (Nielsen and Thomsen, 2009).

Compatibility is therefore a major issue as it may reduce vendor's investments focused on attracting new customers from the existing operator's customer base (Shapiro and Varian, 1998). It may also affect benefits of the network obtainable by the consumer as they switch to the new service. This research therefore addresses customisation by exploring how vendors perceive the technical capability and simplicity of use of WiMax technology by SMEs and maturity in using the technology. It is therefore implied that the diffusion process in the residential market may be slowed down by the high switching costs experienced by consumers (Varshney et al., 2002; Corrocher, 2003).

2.8.3.2 Commercialisation strategies of disruptive innovations

New technological invention in new areas could affect any small and medium size business and sometimes it could be an important player for the development of those particular types of businesses and it had happened for Saudi Arabian small and medium size enterprises because of the implementation of WiMax. Disruption innovation can change the business policies and business strategies and it could happen depending on the types of firms and their services (Aftab, 2001).

The adoption of new disruption innovation could always not be beneficial for organisations and it could affect the revenues of those firms and it could happen for existing services and products. A research done by Walsh et al. (2002) indicated that most of the established organisations prefer to adopt disruptive innovations as their business strategies but it is not too well accepted by newly established companies. According to this research new entrants could achieve more flexible marketing strategies for disruption adoption like WiMax in the small and medium size enterprises.

Being a new entrant or an established firm in the industry determines the firms' position and may also be tied to the type of firm and its customer base and may also be a determining factor in the choice of a disruptive innovation strategy. A major factor in a firm's position is the formation of a customer base which affects the flexibility of the strategies of the firm. The new entrants without an established base can be flexible in its marketing strategies requiring shorter period than would be required by the

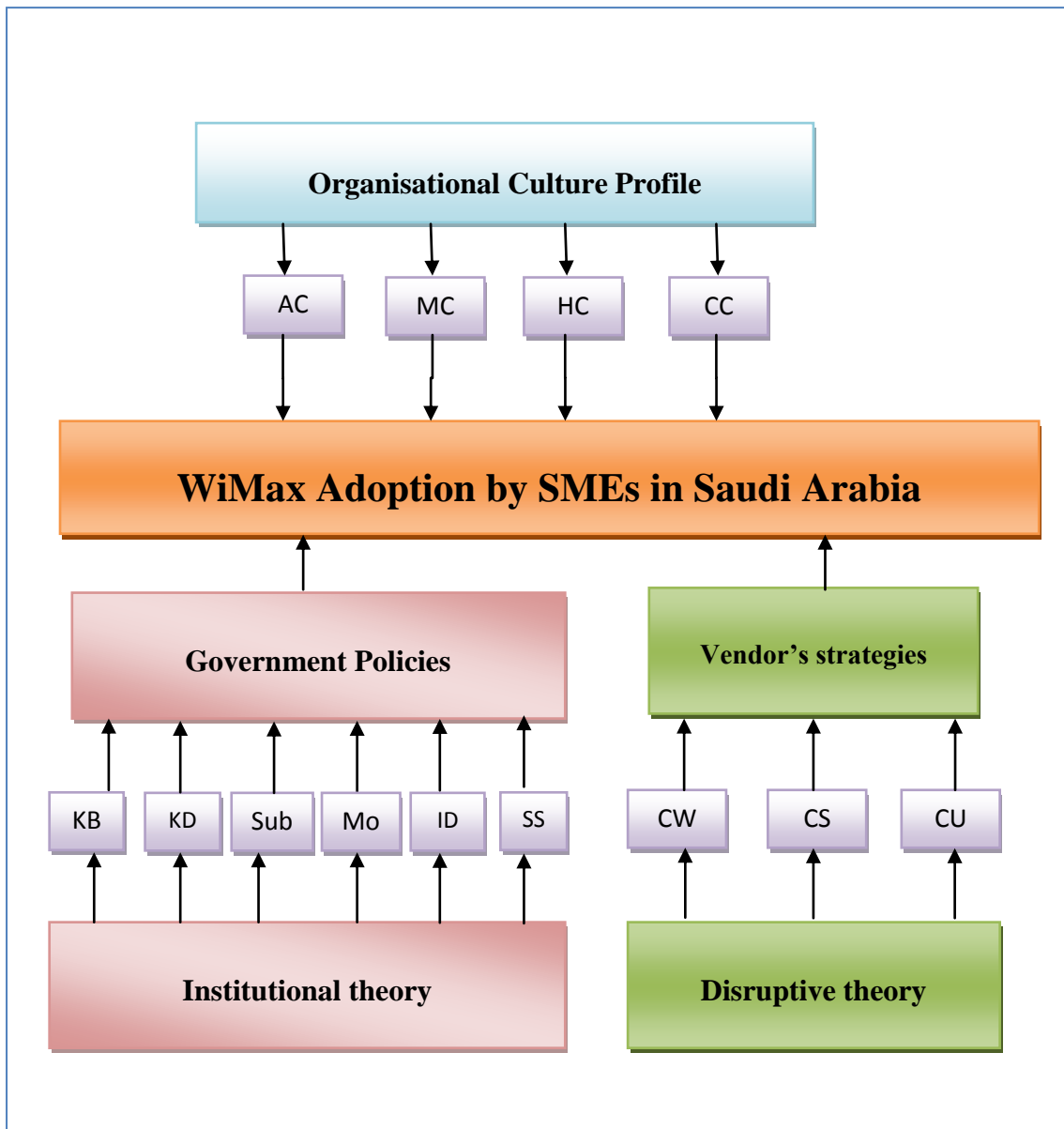
established firms (Walsh et al., 2002). For example, Skype as a new entrant was able to successfully commercialize IP telephony as a disruptive innovation (Rao et al., 2006). Furthermore, because of the competencies already developed by the established firms to explore their market base, they may find it difficult to evaluate the potential of a disruptive innovation as this may require major shift in market research approach. This implies a problem described as organisational competence or inertia (Henderson, 2006) which may be as a result of the lack of visionary leadership of the organisation and the unwillingness to shift assets to new, perhaps niche market, all based on the prevailing organisational culture (Tellis, 2006).

Thus, the established firms' ability to hold their leading market position depends on them offering sustaining innovations and satisfying their customers' needs, but based on this competence challenges from new entrants offering better disruptive innovation may also come (Slater and Mohr, 2006). However, the new will need to augment their skills with new capabilities and should be able to demonstrate that their offering has a clear advantage over existing solutions (Slater and Mohr, 2006). This will enable the new firm to easily capture a niche market, be established in the mainstream and cross the 'chasm' between early adapters and the early majority (Moore and Benbasat, 1991).

2.9 Synthesising the Organisational Culture, the Institutional and Disruptive Theory: a Framework for the Investigation of WiMax Adoption

The research indicated three main factors that might have an impact on the WiMax adoption by SMEs in the context of KSA. These factors that have been identified are the organisational culture profile, government policies and the vendors' strategies. In order to carry out this framework, a survey has been conducted to the SMEs in order to assess the dominant organisational type that has impact on the WiMax adoption. Then, the government representatives were interviewed to determine their views concerning the institutional theory attributes which are knowledge building, knowledge deployment, subsidy and mobilisation. The WiMax vendors in Saudi Arabia were interviewed as well to determine the disruptive theory dimensions concerning the, convenience of WiMax, customisation and cost of use. The SMEs' managers were interviewed based on the combination of the institutional theory and disruptive theory attributes. The framework will be used in order to gather views of the participants in the study. See **Figure 2.7**.

Figure 2.7 Conceptual framework of the research



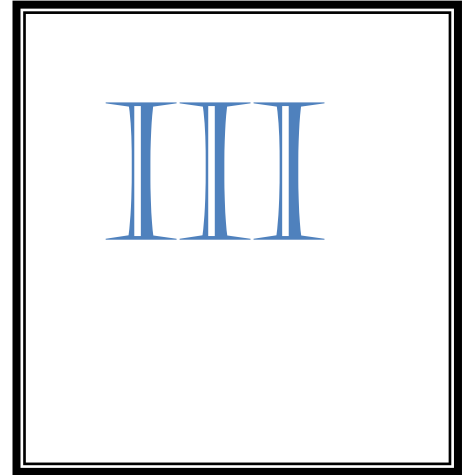
AC: Adhocracy Culture; **MC:** Market Culture; **HC:** Hierarchy Culture; **CC:** Clan Culture

KB: Knowledge Building; **KD:** Knowledge Deployment; **Sub:** Subsidy; **Mob:** Mobilisation; **SS:** Standard Settings; **ID:** Innovation Directive

CW: convenience of WiMax; **CS:** Customisation; **CU:** Cost of Use.

2.10 Conclusion

The purpose of this piece of research work was to review the normative literature and identify research issues in the area broadband (specifically WiMax) technology adoption by SMEs in the context of KSA. In doing so, the researcher determined a gap in the literature dealing with the absence of theoretical frameworks with regards to WiMax adoption by SMEs in KSA. In carrying out this research, the author analysed existing literature with a specific focus on the on the characteristics of SMEs, adoption of the Internet, broadband and associated technologies and specifically broadband adoption and its importance in SMEs. During the course of this research, the author identified limited literature evidence regarding WiMax technology broadband adoption by SMEs; however, there was no such literature that discusses on WiMax adoption in the context of KSA. Therefore, in moving further, the author analysed the available literature in the area and outlined the theoretical basis of this study. In doing so, the author particularly emphasised the Wi-Fi broadband technology and discussed benefits and limitations. Taking into consideration the limitations of wireless broadband technology, the author proposed the use of WiMax technology and presented some discussions. Thereafter, having researched in the area of broadband, the author attempted to present several arguments with regards to WiMax adoption by SMEs and highlighted the literature void with regards to its adoption in SMEs and specifically in the context of KSA. In order to address the literature void that has been identified in this literature review, the author will adopt the organisational cultural theory to understand different levels of culture influencing WiMax adoption by SMEs.



CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

For understanding physical and social phenomena systematically research is performed intensively implementing related theories and experiences. Research is conducted in a scientific way establishing theories, principles or their applications (Kumar, 2008a). Research problems are sorted out using research methodology sequentially. Research methodology also deals with each and every step of any research to do serially. Research method is a part of research methodology which is followed for identifying particular type of data collection procedure and analysis. The scope of research method is not as wide as research methodology (Kumar, 2008a).

Chapter one and two presented the research questions, theoretical framework and empirical related studies. Achieving research objectives is conceived in terms of the research methods used. The current chapter presents the research methodology used to answer the research questions. The uniqueness of this study is represented in its theoretical framework that was translated into empirical questions used in the questionnaire and interview schedule. For making the research effective the researcher has used positivism and post-positivism philosophies for supporting the mixed method.

In addition to the introduction this chapter consists of several sections. The third section presents and discusses the philosophy with particular focus on positivism and post-positivism as well as deductive and inductive approaches, their applicability to information systems in general and adoption of WiMax technology by SMEs in particular. The section also discusses deductive and inductive approaches and their relation to the study in hand. The fourth section discusses, from various perspectives, the choice of research methods and their pertinence to achieving these research questions. Section five demonstrates the notion of quantitative and qualitative methods and the difference between them as well as their uses in information systems research. Section six demonstrates the research design. Section seven presents the data collection procedure with SMEs and conducting semi-structured interviews with SMEs owners, government representatives, and vendors. Sections eight and nine illustrate the sampling strategy including population of the study and unit of analysis, sampling techniques in quantitative and qualitative research. Sections ten and eleven present the study instruments, including the survey questionnaire and the interview schedule for SMEs, government representatives and vendors. Section twelve presents the data analysis strategy of survey research data and semi-structured interviews. Section thirteen presents validity of quantitative data and trustworthiness of qualitative data. Section fourteen presents the ethical issues in research such as informed consent, anonymity, privacy and confidentiality. The last section illustrates the conclusions of the chapter. **Figure 3.1** presents the structure of this chapter.

Figure 3.1 Structure of Chapter 3



3.2 Research Process

Saunders et al. (2009) claimed that, in order to complete any research scientifically a number of steps are followed from data collection procedure to result findings. Number of stages of research could be differed based on the research areas and way of data collection but some issues including selecting related contemporary literature, collecting data from different sources, designing the research and writing up procedures are almost similar for any social science academic research. A series of steps

are involved for any research from research philosophy selection to sampling. The research steps that would be used for this research is shown in the following **Figure 3.2**.

Figure 3.2 **Research Process Steps followed in this research**



Source: Adapted from Saunders et al. (2009)

Both positivism and post-positivism research philosophies are followed for this research including both deductive and inductive research approaches. Semi-structured interview questions and a questionnaire are prepared for data collected from government representatives of Saudi Arabia, Vendors and SMEs of that region.

3.3 Research Philosophy

Views and values about the research are expressed in the research philosophy and so, it is very important for academic research for describing research areas and expected data analysis procedures (Newby, 2010). In the research philosophy research outcomes and essential options are also indicated. Some issues related to beliefs and research predictions are also identified through selected research

philosophy. Research methods and research philosophy are significantly related to each other in the academic research based on particular research philosophy, research method could be varied. Interpretivism, realism and positivism are the main philosophies used in the research. **(Figure 3.3)**

Figure 3.3 **Research philosophy**



Source: Adapted from Saunders et al. (2009)

Running any research effectively and to identify way of data collection and analysis mainly two types of research philosophies such as positivism and post-positivism or any one of them are used for any research (Creswell, 1998; Cryer, 2006). **(Figure.3.4)**

Figure 3.4 **Research philosophy**



Source: Adapted from Creswell (1998)

It is useful in the beginning of this section to define research philosophy and distinguish between epistemology and doxology. Galliers (1992) defines the research philosophy as a manner in which data about a research problem or phenomenon should be collected, analysed and reported. Research philosophy contains two terminologies: epistemology and doxology (Greenwood and Morten, 1998). Epistemology is known as knowledge generated by the problem being studied. In other words, true information may be known in advance (De Vreede, 1995). In contrast, doxology refers to what is believed to be true. In conclusion, both epistemology and doxology refer to generation of knowledge. According to Saunders et al. (2009) research philosophy is of three types and those are discussed below:

3.3.1 Positivism

In the positivism research philosophy some philosophical stances for natural scientist are briefly but effectively followed for showing the way of validating research outcomes. According to Saunders et al. (2009), in the positivism research philosophy observable social reality and natural science related factors are identified and validated. According to Newby (2010) positivism research philosophy is the first step of selecting quantitative research method. Oliver (2010a) has also argued that, as social phenomenon is tried to be validated through quantitative research method and single truth is its one of goals then, it is strongly related to positivism research philosophy. In the positivism research philosophy observable data and statistical results are related for collecting information and to express research outcomes (Cryer, 2006).

Selection of appropriate research paradigms is one of the critical steps for any research project whose main target is to select best suited research method for finding research outcomes or justifying research hypothesis. Epistemology is used in the positivism research philosophy for indispensable considerations. Research methods and also literature review of any research could be affected by research paradigm. Positivism or interpretivism is the main research philosophy used in the information studies, health sciences and social sciences. Laws related to positive facts and quantitative data are the main issues related to positivism research philosophy. Real objectivity is also the basement of positivism research philosophy for natural and law sciences. Facts are produced in this research philosophy by natural scientists. Human behaviour and social science issues are observed by the positivism research philosophy (Mingers, 2001).

3.3.2 Realism

In the realism research philosophy scientific enquires are also indicated for showing reality or truth of the research based on any real event or truth invention. According to Saunders et al (2009) realism is

one of the branches of the epistemology and sometimes similar to positivism research philosophy for developing knowledge or ideas.

3.3.3 Interpretivism/Post-Positivism

Interpretivism is that discipline of science that is concerned with the interpretation of meaning (Sayer, 1992) and in interpretivism, the researcher and phenomenon are mutually interactive (Hirschman, 1986) and the researcher becomes part of the evolving events studied (Gioia and Pitre, 1990). It is necessary to differentiate various human roles as social actors by involving in any research and it is the difference of this philosophy from post positivism research philosophy. According to Saunders et al. (2009) interpretivism research philosophy is used for distinguishing human from other factors related to research. In this research philosophy multiple perspectives are possessed by the researcher for presenting research outcomes in a different ways for making research effective and contemporary (Oliver, 2010a).

Some researchers, like Hirschman (1986), mentioned very slight differences between interpretivism and post-positivism and that is if the researcher is not evolved the events studied is positivism but not interpretive. According to Jonker and Pennink (2010) interpretive data is subject matter and it could be interpreted applying existing theories and personal experiences related to the selected research. Interpreting research outcomes and presenting them sequentially based on their importance is indicated in the interpretivism research philosophy (Kurtz et al., 2010). In the interpretivism research philosophy the researcher and the phenomenon interact with each other but if the researcher is not involved in the phenomenon directly then it is generally termed as post-positivism research philosophy (Gioia and Pitre, 1990).

In the post positivism research philosophy natural science matters are not discussed and it is the main difference from positivism research philosophy. According to Bryman and Bell (2004), human actions and human behaviour are mainly represented in the post-positivism research philosophy. For studying certain phenomenon or problem these two paradigms could be varied. According to Robson (1993) hypotheses or objectives are used from theory in the positivism whereas observations are used for reaching the implications of theories in the post positivism research philosophy. Theories are much emphasised in the deductive research approach whereas, observations are the main theme of the inductive research approach (Maxwell and Loomis 2002). According to Goldstein et al. (1986), in the information technology research mainly deductive research approach is followed for identifying single truth. Some explanatory factors and various groups are considered in the deductive research approach (Pope et al., 2007).

3.3.4 Researcher's Justification

For making research outcomes more realistic and subject oriented both of the positivism and post positivism research philosophy are followed (Robson, 2002; Saunders et al., 2009) and it could help research to collect in-depth as well as short formatted opinion from different research respondents. For these reasons both of these methods are followed for this research. For in-depth information the researcher has selected interview questions and for single truth a survey questionnaire is also prepared. After securitising the research aim the researcher has selected some hypothesis and has collected data via survey questionnaire for validating the selected hypotheses. Deduction starts with theories and it could also be based on hypothesis (Bryman and Bell, 2004: 11). After considering all of these issues it could be told that, deduction research approach is straightforward and linear and it follows a logical sequence. However, Spratt and Porter (1997) argued that this is not true due to some reasons: (1) new hypothesis/results may be published by other authors and (2) the data collected by a researcher may not fit a dataset collected by another researcher.

In contrast to deductive paradigms, inductive paradigms move from empirical to abstract and from particular to general. Inductive approach does not employ a theory or a hypothesis; rather it generates a theory and new ways of understanding new perspectives (Spratt and Porter, 1997). Research questions are set directly collecting relevant data in the inductive research approach and it is goes from observation to theories (Hughes, 1990). Empirical data is generated in the inductive research approach though this research approach does not rely on hypothesis or theory. Theoretical statements could be created in the inductive research approach. Due to its lack of hypothesis, inductive approach does not create cause and effect and makes only plausible guess.

In order to overcome the weaknesses of positivism and post-positivism paradigms, this study sought to mix and combine both methods. Using mixed methods facilitated the process of complementing the survey questionnaire results generated from semi-structured interviews with SMEs, government and vendors.

3.4 Rationale for the Choice of Research Methods

According to De Vreede (1995), until the late 1970s, the prevalent method used in information technology and information systems research was interpretivism. Nevertheless, in the early 1980s and forward, information system researchers began using positivism paradigm which gave them the opportunity to publish their work in high standards journals (Dickson and Desantis, 1990).

Quantitative research is mainly used for information system because they aimed to measure quantitative outcomes which can be grouped into different settings including technical effectiveness, performance and economic measures. These studies tackled various issues related to organisational culture, organisational features, technological features, adoption of information technology and systems information needs, etc. In relation to this aspect, Orlikowski and Baroudi (1991) argued that the vast majority of information system research in the United States use positivism paradigm and less than four per cent use interpretivism paradigm. The main disadvantage of positivism paradigm is its static approach and it neglects the cultural aspects related to the organisations (Dickson and Desantis, 1990). Some researchers such as Argyris (1985) and Goldstein et al. (1986) focused organisational culture because of its association with information system and organisational behaviour. In the information technology research positivism research is known as the dominant approach to identify the truth of the research which are assumed through hypothesis (Goldstein et al., 1986). Impacts of some explanatory factors are discussed based on some variables and their relationship with selected companies, groups etc.

This study aims to investigate the adoption of WiMax technology by SMEs in Jeddah in Saudi Arabia. As mentioned in chapter 2 the adoption of WiMax technology is affected by various groups of factors such as organisational and institutional ones. Therefore, this required addressing the issue of adoption not only from owner/managers of SMEs perspective but also from government and vendors' point of view. This study also helped the researcher to come up with some relevant recommendations formulated by SMEs, government representatives and vendors. To perform all tasks and elicit robust information, it was necessary and critical to use mixed methods. It should be remembered that positivism is associated with objectivity while post-positivism is associated with subjectivity (Mingers, 2003).

Many researchers suggest that there is no preference for one research method to another (i.e. positivism to interpretivism), but the combination of both paradigms improve the quality of results (Kaplan and Dunchan, 1988). In other words, research should not rely on monism methodology. It should be remembered in this regard that the choice of research methods at first and at last should be dependent on research objectives and questions rather than upon the researchers' choice (Shipton, 2001:2). Accordingly, using both paradigms enrich the study and thereby enables researchers to defend their results. For these collective reasons, the researcher decided not to use a single method, but to use mixed methods. As mentioned earlier in this chapter, this study has not studied only SMEs' views, but also broadened to elicit information on institutional and environmental factors affecting SMEs adoption of WiMax in the Saudi Arabia.

According to Jones (2000), there are some challenges to integrate quantitative and qualitative results because they come from different paradigms and theoretical backgrounds. In general, the choice of research method depends upon the problem and phenomenon under study (Myers, 1997). However, mixed methods are valuable and can mutually inform each other by focusing on the relationship between the local level (i.e. an organisation) (Denscombe, 2003) and outsiders (governmental and private sector organisations) (Kaplan and Duchan, 1988). Furthermore, Kaplan and Duchan (1988) suggest that use of mixed methods is more powerful and gives robust insights that may not occur if one single method is used. Mixed methods provide ground to create association between research questions and multi-level analysis (Creswell, 1998). They also provide new insights to research through encouraging creativity and broadening the main aspects of the problem being studied (Mingers, 2001).

In the information system research there are two authors Mingers and Galliers (1992) whose works are deemed as seminal. Own approaches are developed by themselves. According to Mingers (2003) there are mainly five domains in the positivist paradigm and those are observation (passive) measurements, case study selection, preparing survey questionnaire and analysing data by statistical analysis experiments. However, some different methods such as case study selection, proof of theories, surveys, field experiment and laboratory experiments are developed by Galliers (1992). In terms of post-positivism, Mingers' divides this approach into five methods: interviews, qualitative content analysis, ethnography, grounded theory and participants' observation. However, Galliers (1992) classified post-positivism into six methods: subjective/argumentative, reviews, action research, descriptive/ post-positivism, future research and role/game playing. It can be noticed from these two authors that there is a clear difference between both positivism and post-positivism.

Generally in the post-positivism research data are collected via interviews questionnaire and in this process deeper information could be achieved for making any research effective (Saunders et al., 2009). This study has adopted Mingers (2003) approach who reviewed all published journal papers between 1993 and 1998. Mingers (2003) found that the majority of studies in the field of information systems used survey questionnaire methodology and interviews. The study followed Mingers' approach which begins with survey research and ended with in-depth interviews. Choudrie and Dwivedi (2005) investigated the adoption of technology by households which used both positivism represented in survey research and complemented the results by the data collected through in-depth interviews. According to Hevner et al. (2004), studying different issues related to information systems requires using both positivism and interpretivism paradigms due to the fact that data collected through interpretivism approach can explain the issues raised by positivism approach.

3.5 Research Approach

Saunders et al. (2009) have clarified two types of approaches for academic research which are inductive and deductive approaches. (Figure 3.5)

Figure 3.5 Research approach

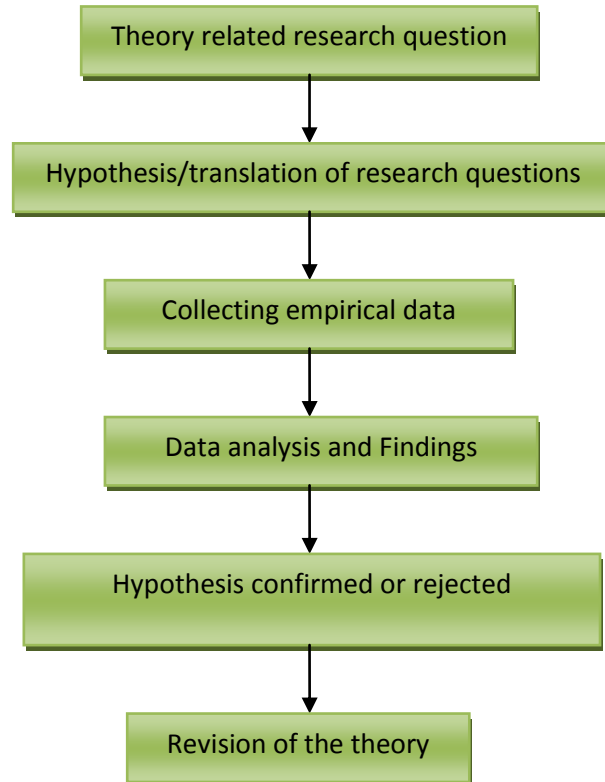


Source: Adapted from Saunders et al. (2009)

3.5.1 Deductive Approach

In the deductive research approach some hypotheses or theories are developed and through empirical observation those theories or hypotheses are tried to be tested. According to Crowther and Lancaster (2008) deductive research approach is a set of techniques in order to apply, test or assess the validity of any theories or hypothesis. In this research approach specific conclusion is drawn from a general principle. Sometimes the set of conclusions is termed as argument and true inferences are drawn through argument. Not truth but validity is the main target of the deductive approach (Krishnaswamy et al., 2009). (Figure 3.6)

Figure 3.6 Deduction Paradigm

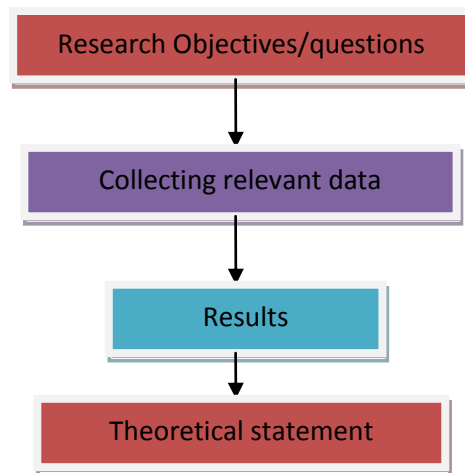


Source: Bryman and Bell (2004)

Testing hypothesis is one of the main applications of the deductive research approach (Krishnaswamy et al., 2009). Hypothesis is considered as true, if the result of testing is true.

3.5.2 Inductive Approach

Based on observations from empirical data inductive research approach is used for developing theories (Crowther and Lancaster, 2008). Krishnaswamy et al., (2009) claimed that, some theoretical evidences are used for inductive approach inference and generally a set of facts are involved in this approach. According to Dane (2010), inductive research approach is known as the process of generalisation to apply particular information for general situation of further incidents. **(Figure 3.7)**

Figure 3.7 **Inductive approach**

Source: Bryman and Bell (2004)

Saunders et al. (2009) mentioned that, a theory is generally tried to be formed from adequate grounded data in the inductive research approach. A number of differences are found from the inductive and deductive research approaches and those are tabulated in the following **Table 3.1**.

Table 3.1 Differences between deductive approach and inductive approach

DEDUCTIVE APPROACH	INDUCTIVE APPROACH
<ul style="list-style-type: none"> Scientific principles 	<ul style="list-style-type: none"> Gaining an understanding of the meanings humans attached to events
<ul style="list-style-type: none"> Moving from theory to data 	<ul style="list-style-type: none"> A close understanding of the research context
<ul style="list-style-type: none"> The need to explain causal relationship between variables 	<ul style="list-style-type: none"> A realisation that the researcher is part of the research process
<ul style="list-style-type: none"> The application of controls to ensure validity of data 	<ul style="list-style-type: none"> Less concern with the need to generalise
<ul style="list-style-type: none"> The necessity of select samples of sufficient size in order to generalise conclusions 	<ul style="list-style-type: none"> A more flexible structure to permit changes of research emphasis as the research progress
<ul style="list-style-type: none"> A highly structured approach 	
<ul style="list-style-type: none"> Researcher is independent of what is being researched 	

Source: Adapted from Saunders et al. (2009)

3.5.3 Researcher's Justification

For this research the researcher has selected both of the inductive and deductive approaches. Both approaches are used for moving theory to data in the deductive approach and from observation to theories by the inductive approach for deeper information. Good outcomes could be achieved from the

mixed approaches and it can help researcher to find in depth information including valid events (Saunders et al., 2009; Pope et al., 2007; Robson, 2002).

3.6 Research Design

Objectives and focuses upon turning a research question are indicated in the research design for making research systematic (Saunders et al., 2009). Various issues including time horizons of the research, ways of data collection and research strategies are also shown in the research design. According to Jonker and Pennink (2010) a set of considerations and assumptions are described in the research design for specific contextualised guidelines and to support the selected methods for gathering empirical evidences. There are mainly three types of research designs that are followed for academic purposes and those are exploratory, descriptive and explanatory research design. (Figure 3.8)

Figure 3.8 Research Design



Source: Adapted from Saunders et al. (2009)

3.6.1 Exploratory Research

Specific problems are tried to be sorted out using the exploratory research design with the help of internal and external information sources of the selected research organisation or issue (Kurtz et al., 2010). Research questions are identified, defined and answered in the exploratory research design including developing initial ideas for providing research direction for further (Housden, 2008). If anybody wishes to understand their research problem clearly based on any observations then exploratory research design could be the best suited research design (Saunders et al., 2009).

3.6.2 Explanatory Research

Reasons of phenomenon and hypothesis are analysed in the explanatory research design for validating the assumptions (Krishnaswamy et al., 2009). One of the main targets of explanatory research design is to test the effect of independent variables on the dependent issues and how these two could be interlinked. According to Dane (2010:101), for analysing all types of potential causes a single explanatory research design is not sufficient but could be used for validating assumptions. The explanatory research design is known as easier way of designing research and applying for considering particular theory. It is the fastest way for cumulating stream of research knowledge for scientific research. Fundamental information about the research topic could be gathered through explanatory research design for various outcomes and contributing on the research areas (McNabb, 2010, p.227).

3.6.3 Descriptive Research

Strength or intensity of any organisation or research areas is usually used for attempting or measuring particular phenomenon instead of assessing something continued (Dane, 2010:85). Exact events are identified and analysed in the descriptive research design. Krishnaswamy et al. (2009) have mentioned the descriptive research design as fact finding based on adequate interpretation and simple analysis. Descriptive research is related to cross sectional time horizon where data is collected at a single point of time and it could also be longitudinal if data is collected for long period. Different types of methods including correlation, comparative and survey are involved in the descriptive research design.

3.6.4 Researcher's Justification

Both exploratory and explanatory researches have been chosen by the researcher for the design of the research. For collecting data the researcher has travelled to the region based on which country this research is going on. For finding research outcomes broadly and deeply exploratory research design is used (Creswell, 1998). Single truth is also tried to be found in the explanatory research design (Saunders et al., 2009) and descriptive research design is generally used for specific events or issue (Robson, 2002). For making research effective the researcher has followed both explanatory and exploratory research design.

3.7 Data Collection Methods

In the data collection way of data collection, identification of the contemporary source, way of data sampling and analysis are discussed in the context of the research area. Source and types of data are recorded to make research updated. According to Krishnaswamy et al. (2009) for information collection either interviews or survey questionnaire or both are used for reflecting respondent's opinion. Primary and secondary are the main types of data used in the research (Kurtz et al., 2010). (Figure 3.9)

Figure 3.9 Data collection methods



Source: Adapted from Saunders et al. (2009)

3.7.1 Primary Data Collection

According to McNabb (2010) primary data is collected and generated by the researcher for specific project and different procedures such as audio and video recordings, interviews, surveys through online or going to the respondent physically (Krishnaswamy et al., 2009). Survey is conducted for viewing comprehensively and details information of the selected research issue and it is sometimes known as a data collection map for social phenomenon (Denscombe, 2003:6). Data are collected relating with research objectives or hypothesis and it is the main purpose of that mapping. Using survey procedure data could be collected from large number of sample within short time.

Surveys are of two types including cross sectional and longitudinal surveys. Survey design is sometimes known as co-relational design when data is collected from random sample using a set of questions. Mainly different types of variables are tried to be interlinked by survey of the research

(Frankfort-Nachmias and Nachmias, 1992: 215). There are some additional advantages of survey if data is collected from proper participants and if it is conducted in a right way (Morrison, 1993). Detailed short formatted data could be collected through survey and it could be inferentially and descriptively analysed by applying some statistical techniques. There are some disadvantages of the survey method because of their limited option (Verma and Mallick, 1999:81).

This study used sequential explanatory (survey questionnaire) and exploratory (in-depth interview) approaches since the researcher firstly collected quantitative data and secondly conducted in-depth interviews with SMEs, government representatives and vendors. In order to explain the quantitative results, in-depth interviews were conducted. In other words, the researcher followed a journey of data collection that began with questionnaire and ended with in-depth interviews.

According to Verma and Mallick (1999), the researcher's role in survey research is not major because it depends upon closed ended questions. For this reason, researcher's bias is not possible. Survey research allowed the researcher to use advanced statistical modelling. Survey research was used in this study to elicit information about SMEs rather than on individuals/owners although the researcher utilised the data on owner for the purpose of complementary analysis (McCracken 1988). For this reason, this study employed survey research method as the main method of data collection complemented with semi-structured interviews.

3.7.1.1 Contribution of the researcher for primary data

The researcher in the first stage used a structured survey questionnaire. The questionnaire intended to identify owners' and managers' of SMEs stances towards adoption of WiMax. The researcher opted to use the survey questionnaire as the first technique for data collection and in-depth interviews as a complementary method.

The original version of survey questionnaire was translated from English to Arabic by an authorised and credited translator in Saudi Arabia. To ensure the accuracy of translation, the questionnaire was validated by an authorised translator in the United Kingdom. Furthermore, the questionnaire was reviewed by Arab students and professionals at the Saudi Culture Bureau and Brunel University in London. Literature identifies a number of steps that should be considered when translating and adapting instruments for cross-cultural research (Brislin, 1986; Hambleton, 1994; Karahanna, et al., 2004; Mullen, 1995; Orlando and Law, 2000).

The researcher arranged three events (workshops) in the city of Jeddah which is a major commercial and business city in Saudi Arabia. The researcher began contacting key people of SMEs including the Chamber of Commerce and the private sector authorisation responsible for funding SMEs such as Bab

rizq Jameel. The researcher intended to contact all potential key organisations to obtain all registered SMEs. However, due to lack of reliable registry of SMEs, the Chamber of Commerce in Jeddah provided the researcher with incomprehensive list of registered SMEs. However, they could not help the researcher to arrange an event to meet the SMEs. As a result the researcher contacted all the banks and relevant sectors that might help contacting/recruiting SMEs. The majority of SMEs in Saudi Arabia have developed their websites which was a hindrance to contact them. This study was endeavouring to target a large sample of SMEs, but due to lack of information on SMEs, the researcher could access 63 SMEs which is considered satisfactory for PhD project.

Due to the complications of the questionnaire and new subject in the field of SMEs, it was critical to arrange a number of meetings with the selected participants. In the first instant, SMEs were not cooperative with the researcher and asked for authorisation from the Chamber of Commerce. Due to some reasons, the Chamber of Commerce was not significantly helpful in this regard. For these reasons, it was necessary to physically meet the participants. It is worth remembering that the researcher worked hard to gather the owners of SMEs since the Chamber of Commerce in Jeddah could not help in arranging the events. The survey was designed in a certain way whereas participants should understand how to complete the questionnaire correctly. As a result, the researcher had prepared a presentation that explained the idea behind the research and explained the method that used in designing the survey. In order to accomplish the task, the researcher paid time, efforts and money to use an advanced technology like the SMS system where one can send several messages to a particular group of people like SMEs.

The researcher also hired two people to work on arranging the events, calling and inviting SMEs to attend the presentation. The nature of the SMEs forced the researcher to target the owners or persons in charge of the organisation. Others were welcomed as well to participate in the research. As a result of this sequential process, the researcher has become able to manage and arrange further three different events in different locations. The researcher tried to make the event less formal by providing the participants with some refreshments. During the events, presentation was given to explain the aim of the research. From an ethical point of view, participants were given the choice of whether to take part in the study or to withdraw any time and they were not bound to complete all the questions. In terms of completing the questionnaire, participants were given sufficient time. The researcher was clear with the participants that the data will be used in the purpose of the research only.

3.7.1.2 Qualitative technique and quantitative technique

Based on data collection and data analysis procedures qualitative and quantitative research methods are widely used in the management research. These two methods could be easily differentiated

considering numeric and non-numeric data. In the quantitative data collection techniques questionnaire is used for generating numeric data. On the other hand, for generating non-numeric data interviews are used in the collection of qualitative data. Sometimes video clips and pictures are also used for qualitative data (Saunders et al., 2009).

The main target of quantitative research is to gather numerical information for quantified and to analyse using statistical techniques. Analysing data easily the scales of data should be collected appropriately. Vital patterns are seen for providing further research in the quantitative data collection method (Bryman and Bell, 2004). On the other hand, in the qualitative research personal experiences, judgement and feelings are used for data collection. Qualitative data is collected via interviews or observations. Social issues could be deeply known by qualitative data and new ideas or information about the research could easily be achieved. Different types of interviews or observations are the main ways for collecting qualitative data (Bryman and Bell, 2004). Most of the researchers are agreed about the differences of the qualitative and quantitative research method based on their numerical presentation. Numerical data is emphasised in the quantitative research method whereas in the qualitative research method descriptive data is emphasised.

Testing of theory is one of the main goals of the deductive research approach but descriptive information is the main emphasising factor of the qualitative research approach. According to Cohen and Manion (1994), generation of theories are mainly emphasised in the qualitative research whereas numerical data are used for quantitative research method. Research methods are related to research questions or research objectives and research hypothesis. Deduction of theory is followed in the quantitative method while interview approach is followed in the qualitative method and construction of theory is followed in this research method (Greenhalph, 2001). According to Robson (2002), qualitative method is associated with post-positivism whereas quantitative method is related to positivism research philosophy.

According to Robson (2002), the main difference between qualitative and quantitative research methods is their ontological positions. For instance, qualitative methods depend upon constructivism represented in understanding the reality of social problems. A social phenomenon is constructed through the interaction between the interviewer and participants (Robson, 2002). In contrast, quantitative methods mean that there is a belief that a social phenomenon exists autonomously of the people in the society (Bryman and Bell, 2004). In other words, individuals are independent of the social phenomenon. On the basis of this contemplation, this study used both quantitative and qualitative research methods due to fact that it sought explanatory (identifying the organisational cultural profile affecting the adoption of WiMax) and exploratory (generation of qualitative data to support quantitative results by identifying the government policies and vendors' strategies that have

impact on the WiMax adoption by SMEs) approaches. The study also sought to understand SMEs, government and vendor views of the obstacles to SMEs adoption of WiMax. Furthermore, De Vaus (2001) argue that quantitative research method represented in survey research method does not establish casual correlation between variables. Adoption of WiMax by SMEs is affected by various types of factors such as organisational and institutional factors. Thus, this required the researcher to address the issue of adoption not only from SMEs point of view, but from the government's and vendors' perspective. Additionally, the researcher wanted to know how the adoption of WiMax may improve SMEs performance. This helped the researcher to come up with some recommendations formulated by three target groups (SMEs, government representation and vendors). To perform all these tasks and elicit robust results, it was critical to use mixed methods (quantitative and qualitative methods). Research methods of this research are shown in **Figure 3.10**.

Figure 3.10 **Research Methods**



Source: Adapted from Saunders et al. (2009)

3.7.1.3 Pilot Study

Pilot study helps researchers to get rid of the bugs in the data. It permits researchers to test the hypothesis on a small sample which may lead to more accurate hypothesis in the primary study and check the applicability of certain statistical techniques of the collected data (Leedy, 1997: 209). Besides, the pilot results may also lead to change in the research instrument and thus in the study hypothesis. Pilot study also reduces the unanticipated nuances in the questions which can be overcome before the main phase of data collection and minimises the errors. It also saves efforts, money and time (Bell, 1991).

Bell (1991) states that the pilot study aids researchers to pre-test their research instruments in terms of understanding the question by respondents and the time taken to complete it. Piloting also helps researchers to eliminate the sensitive and unnecessary items in the instrument. Furthermore, the piloting study aids researchers in understanding the main concepts and constructs in the questionnaire as well as give a picture about them.

The main challenge, and the complex task that can face the researchers, is survey research with a diverse culture where researchers depend on instruments with different languages (Hines, 1993). The translated instrument that has been used in the study was developed and tested in Western countries using the English language. This instrument was translated into the Arabic language for the convenience of participants. Literature identifies steps and guidelines to be considered when translating and adapting instruments for cross-cultural research (Brislin, 1986; Hambleton, 1994; Karahanna, et al., 2004; Mullen, 1995; Orlando and Law, 2000). The questionnaire was firstly translated into the Arabic language by the researcher and reviewed by 10 Arab students and professionals who were fluent in both English and Arabic at the Saudi culture bureau and Brunel University in London (**table 3.2**). Changes were made accordingly and a revised edition was used for the pilot study. The respondents were asked again to give more comments on the translation and the use of Arabic language.

In order to evaluate the effectiveness of the chosen research method, a pilot study was conducted. The outcome from the pilot study helped to detect any flaws in the questions. Additionally, running a pilot study can contribute to maximizing the response rate and minimizing the error rate on answers (Burgess, 2001). The pilot study took place in the UK two months prior to the study. Therefore, 5 Saudi business people were involved as they were visiting the UK on business trips, giving a rate of return of 100 per cent (**table 3.2**). The results of the pilot study were very positive, with the majority of the participants agreed that most questions were very easy and straightforward. All changes were then made before sending the questionnaire to the participating SMEs in Saudi Arabia. In terms of

cultural considerations, adopting and using Western developed instruments bears some limitations but there were no indigenous instruments available.

Additionally, running a pilot study can contribute in maximizing the response rate and minimizing the error rate on answers (Burgess, 2001).

Table 3.2 **Pilot study – response rate**

Parties	Sent	Response	Response rate
Saudi culture bureau	3	2	66.7%
Saudi SMEs	5	5	100%
Saudi student	7	5	75%

3.7.2 Secondary Data Collection

From compiled or previously published sources secondary data are collected (Kurtz et al., 2010). For supporting research findings and to get idea or theoretical background of the research secondary data are used and different sources including newspaper, e-books etc. could be used for secondary data. There are some advantages and disadvantages of secondary data and some of them are tabulated below. **(Table 3.3)**

Table 3.3 Advantages and disadvantages of secondary research

ADVANTAGES	DISADVANTAGES
<ul style="list-style-type: none"> ▪ Easy to find ▪ Low costs ▪ Collect only relevant information ▪ Accessibility to previous numeric sources ▪ Higher quality of the data ▪ Obtains easy access to the information ▪ Faster than primary research ▪ More detailed information 	<ul style="list-style-type: none"> ▪ Lack of familiar data about the topic ▪ Limited control about the data ▪ More complex information than needed information ▪ Lack of finding updated information

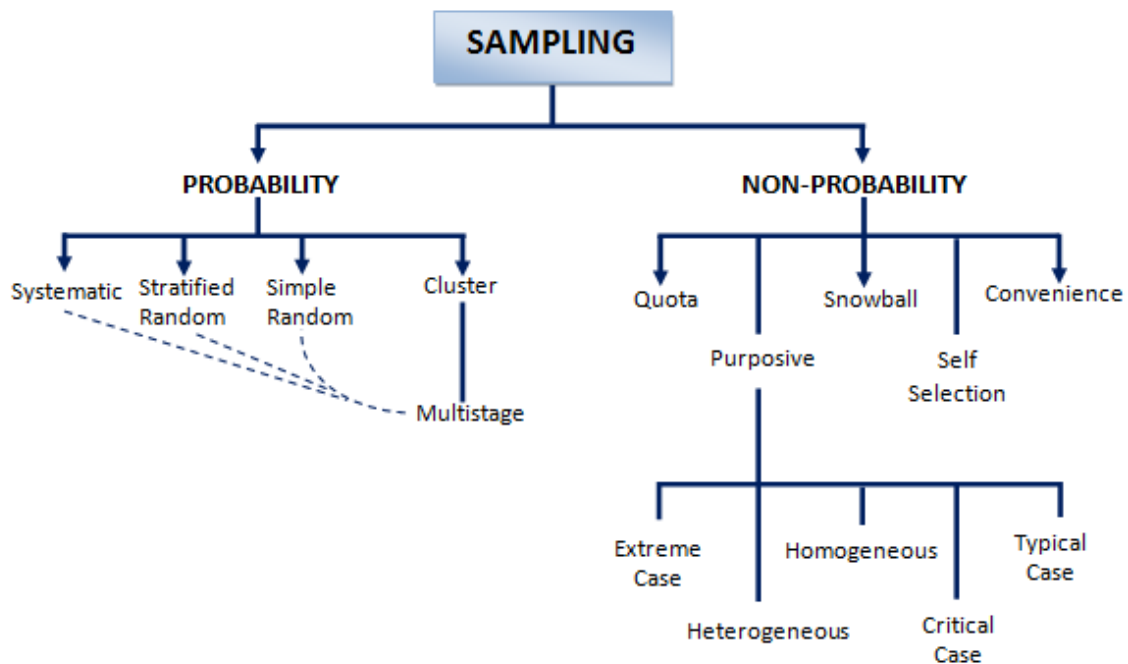
Source: Adapted from Saunders et al. (2009)

3.7.2.1 Interpretation of the researcher for secondary data collection

According to Saunders et al. (2009) secondary sources are used for supporting literature reviews and research field theoretically and the researcher has followed some contemporary journals for supporting her research. Presentation of relational information is one of the main goals of this study and so, secondary study has been vitally considered. Various updated sources including strategic plans of the organisation, annual report, periodical publications, websites, journals and books are used as secondary sources of the research. The researcher has got latest information through these sources.

3.8 Sampling

According to Kurtz et al. (2010) for selecting research participants or survey respondents sampling process is followed in the academic research. In the research design it is one of the important aspects. In the research work data are sampled in two ways one of them is probability sampling and another one is non-probability sampling (Kurtz et al., 2010). **(Figure 3.11)**

Figure 3.11 **Sampling**

Source: Adapted from Saunders et al. (2009:213)

3.8.1 Probability Sampling

Random sample is used in the probability sampling for data collection and each sample has equal chance to be research sample (Dane, 2010). A chance of being selection to be the research sample is provided to each population in the probability sampling (Kurtz et al., 2010).

3.8.2 Non- Probability Sampling

A range of alternatives techniques are provided in the non-probability sampling based on the particular subject areas (Saunders et al., 2009). For identifying problems or exploring research stages some procedures such as pilot survey is not an effective way of sampling (Saunders et al., 2009). Sampling error could not be estimated during non-probability sampling because they are not random sample (Dane, 2010).

3.8.3 Researcher's Justification

Rubin and Babbie (2001:225) define study population as the population on which the study sample is actually drawn. Study population usually have similar characteristics. The target population in this

study is all SMEs in the Jeddah area in Saudi Arabia. Therefore, the unit of analysis employed in this study is individual SMEs. It is worth mentioning that owners and managers of SMEs are not considered as the unit of analysis, rather, they will be analysed in relation to the SMEs they own or manage.

Rubin and Babbie (2001) define unit of analysis as individuals or things targeted in a study and their characteristics are studied. One of the main aspects in research is choosing the units of analysis because data analysis strategy depends on this unit. In this study, the researcher used SMEs as a unit of analysis because the study focused on SMEs activities related to the adoption of WiMax technology rather than on owners/managers of these SMEs.

3.9 Sampling Procedure

It is not reasonable and feasible to include all of the target population in the study because it costs time and human resources. Therefore, it is essential to target a small portion of the population. Leedy (1997) defines sampling as the process of selecting a small sample or portion from a large population. Neuman (2003) states that a sample is a small portion of the population a researcher selects from the large population to study specific number of variables (factors) and generalise the finding to the larger population.

According to Borg and Gall (1989), a group of people is selected from organisations or large population for sampling using specific sampling techniques. Sampling techniques could be probability sampling and non-probability sampling. Each member has change to be selected as sampling in the probability sampling technique whereas non-probability sampling does not follow the probability theory. According to Cohen et al. (2000), sample selection depends on the researcher in the non-probability sampling and so, it could not be used in terms of probability.

Research result and statistical significance could be affected by the sample size of any research (Baines and Bal, 2002:29). Cohen et al. (2000) have claimed that, there is no particular size of the research sample. View of large population should be reflected in the sample size for any research and it should be large enough for estimating the mean of the selected population (Kumar, 1999). Convenient sampling technique is very important for concluding the research outcomes and it could also be used for quantitative research technique (Leedy, 1997). Accessibility and availability of information is related to the data collection techniques. Fair insight should be provided using reliable source of information for any research (Cohen and Marrison, 1994). Due to time constraint and resource of this study the researcher has targeted 63 SMEs owners/managers and respondents from

different levels and from this sample good result could be achieved because direct users, employees and government representatives are involved in the data sample.

3.9.1 Sampling in Quantitative Data

Based on the number of assumptions sample size could be estimated for any particular research. Study conditions could not be assumed by researchers but sampling size is predefined. Generally seven steps are followed for calculating research sample and those steps are as follows:

- ⌘ Selection of the end point of the research sample
- ⌘ Considering data statistical techniques should be selected
- ⌘ Effects or magnitude of the difference should be specified
- ⌘ Expected variability should be estimated
- ⌘ Maximum acceptable risks should be specified
- ⌘ Probability of successful effect or differences should also be specified
- ⌘ Appropriate calculations should be applied (Monsen and Horn, 2008: 374).

3.9.2 Sampling in Qualitative Research

This study used purposive sampling technique which sometimes refers to judgement sampling (Patton, 2002). This type of sampling depends upon subjectivity of the researcher because he/she is aware of the research being investigated. It is a purposive sampling of individual experiences rather than attitudes. The identifying assumption of purposive is that, the method does not seek generalisation because of focuses on individuals' experience rather than collective views of individuals (Frankfurt- Frankfort-Nachmias and Nachmias, 1992:175-176). According to Bowling (2002) researchers deliberately select participants because they have substantial knowledge in the subject matter area. For this reason, the researcher in the study selected knowledgeable SMEs owners and specialised key information in the governors as well as relevant vendors.

This study used what is called purposive sampling strategy which targets a small number of key people in the SMEs, government and vendors. According to Neuman (2000) purposive sampling enables the researcher to select the cases or people who are informative in the field of study. A number of factors were identified to recruit the key people from the SMEs, government sectors and vendors.

3.10 Survey Questionnaire: Quantitative

For collecting particular sorts of data questionnaire is used (Bell, 1993). Research questions are not reflected if proper construction is not followed during questionnaire preparation. Study conclusion could be affected because of robust research results. Any types of complexities and confused language should be avoided for clarifying research question through survey questionnaire (Gall et al., 1996). Various research related issues should be explored by the survey questionnaire (Leedy, 1997: 198) and questions in the survey questionnaire should be logically arranged for easy reading and understanding. Organisational culture assessment instrument (OCAI) (Cameron and Quinn, 1999) could be employed to those research surveys which are related to organisational culture. For analysing various dimensions of culture this analysing tool could be used. In different sectors including information generation and communication (Dhillon, 2001), organisational change (Bennis et al., 2001), organisational effectiveness (Cameron and Freeman, 1991) and higher education (Fralinger, 2007) the above mentioned tool could be employed.

For organisational culture different models are available including Hofstede (1991, 2001). In the Hofstede model four dimensions are centred including individualism and masculinity or femininity, uncertainty avoidance and power distance. Culture within the organisations is focused in the Hofstede organisational culture. Contrary to Hofstede model a model presented by O'Reilly et al. (1991) indicated seven dimensions including stability, aggressiveness, team orientation or individual issues, people orientation, outcome orientation, attention to detail, risk taking and innovations.

In terms of information systems, there are several studies which employed OCAI instrument. For instance, Muller et al. (2009) examined the organisational culture profile and its impact on software process improvement. Muller and his colleagues' idea was to understand the impact of organisational culture on standardising the operating system and management information system. The authors also employed OCAI to assess the software development practices within the selected organisations. According to Ngwenyama and Nielsen (2003), the Cameron and Quinn model includes the fundamental aspects of the organisational culture as well as design and change. Although this study does not aim to investigate the organisational change within, adoption of WiMax in itself is considered as a change. On the basis of Cameron and Quinn (1999), the researcher designed the study questionnaire which was used by several researchers (i.e. Fralinger and Olson, 2007, Al-Khalifa and Aspinwall, 2001, Giritli et al., 2004, Cameron, 2004). See appendix B.

3.11 Interview Schedule

Interview schedule is an instrument or a tool used for data collection in qualitative research. It is employed when structured or semi-structured interviews are conducted on the phone or face-to-face between the researcher and interviews. Interview schedule is involved when some kind of a conversation takes place between the researcher and participants (Neuman, 2000: 512).

On the basis of the result from the questionnaire, the institutional theory and the theory of disruptive innovation, three interview schedules in this study were designed. They addressed the main issues related to adoption of WiMax by SMEs in Saudi Arabia.

Mingers (2003) described interviews as a useful method in gaining the key people in organisation. Following this approach, this study interviewed key informants from the governmental topics covered in the interview schedule.

In this seminal work, Patton (2002:32) regards interview method as critical instrument for data collection. In order to complement the qualitative results and elicit information from SMEs, government representatives and vendors, interviews in this study took place face to face, facial expression, tone of voice and body language (Bell, 1999). The researcher was reflective and focused to avoid bias in analysing in-depth interviews. The researcher was keen to encourage the target people from SMEs, government and vendors to speak about their experience and the researcher used probing.

3.11.1 Interview Schedule of Governmental Representative

The second objective of this study is to assess the Saudi government policies for SMEs adoption of WiMax. Some questions were related to regulations and policies about the diffusion of technology. This required the researcher to use in-depth interviews with governmental representatives which was not easily performed using qualitative approach (see appendix C).

The semi-structured interview schedule of government representative contains five questions as follows:

- *Knowledge Building*
- *Knowledge Deployment*
- *Subsidy*
- *Standard settings*

- *Innovation directive*
- *Mobilisation*

These questions were based on supply push and demand push forces initiated by King et al. (1994). The main aim of using institutional theory is to examine technology diffusion through governmental interventions. The supply pushes forces arose from the generation of product innovations. The demand push forces, in contrast, take place as a result of users' willingness to use that product. According to King et al. (1994), the government rule could either be helpful and powerful or just regulatory. Powerful means, in this context, that the governmental institutions exert regulations and rules on the diffusion of technology. In other words, these regulations may hinder firms' adoption of some type of technology. If the governmental representatives are not knowledgeable in information technology, they will not be able to work on diffusion of technology.

This study used institutional theory as a theoretical framework to develop the interview schedule. There are many studies that used institutional theory as an instrument for data collection.

The main purpose of using institutional theory in this study is to explore the impact of relevant governmental institutions on adoption of WiMax by SMEs. Governmental institutions in this study are represented in the Ministry of Information which is reasonable for software licence and related regulations. The role of these governmental institutions is to facilitate the adoption of different types of information technologies.

3.11.2 Interview Schedule of Vendors

This interview schedule was based on disruptive theory which focuses on commercialisation strategies and diffusion process (Christensen et al., 2006). According to Christensen et al. (2004) technology providers are willing to offer new information technology, but such technology may not be useful to organisations. Furthermore, if the new technology is useful, but it may not be adopted by organisations. This study aims to collect information on vendors' views regarding the cost of WiMax its and its convenience for SMEs (see appendix C).

The semi-structured interview schedule of vendors consists of three main questions:

- *Convince of WiMax*
- *Customisation*
- *Cost of use*

3.11.3 Interview Schedule of SMEs

In order to complement and examine the agreement between quantitative and qualitative findings, it was necessary to extract a number of questions from the survey questionnaire and use them as open-ended ones. Moreover, designing the interview schedule for SMEs was also based on the interview schedule of government representatives and vendors. The purpose of this process was to compare the perspectives of SMEs, government and vendors. See appendix C.

3.11.4 Participants of the Interviews

As mentioned earlier, in-depth interviews targeted three groups: SMEs, government representatives and vendors. The total number of participants accounted for is 13 participants. 5 SMEs, 5 governmental representatives and 3 WiMax vendors have participated in this research. The **table 3.4** below shows the number of participants, their position and the duration of the interview:

Table 3.4 **Participants of the interviews**

Organisation	Interviewee position	Duration (minutes)
SME1	Partner	60
SME2	Partner	80
SME3	Business Manager	50
SME4	Business Manager	90
SME5	Business owner	45
Government agency 1	Advisor	39
Government agency 2	Consultant	30
Government agency 3	Infrastructure	50
Government agency 4	Deputy Governor	40
Government agency 5	Director-General	90
Vendor 1	Sales manager	30
Vendor 2	Store manager	36
Vendor 3	VP Strategy & Business development	30

3.12 Data Analysis Strategy

A particular data collection and analysis strategy is followed by the researcher for both semi-structured interviews and survey questionnaire for collecting data from government representatives, vendors and Saudi SMEs. Collected data and research objectives are interlinked through data analysis strategy. In the data analysis strategy from research objectives to findings are discussed (Goldstein, 1995). For policy implications and recommendations some of these findings could be applied. Both independent and dependent variables are identified in this phase of the research.

On the basis of the collected data using questionnaire the researcher would follow particular data analysis strategy and for data analysis the researcher would use the Statistical Software for Social

Science (SPSS) for relating various variables with each other related to this research. Particularly the researcher would relate to the adoption of WiMax technology with dominating organisational culture profile and the data analysis strategy for the quantitative research is as follows:

Organisational culture Assessment Instrument (OCAI) is used for assessing organisational culture. This tool was used by Cameron & Quinn, (1999) in their book “*Diagnosing and Changing Organisational Culture: Based on The Competing Values Framework*”. The analysis was straightforward, using the following provided formulae:

$$\text{Clan Culture} = \text{MEAN} (\text{ClanCu1} + \text{ClanCu2} + \text{ClanCu3} + \text{ClanCu4} + \text{ClanCu5} + \text{ClanCu6})$$

In which ClanCu1 is the mean score for question C1A, and ClanCu2 is the mean score for question C2A, etc.

$$\text{Adhocracy Culture} = \text{MEAN} (\text{AdhoCu1} + \text{AdhoCu2} + \text{AdhoCu3} + \text{AdhoCu4} + \text{AdhoCu5} + \text{AdhoCu6})$$

In which AdhoCu1 is the mean score for question C1B, and AddhoCu2 is the mean score for question C2B, etc.

$$\text{Market Culture} = \text{MEAN} (\text{MarkCu1} + \text{MarkCu2} + \text{MarkCu3} + \text{MarkCu4} + \text{MarkCu5} + \text{MarkCu6})$$

In which MarkCu1 is the mean score for question C1C, and MarkCu2 is the mean score for question C2C, etc.

$$\text{Hierarchy Culture} = \text{MEAN} (\text{HierCu1} + \text{HierCu2} + \text{HierCu3} + \text{HierCu4} + \text{HierCu5} + \text{HierCu6})$$

In which HierCu1 is the mean score for question C1D, and HierCu2 is the mean score for question C2D, etc.

3.12.1 Qualitative Data Analysis Strategy

For qualitative data the researcher has taken interviews from various respondents for adoption of WiMax in SMEs and as part of interviews the researcher has interviewed three groups including

SMEs, government agencies and WiMax vendors. There are various types of data analysis strategies e.g. thematic, constant comparative approach and content analysis. For analysing qualitative data the researcher would follow the next steps.

3.12.2 Phase I: Transcription and Reduction of Data

After taking permission from the participants, all interviews were recorded. Robson (2002) suggests that tape recording increases the trustworthiness of semi-structured results. There is no specific method for transcribing data (Drisko, 1997; Kvale, 1996: 163), but there are some practical steps which can aid researchers to transcribe their data. This study used Strotman et al. (1998) approach for transcribing data that focuses on analysis of qualitative data from information systems and word records. The researcher in this study listened to tape records two to four times in order to understand what participants started in the interviews. By listening to the interviews, the researcher could label the primary themes in the data. In order not to mix up the participants, each participant was given a particular number which used also as an identity of the location.

The first step in qualitative data analysis was to transcribe the data collected from owners/managers of SMEs, government representatives and vendors. In order to reduce the bulk of data, the researcher aggressively read the transcript several times. Reading the transcripts several times aided the researcher in identifying the main themes and sub-themes particularly, those which are related to answer the research questions. This process included simplifying the data, abstracting and transforming the data that appeared in the results chapter.

3.12.3 Phase II: Thematic Analysis

For analysing qualitative data different approaches could be followed and among them content analysis and thematic analysis are the main approaches. Frequency of certain words and relevance are evaluated in the content analysis. More to this, some key words or counting of simple words are included in the content analysis (LeCompte and Schensul, 1999; Dey, 1993:59). According to Bernard and Rayan (1998), mass collected data with short summary is the main limitation of the content analysis and it is generally used for documentary studies.

According to Namey et al., (2007) thematic analysis could be widely used in information technology, health and social sciences. Themes or words are not counted in the thematic research but it concentrates on describing ideas. Coding and categorising the emerged themes are allowed in the thematic research analysis procedure for building some sorts of relationships. Using geographical approach could be used for combining thematic analysis with constant comparative approach.

According to Wright (1997), thematic analysing procedure is less reliable than content analysis due to the use of coding system and biasness.

According to Morse and Field (1995), thematic analysis helps researchers to focus on the core meaningful of data which is performed through defining certain themes and analysing them. The merged themes are deemed as abstract nodes (codes) that, to a large extent, reflect the participants' views. These codes are also known as categories or segments. Themes usually follow the notion of recurrence in which these themes which frequently occur across the transcripts. Nevertheless, some authors (Smith and Pohland, 1976) claim that the recurrence of themes or sub-themes is not necessary to reflect the efficiency of emerged themes from the data. In other words, the number of themes does not necessarily reflect the importance of themes.

3.12.4 Phase III: Constant Comparative Approach

This study used constant comparative approach which helped the researcher to compare SMEs' perspective with vendors and governmental representatives. Although constant comparative approach follows grounded theory, it has been used in analysing data collected through interviews, focus groups, etc. The main goal of constant comparative approach is to compare a piece of in-depth interview with another piece in the data (Straus and Corbin, 1998). For instance, in the study, the researcher compared the views of government representative regarding regulations with SMEs' views. According to Straus and Corbin (1998), constant comparative method takes three steps: (1) coding the main themes emerged from the data, (2) categorisation of the emerged theories and (3) finally, comparing the views of SMEs with governmental and vendors.

3.13 Reliability and Validity of Quantitative and Qualitative Results

The validity and reliability of the research instruments including quantitative and qualitative methods are discussed in this section.

3.13.1 Reliability and Validity of Quantitative Results

The main purpose of validity is to ensure that the questions and items in the survey instrument measures what the study should measure. In other words, the validity of a scale is to measure what was intended to measure. Literature documents different types of validity including construct validity, content validity and criterion validity (Bagozzi, 1996). Content validity focuses on wording and compositions of the questions. For examining content validity, the researcher thoroughly and critically reviewed literature related to the research questions and identified the main items.

3.13.2 Trustworthiness of Qualitative Data

It should be remembered that it is difficult to replicate qualitative results which lead to replace reliability by what is called dependability. In order to ensure dependability, the researcher clearly explained the questions to the participants. The interview schedule has reflected the SMEs owners experience in adoption of WiMax which supported the results produced by the survey questionnaire (Burns, 2000:419).

There are many positivists (quantitative researchers) that claimed that the trustworthiness and rigour (reliability and validity) of qualitative data can be questioned (i.e. Strebert and Carpenter, 1999; Collier et al., 2004; Braumoeller and Gary, 2002). The refuting of these claims was raised by Lincoln and Guba (1985) who argued that qualitative data is rigour and valid. The authors suggested four criteria for trustworthiness of qualitative results: credibility, transferability, dependability and conformability.

1. *Credibility* is equivalent to internal validity in quantitative methods. Credibility aims to ensure that the findings of the study being investigated have measured what it sought to measure. The internal validity of this research represents the credibility of the findings through the use of both qualitative and quantitative results. In order to ensure the credibility of the research, the researcher has also conducted semi-structured interviews to compare different perspectives (SMEs, governmental representatives and vendors representatives) on the adoption of WiMax in Saudi Arabia.
2. *Transferability* in qualitative research is equivalent to external validity and generalisation in quantitative methods. In quantitative methods researcher can generalise the results drawn from a sample to larger population due to large sample used in the study. However, in qualitative methods it is not possible to generalise the results to larger population due to small size of the sample. The role of transferability in qualitative methods (Lincoln and Guba (1985) suggests that the researcher is responsible for collection of sufficient information to answer the research questions. The researcher in this study conducted the data collection in two phases: data collection through survey questionnaires and conducted semi-structured interviews with relevant key informants in the government sector, SMEs and vendors. The researcher also identified the number of people participated had taken part in qualitative research before commencing the study. Each semi-structured interview was about an hour long to ensure that all areas addressed in the interview schedule were answered.
3. *Dependability* is equivalent to reliability in quantitative methods. The researcher in this study has taken all relevant steps to ensure the reliability of data. For instance, the researcher

developed a plan for data collection, analysis and writing the findings. Procedures of data collection and analysis employed in this study can be replicated by other researchers.

4. *Conformability (subjectivity)* is equivalent to objectivity in quantitative research. Objectivity is related to the questionnaire that depends upon the researcher who sets the questions. In other words, the target groups do interfere in designing the questionnaire. Nevertheless, according to Patton (2002), objectivity does not ensure the reality through its use of statistical techniques. Patton (2002) added that, bias in both quantitative and qualitative results is inevitable. To ensure conformability in this study, the researcher attempted to reflect participants' perspective represented in their experience in information technology and WiMax.

3.14 Ethical Issues

This study sought ethical approval from the participants in the study. Bryman and Bell (2004) suggest that ethical issues emerge in all stages of a research project. Names of participants were anonymized in both questionnaire and semi-structured interviews.

- **Consent of participants to take part in the study**

As mentioned earlier, the researcher organised three events with SMEs owners/managers. During these events, participants were asked to sign the informed consent designed for the purpose of this study. The signed informed consent gave the researcher permission to conduct the semi-structured interviews with the target SMEs. In terms of the governmental representatives who were interviewed on the phone, they sent their consent form by mail. Vendors were also asked to sign the informed consent. Participants and researchers legal responsibility has been reduced by signing on the consents (Frankfort-Nachmias and Nachmias, 1992). For this reason, participation of SMEs, governmental representatives and vendors was voluntary. Furthermore, informed consent gives participants the freedom and self-determination to take part in the study.

Anonymity of data means that the data collected, manipulated and written should be anonymous. Anonymity initially means that names and/or addresses of participants are removed (Jordi and Herran, 2010). Participants in this study were informed about anonymity of their personal information. Data manipulation in this study means data entry, data handling, data analysis and writing up the results. Anonymity of information was taken into consideration in all stages of this study. The researcher has kept participants' details anonymous and secured, that is to say their names and addresses were separated from the collected information.

- **Privacy and confidentiality**

Confidentiality is different from privacy; it refers to discrete items of information which may be disclosed under certain conditions, while *privacy* indicates a domain of information specified by social and cultural aspects Porter (1998). The researcher should be aware with some issues such as circumstances and timing control of the participants. There are three ethical issues followed by the researcher to ensure the anonymity and confidentiality of collected information (Porter, 1998).

Participants' background characteristics are respected by the researcher and no personal information is used for any purposes. Moreover, personal data are kept secured and confidential. Withdraw right is given to the participants and they are allowed to fill up any or all sections of the survey questionnaire. The researcher obliged herself to keep the privacy of participants in all aspects of the study.

3.15 Conclusion

The main objective of this study is to explore the impact of the organisational culture factors on adoption of WiMax by SMEs in Saudi Arabia. The current chapter aimed at setting out the procedures through which the objectives of the study were achieved. These include the philosophy of research, rationale of mixed research methods, sampling, data collection, data analysis, ethical issues and the trustworthiness of findings.

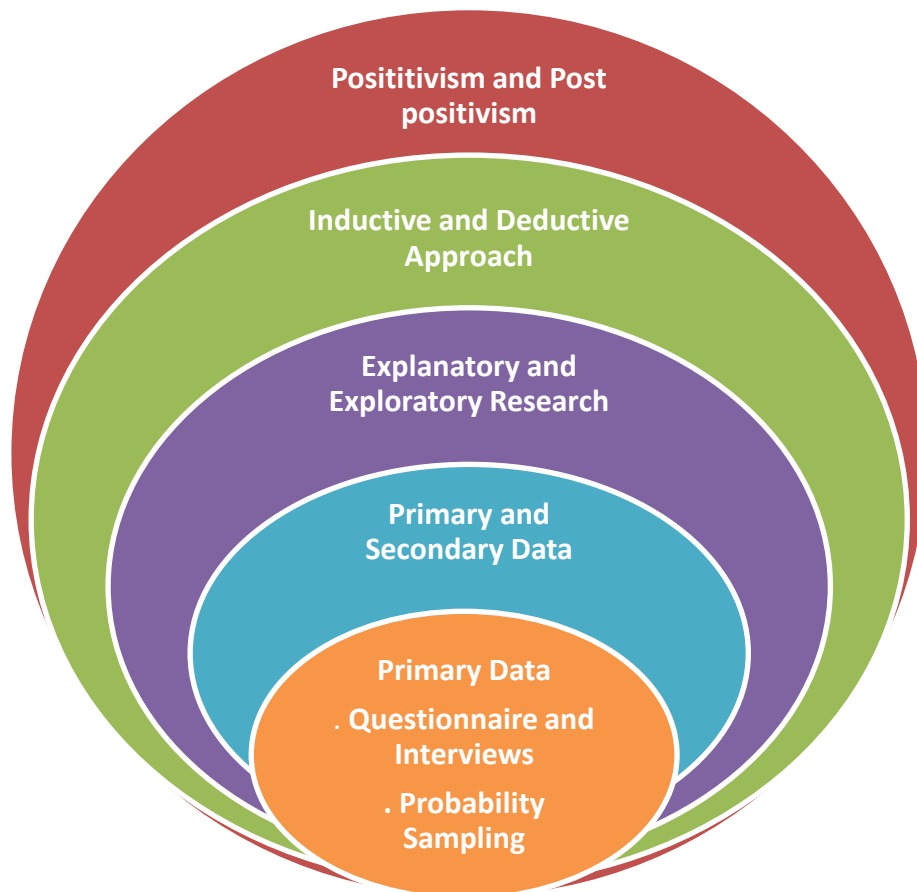
Research questions and literature review revealed that the mixed methods were the best methods for answering these questions. It was difficult in this study to draw a probability sample due to non-availability of sampling frame or population of SMEs in Saudi Arabia in general and Jeddah in particular. For this reason, convenient sampling was applied in this study.

Survey research method was used to elicit quantitative data to answer the first question of the study. In contrast, the second and third research questions required the researcher to use qualitative method (semi-structured).

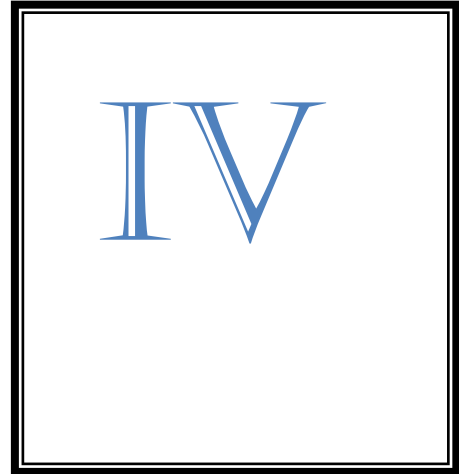
When the justifications and interpretations of the researcher are summarised, it has been shown that researcher has selected positivism and post-positivism as a philosophy of the research from the previously explained different kinds of research philosophies. The design of the research is exploratory and explanatory. The researcher has chosen the deductive and inductive approach for the approach of the research. Primary data collection and secondary data collection were both used by the researcher. As a primary research, questionnaire and interviews have been conducted by the

researcher. As a secondary research, the data was collected from books, journals and online sources. (Figure 3.12)

Figure 3.12 **Research Onion of this research**



In the next chapter of the research, data analysis part will be discussed. The data that was gathered from the questionnaires and interviews will be presented in chapters 4 and 5.



CHAPTER 4: QUANTITATIVE FINDINGS

4.1 Introduction

This chapter presents the results of the questionnaire survey of this study. It describes the questionnaire data collected from the respondents of the SMEs in the city of Jeddah in Saudi Arabia. The researcher has divided the questionnaire into two sections. Section-I is related to demographic data including individual and organisational information. Section-II assesses the organisational culture profile of SMEs based on Organisational Culture Assessment Instrument (OCAI) by Cameron and Quinn (1999). The OCAI questions in section-II of the questionnaire consist of six questions rating the organisation's culture. Each question has four alternative answers, and the participants were asked to divide 100 points proportionally among the four alternatives depending on the extent to which each alternative fitted with their organisation. The participants were requested to give the higher number of points to the alternative that mostly describes their organisation and the least points to the alternatives that do not match with their organisation. Appendix B contains the survey questions that served as the basis for the questionnaires carried out during the first phase of this research.

Analysis of the questions is done by adding all scores of the first alternative of each of the six questions and dividing them by six to get the average score for each alternative, which represents the type of culture that dominates the organisation. This process is repeated for each of the four alternatives. The average result of each alternative represents the four types of culture: hierarchy, clan, adhocracy, and market cultures.

A total of 63 organisations from different industry sectors of SMEs participated in this study. The majority of the participants were Saudi natives who were in charge of their organisations. Questionnaires were handed to the participants for SMEs in three planned events during June and July 2010 in the city of Jeddah, Saudi Arabia. A total of 100 questionnaires were distributed during the events and a total of 63 completed questionnaires were returned. All surveys were suitable for data analysis and the percentage of the returning questionnaire is 63%.

Various data analysis tools are used by the researcher and those will be described in the following section 4.2. In section 4.3 the researcher discusses the data analysis including demographic data like gender, age level, education level, IT background and education abroad. Moreover, data related to SMEs profile such as the decision making, Internet access, Internet connection type, trade type, numbers of staff and equity capital have been analysed. To show the statistical significance of the collected data the researcher has implemented the Chi square distribution. Organisational culture profiles considering the trade type and Internet connection of SMEs have been discussed in section

4.4. Conclusion of the research findings is provided in the last section 4.5. **Figure 4.1** presents the structure of this chapter.

Figure 4.1 **Structure of chapter 4**



4.2 Data Analysis Tools

For analysing the quantitative data the researcher has used the Statistical Programs for Social Science (SPSS) software. For the purpose of comparing, justifying and relating the data with the research objectives some statistical tools like mean, variance and standard deviations are also calculated.

Mean-Variance Approach: The mean-variance approach, the traditional analytical method that is used in rate of return market projection, is based on the premise that the rate of return is normally distributed. Therefore, mean-variance analysis cannot fully grasp the characteristics of returns when normality is dubious. However, by introducing the concepts of deviance and kurtosis in higher order moments can make clear the characteristic of the rate of return in emerging equity markets (Beridze, 2008).

$$\mu = E(x) = \sum[x \cdot P(x)]$$

$E(x)$ = Long run average

x = an outcome

$P(x)$ = Probability of the outcome (Black, 2010).

Standard deviation: A measure of dispersion throughout the population is given by the population variance or the arithmetic mean of the squared deviation of each observation from the overall mean. The squared deviation of each observation from the overall mean is considered in order to give equal weight to upside as well as downside variation within the population. Population variance is (Hirschey, 2009):

$$\sigma^2 = \frac{\sum_{i=1}^N (X_i - \mu)^2}{N}$$

The population standard deviation is a measure that describes dispersion throughout the entire population. The standard deviation is a measure that describes the overall population (Hirschey, 2009):

$$\sigma = \sqrt{\frac{\sum_{i=1}^N (X_i - \mu)^2}{N}}$$

μ = the mean of the population

N = number of observations

X = an outcome (Hirschey, 2009).

Organisational cultural formula

Organisational culture profile of SMEs is assessed using Cameron and Quinn's Organisational Culture Assessment Instrument (OCAI). The instrument and the analysis is described in their book "Diagnosing and Changing Organisational Culture: Based on The Competing Values Framework" (Cameron & Quinn, 1999). The analysis is straightforward, using the following provided formulae:

Clan Culture = MEAN (ClanCu1 + ClanCu2 + ClanCu3 + ClanCu4 + ClanCu5 + ClanCu6)

In which ClanCu1 is the mean score for question C1A, and ClanCu2 is the mean score for question C2A, etc.

Adhocracy Culture = MEAN (AdhoCu1 + AdhoCu2 + AdhoCu3 + AdhoCu4 + AdhoCu5 + AdhoCu6)

In which AdhoCu1 is the mean score for question C1B, and AddhoCu2 is the mean score for question C2B, etc.

$$\text{Market Culture} = \text{MEAN} (\text{MarkCu1} + \text{MarkCu2} + \text{MarkCu3} + \text{MarkCu4} + \text{MarkCu5} + \text{MarkCu6})$$

In which MarkCu1 is the mean score for question C1C, and MarkCu2 is the mean score for question C2C, etc.

$$\text{Hierarchy Culture} = \text{MEAN} (\text{HierCu1} + \text{HierCu2} + \text{HierCu3} + \text{HierCu4} + \text{HierCu5} + \text{HierCu6})$$

In which HierCu1 is the mean score for question C1D, and HierCu2 is the mean score for question C2D, etc.

4.3 Data Analysis

Descriptive statistics which include frequencies and percentages have been analysed by the Statistical Package for the Social Sciences (SPSS) (chart 4.1 to chart 4.12). Data of organisational culture were analysed using the OCAI (table 4.2 to table 4.31). Analysis of the questions was done by adding all scores of an alternative of each of the six questions and dividing them by six to get the average score for each alternative. This process was repeated for each of the four alternatives. The average result of each alternative represents the four types of culture: Clan, Adhocracy, Market, and Hierarchy cultures. All of the average scores were then plotted on a two-dimensional graph with four quadrants as shown in figure 4.2 to figure 4.16. The dominant culture is in the quadrant where the graph shifts most away from the centre point. The validity and reliability of the OCAI in WiMax adoption have been confirmed by some researchers like Cooper and Quinn (1993); Grieco (1993); Reagan & Rohrbaugh (1990). The following **table 4.1** highlights the description of the survey and the tools that have been used to analysis the collected data.

Table 4.1 Survey questions description and data analysis tools

Survey and Analysis Statistics	
Parts of the Questionnaire	2
Part – I (Demographic information)	12
Part – II (Organisational culture)	6 with 4 subsections
Total participants	63
Data analysis tool	Statistical Software for Social Science (SPSS)
Applied statistical tools	OCAI, Standard deviation and Mean.

4.3.1 Descriptive Data

Descriptive data related to demographic issues are discussed in this section. For the demographic data the researcher has collected information about participants' gender, age level, education level, IT background and whether they were educated abroad or not. Moreover, some information is related to the decision making of their organisation, Internet access, Internet connection type and also the main area of their business. Additionally, number of staff and amount ranges in their investment information is also collected by the researcher. The result of Al-Gahtani's study showed that various organisational culture characteristics such as gender, education background and age influenced how people perceived technology (2004) and it was also found from this research data.

Dholakia and Hamilton (2006) claimed that, there is a distinct cultural difference for adoption of technology based on gender at the global level. Chart 4.1 indicates that percentage of the male participants is higher than female. It was found that, 61.9% participants of the survey were male and 38.1% were female. Research data indicates that, more than 60% participants of SMEs owners/managers are male. Possible explanation is that, the researcher has collected data from male dominated region or number of women participants could be lower than male participants because of cultural issue like religion.

From the survey it could be noticed that, participants taking part represented various age groups and among them the 25-34 age group participants are higher than any other groups as shown in chart 4.2. It can be seen that 7.9% of the participants were up to 24 years old. 30.2% participants were in the age

group 35-44 and only 4.8% participants were in the age group 45-54. From this chart it could be concluded that, middle aged group are highly involved in SMEs in Jeddah.

Participants' education level could affect the Internet use and e-commerce adoption by them. Increased chance of computer and Internet access is correlated to the increasing levels of education. Lower Internet opportunity could be because of lower education level (Lee et al., 2003). Data in chart 4.3 provides information about education level of the SMEs owners/managers. Various education level participants took part in the survey. First degree holders were the highest and secondary degree holders were the lowest group. 9.5% of the participants were with high school and only 7.9% participants were post graduates. Moreover, 12.7% participants were diploma holders. It indicates that, the majority of SMEs owners/managers are holding first degree qualification.

A large number of the SMEs owners/managers have an information technology background but the number of participants without IT background is not small. It was found from the survey data (Chart 4.4) that 65.1% of the participants have IT background whereas, 34.9% participants have no IT background. Therefore, it could be concluded that most of the SMEs owners/managers are with an IT background with lower level knowledge and their percentage is 31.7%. Medium level IT background participants are 15.9% and there are some participants (17.5%) who are advanced level IT knowledge holders as shown in chart 4.5.

Chart 4.6 shows that, some of SMEs owners/managers were educated abroad and their percentage is 36.5. On the other hand, 63.5% participants had their education within the KSA. Though, the percentage of the SMEs studied abroad is not too high but they are involved in the SMEs and it could be a reason that they want to bring new Internet technology like WiMax in their business.

Survey data indicates that more than three quarter participants were responsible for taking the organisational decision. As can be seen from chart 4.7, 87.3% participants of this survey were responsible for organisational decision making but only 12.7% were not. Most of the respondents of the SMEs are the decision makers and it could be a reason that the respondents are also the owners of these organisations.

Chart 4.8 indicates that 25.4% organisations have no Internet access and 74.6% are using Internet. This indicates that most of the SMEs are using Internet for their business. From the research data it was also found that various types of Internet connections are available in different SMEs. Chart 4.9 shows a large number of the participants (65.1%) are using DSL connection. On the other hand, percentage of VSAT user is 4.8 % and only a few users are using Wi-Fi (1.6%) and WiMax (1.6%). It indicates that SMEs owners/managers are willing to adopt the latest Internet technology available in the Saudi market. However, WiMax technology is latest but its adoption rate is very low. Possible

explanation is that most of the SMEs of Saudi Arabia are not aware about new communication technology like WiMax. Moreover, pricing, quality and availability could be other barriers to adopt WiMax. The researcher has conducted in depth interviews among SMEs for finding the reasons (shown in chapter 5).

Teo and Tan (1998) claimed that, adoption of e-commerce could be influenced by the type of businesses. According to these researchers the main reason for adopting new technology like Internet is internal expertise of organisations. The researcher has collected data regarding different industry sectors of SMEs by survey questionnaire. Respondents of the organisations were varied and from the survey data it was found that the highest number of SMEs who participated in the survey is involved in creative industries as the main business area. After the creative industries (22.2%), the education and community (15.9%) is the second main area of SMEs who took part in the survey. Moreover, some SMEs like advertising & PR and marketing (9.5%), wholesale and retail (9.5%) and manufacturing organisations are almost similar in the survey participations (Chart 4.10). Additionally, the percentage of the survey participants in food and beverages, construction & health and beauty organisation is 4.8% individually. It could be concluded from chart 4.10 that majority of SMEs in Jeddah who participated in the study are from the creative industries. As the majority of the SMEs in Jeddah are involved in the creative industries and they need latest technology to achieve their business. It could be a reason for adopting new Internet technologies like WiMax to improve their way of doing business.

According to Ofcom (2007), 62% of SMEs within the UK used broadband for their Internet connection. SMEs with 50-250 employs were the higher adopters of broadband at 70%. Depending on the organisations, staff are varied as mentioned in chapter 2. From the survey it was found that 33.3% SMEs hold 10-49 staff, 28.6% SMEs hold 1-4 staff and percentage of 5-9 staff holder SMEs is 27.0%. Moreover, there are 9.5% SMEs that have over hundred staffs and only one SME has 50-99 staff. From chart 4.11 it was found that, majority number of employees in Saudi SMEs is between 1-4 and 10-49. It indicates that the working place for SMEs in the Saudi Arabia is similar to family environment.

Due to the nature and size and slow pace in adopting technological solutions, SMEs may be unable to invest substantial sums of money on adopting technologies to support the prosperity of their business. This argument is also supported by Oni (2008), who reports that the decision to adopt certain technologies might depend on the varying sizes and nature of SMEs. Equity capital varies depending on business types and from this survey it was found that about 66.7% organisations have up to 999,000 SR (Saudi Riyal) and about one fifth of the organisations have 1000,000-1999,000 SR. There are some organisations (7.9%) whose equity capital is more than 5000,000 SR (Chart 4.12). This chart

shows that, more than half of the SMEs in Jeddah who participated in this study have their equity capital up to 999, 000 SR. SMEs with limited financial resources might consider the price of technology as an obstacle to adopting new Internet technologies. Demographic charts for showing the statistical significance of the survey data are shown below:

Chart 4.1 Gender of SMEs participants

1. Gender		Response %	Response Total
1	Male	61.9 %	39
2	Female	38.1 %	24
Statistics based on 63 respondents.			

Chart 4.1 shows that majority of SMEs participants were male with 61.9%. However, female percentage was 38.1% and the possible explanation could be that the researcher has collected data from male dominated region such as Saudi Arabia.

Chart 4.2 Age groups of SMEs participants

2. Age		Response %	Response Total
1	Up to 24	7.9%	5
2	25-34	57.1%	36
3	35-44	30.2%	19
4	45-54	4.8%	3
5	55+	0%	0
Statistics based on 63 respondents.			

From chart 4.2 it can be noticed that, participants taking part represented various age groups and among them the 25-34 age group participants are higher than any other groups. 7.9% of the participants were up to 24 years old. 30.2% participants were in the age group 35-44 and only 4.8% participants were in the age group 45-54.

Chart 4.3 Education level of SMEs participants

3. Education level		Response %	Response Total
1	Secondary	4.80%	3
2	High school	9.5%	6
3	Diploma	12.7%	8
4	First Degree	65.1%	41
5	Post Graduate	7.9%	5
Statistics based on 63 respondents.			

It can be seen from chart 4.3 that participants with various degrees of education level took part in the survey. First degree holders were the highest and secondary degree holders were the lowest group. 9.5% of the participants were with high school and only 7.9% participants were post graduates. Moreover, 12.7% participants were diploma holders. It indicates that, the majority of SMEs owners/managers are holding first degree qualification.

Chart 4.4 IT background of SMEs participants



4. IT background			Response %	Response Total
1	Yes		65.1 %	41
2	No		34.9 %	22
Statistics based on 63 respondents.				

Chart 4.4 shows that 65.1% from SMEs participants have IT background whereas, 34.9% participants have no IT background.

Chart 4.5 If the participants have IT background




5. If yes			Response %	Response Total
1	Low level		31.7%	20
2	Medium level		15.9%	10
3	Advanced level		17.5%	11
Statistics based on 41 respondents.				

Chart 4.5 shows that most of the SMEs owners/managers are with an IT background with lower level knowledge and their percentage is 31.7%. Medium level IT background participants are 15.9% and there are some participants (17.5%) who are advanced level IT knowledge holders.

Chart 4.6 Education abroad for SMEs participants



6. Education abroad			Response %	Response Total
1	Yes		36.5 %	23
2	No		63.5 %	40
Statistics based on 63 respondents.				

Chart 4.6 shows that some of SMEs owners/managers were educated abroad and their percentage is 36.5. On the other hand, 63.5% participants had their education within the KSA.

Chart 4.7 Decision maker of SMEs participants



7. Decision maker			Response %	Response Total
1	Yes		87.3 %	55
2	No		12.7 %	8
Statistics based on 63 respondents.				

Chart 4.7 indicates that 87.3% participants of this survey were responsible for organisational decision making whereas, only 12.7% were not.

Chart 4.8 Internet access of SMEs participants

8. Internet access		Response %	Response Total
1	Yes	74.6 %	47
2	No	25.4 %	16
Statistics based on 63 respondents.			

Chart 4.8 indicates that 25.4% organisations have no Internet access and 74.6% are using Internet. This indicates that most of the SMEs are using Internet for their business.

Chart 4.9 Internet connection type of SMEs participants

9. Internet connection type		Response %	Response Total
1	DSL	65.1%	41
2	Wi-Fi	1.6%	1
3	WiMax	1.6%	1
4	VSAT	4.8%	3
5	I don't know	1.6%	1
Statistics based on 47 respondents.			

Chart 4.9 shows a large number of the participants (65.1%) are using DSL connection. On the other hand, percentage of VSAT user is 4.8 % and only a few users are using Wi-Fi (1.6%) and WiMax (1.6%).

Chart 4.10 Trade type of SMEs participants

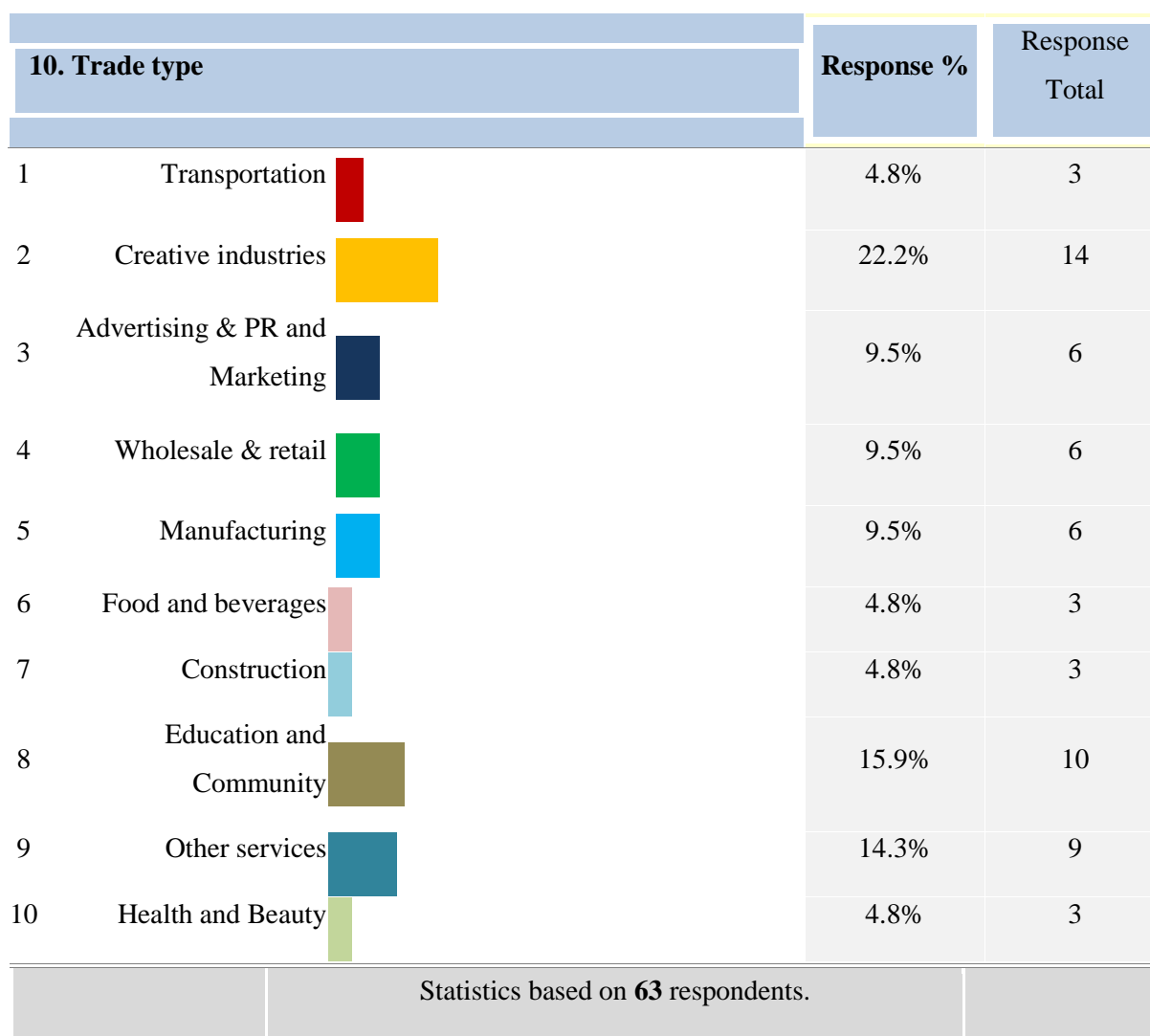
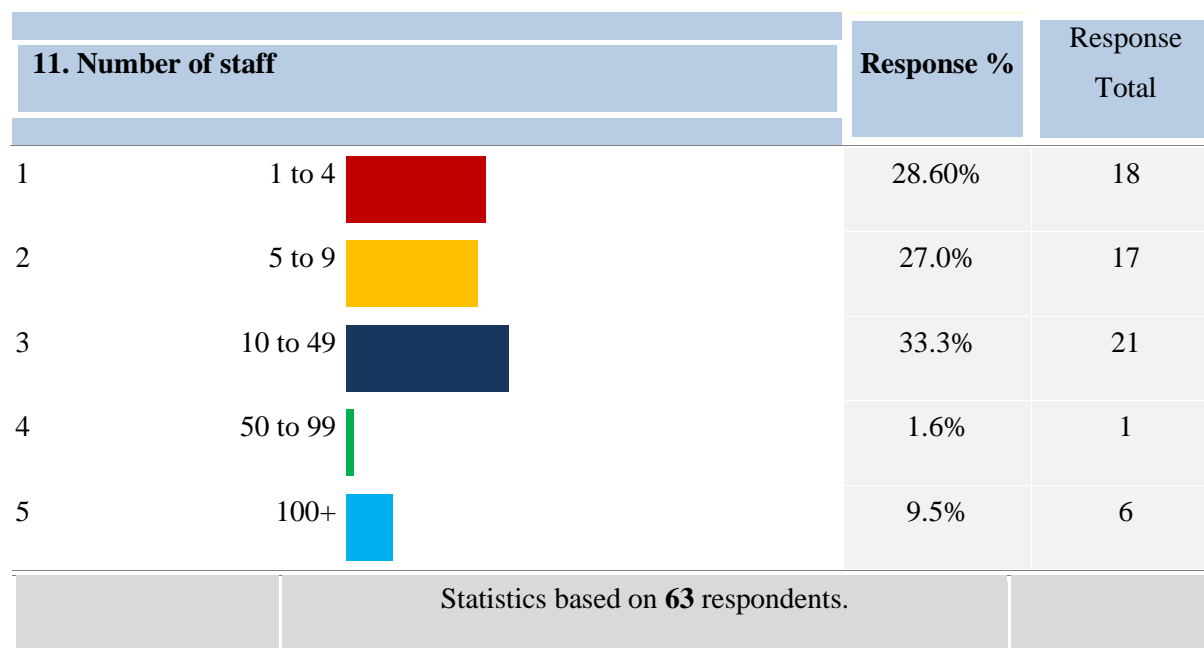
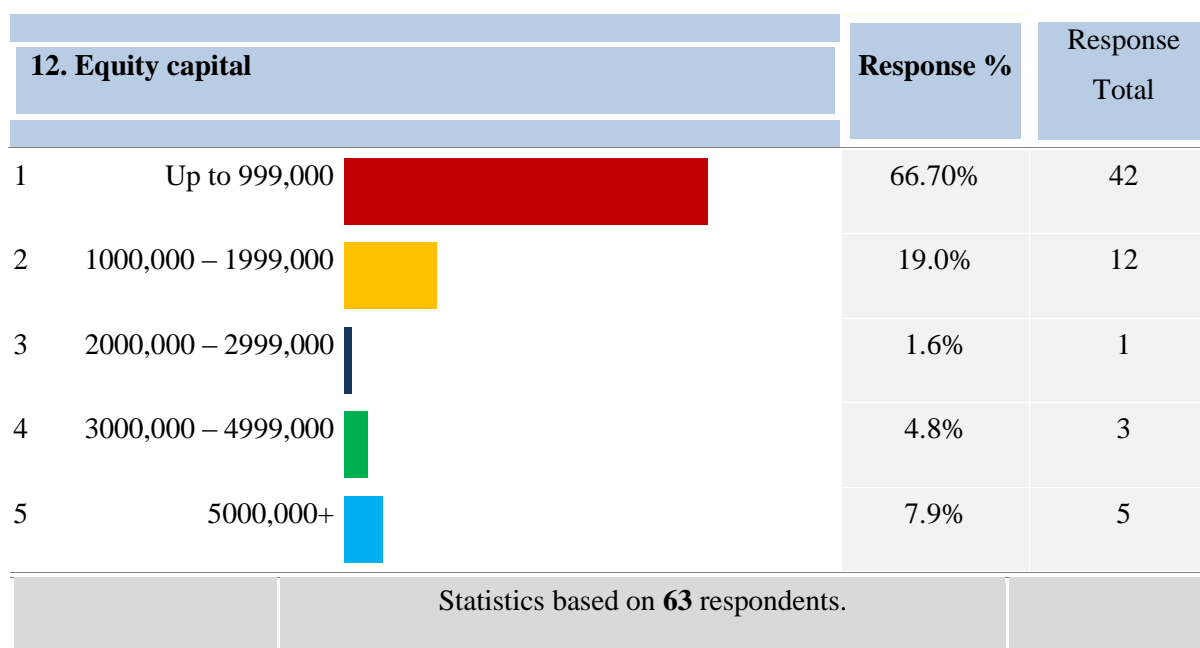


Chart 4.10 shows that the highest number of SMEs who participated in the survey is involved in creative industries as a main business area with 22.2%. The education and community (15.9%) is the second main area of SMEs who took part in the survey. Moreover, some SMEs like advertising & PR and marketing (9.5%), wholesale and retail (9.5%) and manufacturing organisations are almost similar in the survey participations as shown in the chart 4.10. Additionally, the percentage of the survey participants in food and beverages, construction & health and beauty organisation is 4.8% individually.

Chart 4.11 Number of employees of SMEs participants



From the chart 4.11 it can be seen that 33.3% SMEs have 10-49 staff, 28.6% SMEs have 1-4 staff and percentage of SMEs who have 5-9 staff is 27.0%. Moreover, there are 9.5% SMEs that have over hundred members of staff and only one SME has 50-99 staff. From the chart 4.11 it can be concluded that the majority number of employees in Saudi SMEs is between 1-4 and 10-49.

Chart 4.12 Equity capital of SMEs participants

It can be seen from chart 4.12 that 66.7% SMEs have up to 999,000 SR (Saudi Riyal) and 19.0% of the SMEs have 1000,000-1999,000 SR. There are some SMEs (7.9%) whose equity capital is more than 5000,000 SR. Moreover, 4.8% SMEs have 3000,000-4999,000 as equity capital for their business and only 1.6% of the SMEs in Jeddah have 2000,000-2999,000 SR.

4.4 Findings of Organisational Culture Profiles

Tables from 4.2 to 4.22 and figures from 4.2 to 4.11 show the organisational culture profile of Saudi SMEs according to their trading sectors. The SMEs that have been considered in this study are from various industry sectors including transportation, creative industries, advertising & PR and marketing, wholesale & retail, manufacturing, food and beverages, construction, education and community, other services and health and beauty. Using the organisational culture formula and on the basis of information presented in tables 4.2 to table 4.22, it can be said that the overall organisational culture type for all Saudi SMEs and their trading sectors in Jeddah is clearly dominated by the clan culture. Hierarchy culture is not influencing these industry sectors as much as market and adhocracy cultures. Overall, almost all the trading sectors of Saudi SMEs in Jeddah are dominated by clan culture with the highest average score. However, the education and community and transportation trading sectors are dominated by the market culture. Market culture is likely to view the external environment as threatening, and searches to recognise threats and opportunities as it looks for competitive advantage

and profit (Cameron and Quinn, 1999). A possible explanation is that, education and community and transportation sectors are dominated by this type of culture on account of their trading activity type.

SMEs in clan culture are characterised as a friendly workplace, with shared values, beliefs, goals, unity and participation. This type of culture focuses on internal issues, flexible values and carefulness rather than looking for stability and control. Compared to large companies SMEs have fewer numbers of employees. Chart 4.11 shows that, majority Saudi SMEs have between 1-4 and 10-49 employees. It indicates that, the working place for SMEs in Saudi Arabia is like a family environment where lower number of people is involved and can share ideas together with their leaders. That could be a possible explanation as to why they are dominated by clan culture.

Moreover, it was found from the research that, all SMEs in Jeddah with all different trade sectors who participated in the survey are mainly dominated by the clan culture. Additionally, some of the SMEs like creative industries and education and community are slightly dominated by the adhocracy and market cultures. It is clearly indicated from the table 4.22 that, SMEs who are involved in all trade types fit in the upper left quadrant with a significant greater average as shown in figure 4.11.

SMEs are naturally small in size and their workplace is like a family. These could be the reason for the SMEs in Jeddah seem to be dominated by the clan culture. Clan culture is a friendly workplace where people share their ideas and that could be helpful for adopting new Internet technology like WiMax. It was found from this research (table 4.6, 4.7) that, SMEs with the combination of clan and adhocracy cultures (as in creative industries) are more likely to adopt latest Internet technology such as WiMax.

Moreover, tables from 4.23 to 4.31 show the dominant organisational culture type for Saudi SMEs in Jeddah based on their Internet connection types. From the survey it was found that, there are mainly four types of Internet connection namely DSL, WiMax, Wi-Fi and VSAT that have been adopted by the Saudi SMEs in Jeddah. The results illustrate that, all Internet connection profiles are dominated by the clan culture as shown in table 4.31 and figure 4.17. Tables 4.23, 4.25, 4.27 and 4.29 show that SMEs who are adopters and non-adopters of WiMax technology are clearly dominated by the clan culture with the highest average mean as shown in figure 4.17. It could be assumed that, Saudi SMEs in Jeddah are showing readiness to adopt latest Internet technologies such as WiMax.

In the next sections the researcher has analysed in details the data according to the characteristics of the sample based on the SMEs trading sectors (tables 4.2, 4.4, 4.6, 4.8, 4.10, 4.12, 4.14, 4.16, 4.18, 4.20) and SMEs' Internet connection types (tables 4.23, 4.25, 3.27, 4.29). Considering the characteristics of the SMEs sample, the data was analysed accordingly. Moreover, each type of SMEs

trading sectors and their Internet connection types have been analysed individually using the organisational culture assessment instrument (OCAI).

4.4.1 Organisational Culture Profile of SMEs According to their Trading Sectors

Tables 4.2 to 4.22 illustrate the dominant organisational culture type for Saudi SMEs in Jeddah based on their trade type, broken down according to the characteristics of the sample. Tables 4.2, 4.4, 4.6, 4.10, 4.12, 4.14, 4.16 and 4.20 indicate that, all of employees of all ages share the same clan culture, demonstrating that they are with similar beliefs, attitudes and values. However, tables 4.8 and 4.18 illustrate that people of all ages, who are involved in transportation and education, are dominated by the market culture. Table 4.2 to table 4.20, show that there are some differences with respect to the gender. All the males and majority of the females are dominated by the clan culture while some of the females are dominated by hierarchy and market culture. Tables 4.4, 4.6, 4.10, 4.12, 4.14, 4.16, 4.18 and 4.20 show that, both genders of SMEs share clan culture. On the other hand, table 4.2 shows that, in the advertising & PR and marketing sector females share hierarchy culture while in education and community sector they share market organisational culture type as shown in table 4.8.

Tables 4.2, 4.4, 4.10, 4.12, 4.14, 4.16, 4.18 and 4.20 indicate that, the majority of the people in SMEs sectors are dominated by clan culture according to their education level, IT background and education from abroad. People in creative industries with secondary school level education, without IT background and education abroad are dominated by the adhocracy culture as shown in table 4.6. However, table 4.8 shows that, people in education and community sector with first degree, with IT background and education from abroad are dominated by the market culture.

Tables 4.2 to 4.20 show that, all the decision makers within the Saudi SMEs are dominated by the clan culture. People involved in education and community sector and creative industries who are not decision makers are dominated by the market culture as shown in tables 4.6 and 4.8.

Tables 4.2, 4.4, 4.10, 4.12, 4.16 and 4.20 point out that, Saudi SMEs who have Internet access are clearly dominated by clan culture. However, table 4.6 and 4.14 show that SMEs who do not have Internet access are dominated by the adhocracy culture. Moreover, table 4.8 and 4.18 indicate that, both Internet adopter and non-adopter SMEs are dominated by the market culture.

From the tables 4.2 to 4.20 it can be seen that, most of the SMEs in Jeddah, Saudi Arabia with small number of staff and with small equity capital are dominated by the clan culture where people share values, beliefs, goals, unity and participation. This type of culture focuses on internal issues, flexible values and carefulness and characterised as a friendly workplace (Cameron and Quinn, 1999). However, table 4.8, 4.18 and 4.20 show that SMEs with higher equity capital (5000, 000+) are

dominated by the adhocracy and hierarchy culture. Moreover, SMEs who have higher than 100 staff are dominated by the adhocracy and market culture. Next sections will discuss the dominating organisational culture profile for each industry sector of SMEs participants.

4.4.1.1 Organisational culture profile of advertising & PR and marketing industry sector participants

Tables 4.2, 4.3 and figure 4.2 represent the current dominant culture type for advertising & PR and marketing industry sector of the Saudi SMEs in Jeddah. An analysis of the highest mean showing in table 4.3 represents the dominant organisational culture of this sector. It is clearly evident that, clan culture is dominating the advertising & PR and marketing sector. The nature of the sector requires an Internet connection with high speed that could help to improve the advertising & PR and marketing business. This could be a reason to encourage such SMEs to adopt latest Internet technology like WiMax. In order to adopt a new Internet technology such as WiMax, nature of clan culture could help to make decision effectively as it is characterised as a friendly workplace in comparison with hierarchy culture where workplace is very formalised and structured (Cameron and Quinn, 1999). Their collaborate (clan) SMEs operate more like families and the leaders of this type of culture is mentoring and responsive to their employee needs. In contrast to the hierarchy culture where success is defined in terms of dependable delivery, smooth scheduling and low cost, the clan culture is more concerned about customers' requirements. Consequently, clan culture could be very good environment to adopt new Internet technology like WiMax easily and advertising & PR and marketing sector could be able to provide good services to satisfy their consumers.

Table 4.2 The dominating organisational culture profile for advertising & PR and marketing sector participants according to their characteristics

Category	N	Mean	S.D.	Dominant culture
Age				
Less than 35 years	4	32.7500	9.63933	Clan Culture
More than 35 years	2	34.0000	7.07107	Clan Culture
Gender				
Male	5	35.2000	7.19027	Clan Culture
Female	1	24.000	-	Hierarchy Culture
Education level				
Diploma	2	34.5000	7.77817	Clan Culture
First degree	4	32.5000	9.39858	Clan Culture
IT background				
Yes	4	29.2500	6.94622	Clan Culture
No	2	41.0000	1.41421	Clan Culture
Education abroad				
Yes	3	35.6667	8.50490	Clan Culture
No	3	30.6667	8.62168	Clan Culture
Decision Maker				
Yes	6	33.1667	8.13429	Clan Culture
No	0	0	0	-
Internet access				
Yes	6	33.1667	8.13429	Clan Culture
No	0	0	0	-
Number of staff				
1 to 4	1	42.00	-	Clan Culture
5 to 9	2	26.0000	4.24264	Clan Culture
10 to 49	3	35.0000	7.81025	Clan Culture
Equity capital				
Up to 999, 000	3	35.0000	10.44031	Clan Culture
1000,000 – 1999,000	1	39.00	-	Clan Culture
3000,000 – 4999,000	2	27.5000	2.12132	Clan Culture
Overall advertising &PR and marketing culture	6	33.024453	7.1631687	<i>Clan Culture</i>

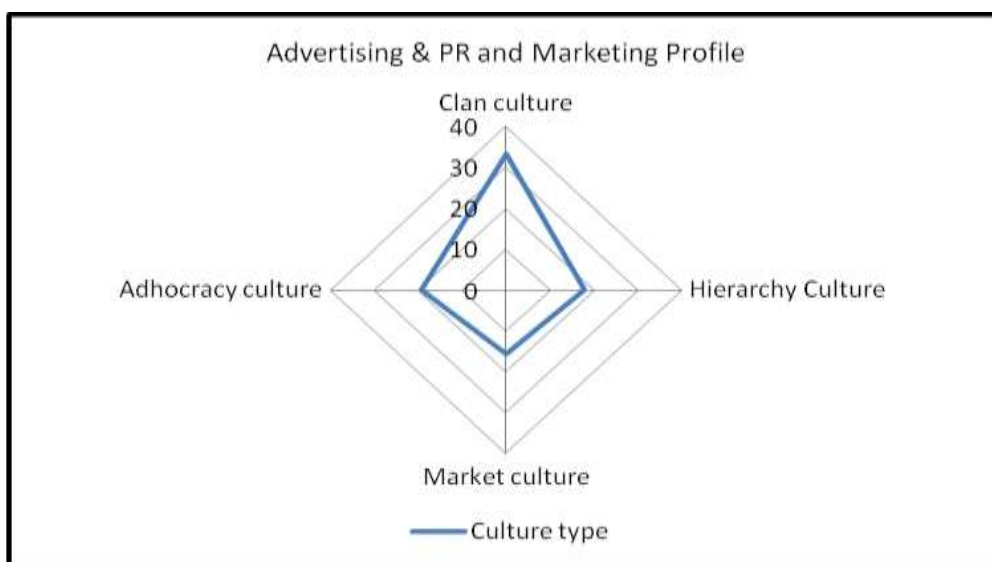
Table 4.2 illustrates the dominant organisational culture type of the advertising & PR and marketing sector in Jeddah according to the characteristics of the sample. Table 4.2 indicates that all of employees of all ages, all education level, different IT background, education abroad, decision makers and Internet access share the same clan culture. Moreover, advertising & PR and marketing SMEs with different number of staff and equity capital are dominated by the clan culture as well. However, there are some differences with respect to the gender. All the males are dominated by the clan culture while females are dominated by hierarchy culture.

Table 4.3 Organizational culture profile of advertising & PR and Marketing participants

Culture type	N	Mean	S.D.
Clan culture	6	33.1667	8.13429
Adhocracy culture	6	19.1667	4.26224
Market culture	6	15.6667	5.81951
Hierarchy Culture	6	17.8333	5.23132

Table 4.3 represents the overall dominant organizational culture profile of advertising & PR and marketing trading sector. It is clearly evident that, clan culture is dominating this sector with the highest mean (33.1667) as shown in table 4.3. **Figure 4.2** presents the highest mean of the dominant organizational profile of the advertising & PR and marketing trading sector. All of the average scores were plotted on the two-dimension graph with four quadrants as shown in figure 4.2. The dominant culture is the quadrant where the graph shifts more away from the centre point.

Figure 4.2 Organizational culture profile of advertising & PR and marketing participants



4.4.1.2 Organisational culture profile of construction industry sector participants

Tables 4.4, 4.5 and figure 4.3 show that the construction industry sector of the Saudi SMEs in Jeddah are dominated by clan culture. Dominant culture is seen from the table 4.5 by analysing the highest mean. This table clearly provides evidence of this dominating culture. SMEs who are involved in the construction industry who participated in this study fit in the upper left quadrant, or clan culture with a significant greater average as shown in figure 4.3. Unlike the rules and procedures of hierarchies or the competitive profit centres of market culture, typical characteristics of clan culture are cooperative, coordinative, involve teamwork, and fewer management levels. SMEs in clan culture are characterised as a friendly workplace, with shared values, beliefs, goals, unity and participation. This type of culture focuses on internal issues, flexible values and carefulness rather than looking for stability (Cameron and Quinn, 1999). Using Internet technology such as WiMax in the construction sectors could facilitate communication with their suppliers as well as customers.

Table 4.4 The dominating organisational culture profile for construction sector participants according to their characteristics

Category	N	Mean	S.D.	Dominant culture
Age				
Less than 35 years	1	34.0000	-	Clan Culture
More than 35 years	2	29.0000	4.24264	Clan Culture
Gender				
Male	3	30.6667	4.16333	Clan Culture
Female	0	0	0	-
Education level				
Diploma	1	26.0000	-	Clan Culture
First degree	2	33.0000	1.41421	Clan Culture
IT background				
Yes	2	30.0000	5.65685	Clan Culture
No	1	32.0000	-	Clan Culture
Education abroad				
Yes	3	30.6667	4.16333	Clan Culture
No	0	0	0	-
Decision Maker				
Yes	3	30.6667	4.16333	Clan Culture
No	0	0	0	-
Internet access				
Yes	2	30.0000	5.65685	Clan Culture
No	1	32.0000	0	Clan Culture
Number of staff				
1 to 4	1	26	-	Clan Culture
5 to 9	2	33.0000	1.41421	Clan Culture
Equity capital				
Up to 999, 000	3	30.6667	4.16333	Clan Culture
Overall Construction culture	3	30.85187	3.89312	<i>Clan Culture</i>

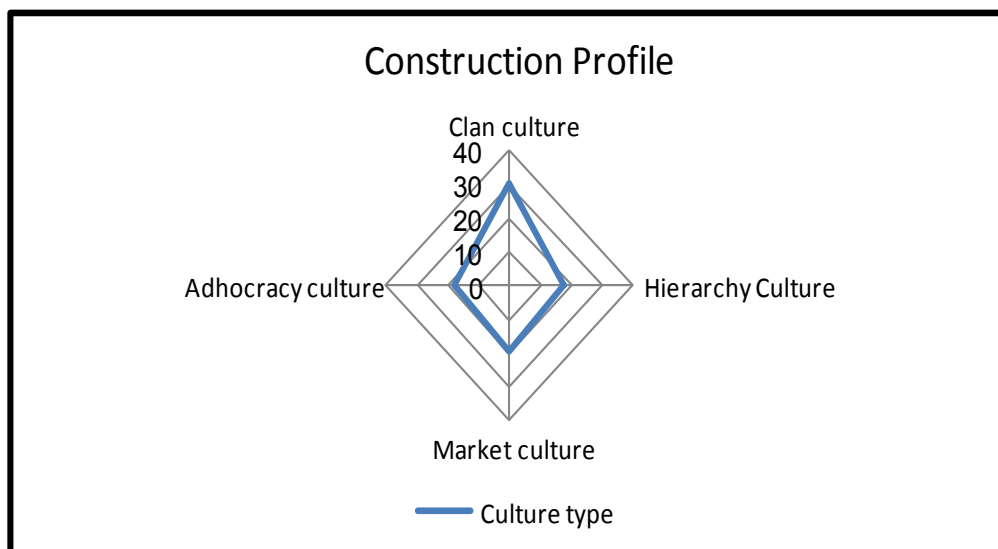
Table 4.4 indicates that SMEs in Jeddah who are involved in construction industry are clearly dominated by the clan culture according to their characteristics. Construction SMEs with different number of staff and equity capital are dominated by the clan culture. Moreover, all of employees of all ages, both genders, all education level, different IT background, education abroad, decision makers and Internet access share the same clan culture.

Table 4.5 **Organisational culture profile of construction participants**

Culture type	N	Mean	S.D.
Clan culture	3	30.6667	4.16333
Adhocracy culture	3	18.000	3.60555
Market culture	3	19.3333	5.85947
Hierarchy Culture	3	17.6667	7.37111

Table 4.5 represents the dominant organisational culture of construction sector. It is clearly evident that clan culture is dominating this sector with the highest mean as shown in table 4.5. **Figure 4.3** presents the highest mean of the dominant organisational culture of this sector. The dominant culture is the quadrant where the graph shifts more away from the centre point as shown in **figure 4.3**.

Figure 4.3 **Organisational culture profile of construction participants**



4.4.1.3 Organisational culture profile of creative industries sector participants

From tables 4.6 and 4.7 it is clearly evident that, clan culture is dominating the creative industries of the Saudi Arabia in Jeddah. Creative industries SMEs who participated in this study are the most with 22.2% among the total participants. Moreover, some of these SMEs are showing tendency towards adhocracy culture in comparison with the hierarchy and market culture. SMEs in adhocracy culture are more creative than the other SMEs with different types of cultures like market and hierarchy. Adhocratic leaders are considered to be innovators and risk takers and their workplace is creative, dynamic and entrepreneurial. Additionally, long term growth and acquiring new resources are being emphasised by SMEs with adhocracy culture. Adhocratic SMEs' main goal is to gain unique and new service or product. Also, the organisation encourages individual initiatives and freedom (Cameron and Quinn, 1999). Furthermore, Saudi SMEs in creative industries are involved in business activities like arts, music, design, filming, architecture and other media. Consequently, this industry is dominated mostly by adhocracy as shown in figure 4.4 where people are more creative and innovative than the other SMEs sectors. Moreover, they are dominated by clan culture where it is a very friendly place and people share lots of their ideas due to the nature and size of SMEs. Subsequently, SMEs who are dominated by both clan and adhocracy cultures could lead them to a good work environment to adopt new Internet technology like WiMax.

Table 4.6 The dominating organisational culture profile for creative industries sector participants according to their characteristics

Category	N	Mean	S.D.	Dominant culture
Age				
Less than 35 years	10	28.4000	7.96102	Clan Culture
More than 35 years	4	24.7500	7.63217	Clan Culture
Gender				
Male	8	28.5000	8.24621	Clan Culture
Female	6	25.8333	7.52108	Clan Culture
Education level				
Secondary school	2	26.0000	0.00000	Adhocracy Culture
High school	2	26.0000	9.89949	Clan Culture
Diploma	2	24.0000	1.41421	Clan Culture
First degree	6	29.3333	6.77249	Clan Culture
PG	2	33.5000	14.84924	Clan Culture
IT background				
Yes	8	31.1250	8.02563	Clan Culture
No	6	25.0000	6.13188	Adhocracy Culture
Education abroad				
Yes	7	25.2857	8.59679	Adhocracy Culture
No	7	30.8571	9.06327	Clan Culture
Decision Maker				
Yes	13	27.6923	7.97271	Clan Culture
No	1	27	-	Market Culture
Internet access				
Yes	10	27.2000	7.67101	Clan Culture
No	4	27.7500	9.17878	Clan Culture
Number of staff				
1 to 4	6	26.5000	8.01873	Clan Culture
5 to 9	2	36.5000	10.60660	Clan Culture
10 to 49	5	25.6000	5.98331	Clan Culture
50 to 99	1	27	-	Market Culture
Equity capital				
Up to 999, 000	12	27.7500	8.19229	Clan Culture
1000,000 – 1999,000	1	-	-	Clan Culture
5000,000 +	1	-	-	Clan Culture
Overall creative industries culture	14	27.87884	7.686846	<i>Clan Culture</i>

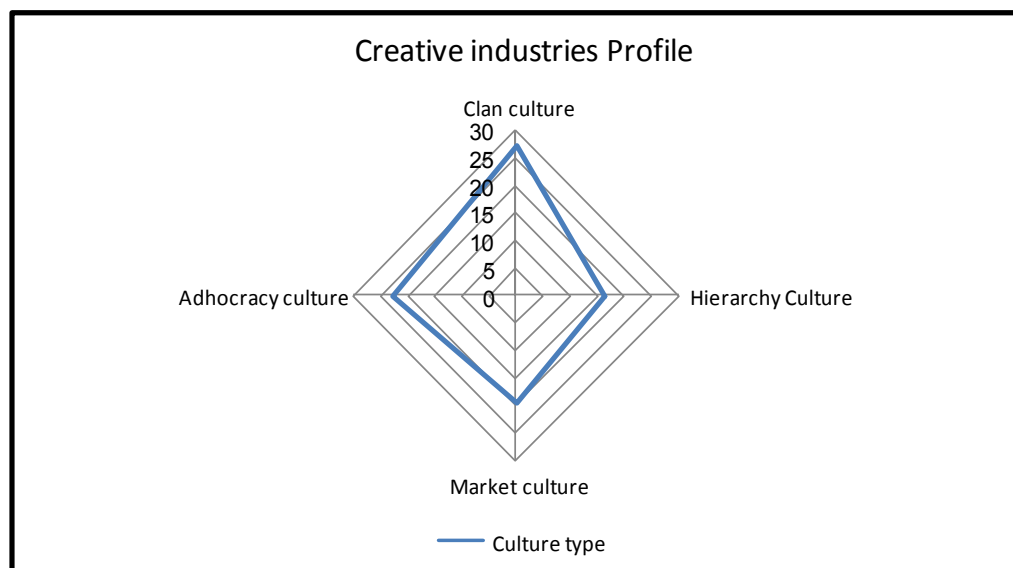
Table 4.6 illustrates the dominant organisational culture type of the SMEs who are involved in creative industries sector in Jeddah according to their characteristics. It indicates that, the majority of the people in this sector are dominated by clan culture according to their age, gender, Internet access and the equity capital of the organisations. However, people with different education level, IT background and education from abroad are shared both clan and adhocracy cultures. Moreover, SMEs with different number of staff share clan and market cultures.

Table 4.7 Organisational culture profile of creative industries participants

Culture type	N	Mean	S.D.
Clan culture	14	27.3571	7.76191
Adhocracy culture	14	22.7857	7.29782
Market culture	14	19.2857	4.53073
Hierarchy Culture	14	16.2143	5.68640

An analysis of the highest mean showing in **table 4.7** represents the dominant organisational culture of the creative industries sector in Jeddah who participated in this study. It is clearly evident that, clan culture is dominating this sector with the highest mean (27.3571) as shown in table 4.3. Moreover, some of these SMEs are showing tendency towards adhocracy culture as well. **Figure 4.4** presents the highest mean of the dominant organisational culture of this sector. The dominant culture is the quadrant where the graph shifts more away from the centre point.

Figure 4.4 Organisational culture profile of creative industries participants



4.4.1.4 Organisational culture profile of education and community industry sector participants

Education and community profile of Saudi Arabia is dominated by the market culture with the highest average as shown in tables 4.8, 4.9 and figure 4.5. According to Cameron and Quinn (1999), market culture focuses on external maintenance with a need for stability and control. Leaders involved in this culture are tough and demanding. Their main concern is the reputation and to get the job done as SMEs who are involved in education and community do. In the market culture pricing and market leadership are very important. These characteristics could be a reason for holding them back from adopting costly Internet technology. If they find WiMax technology is more expensive than other Internet connections then, they might not adopt it.

Table 4.8 The dominating organisational culture profile for education and community sector participants according to their characteristics

Category	N	Mean	S.D.	Dominant culture
Age				
Less than 35 years	9	29.5556	11.90705	Market Culture
More than 35 years	1	31.00	-	Market Culture
Gender				
Male	1	26	-	Clan Culture
Female	9	30.3333	11.72604	Market Culture
Education level				
First degree	10	29.7000	11.23536	Market Culture
IT background				
Yes	7	27.4286	8.50210	Market Culture
No	3	35.00	17.059	Market Culture
Education abroad				
Yes	2	32.0000	11.31371	Market Culture
No	8	29.1250	11.92162	Market Culture
Decision Maker				
Yes	3	26.6667	14.64013	Clan Culture
No	7	31.5714	5.79819	Market Culture
Internet access				
Yes	8	28.6250	12.37437	Market Culture
No	2	34.0000	4.24264	Market Culture
Number of staff				
5 to 9	1	26	-	Clan Culture
10 to 49	4	26.7500	17.09532	Market Culture
100 +	5	33.2000	5.71839	Market Culture
Equity capital				
Up to 999, 000	4	28.5000	10.63015	Market Culture
1000,000 – 1999,000	5	26.8000	9.70567	Market Culture
5000,000 +	1	49.00	-	Hierarchy Culture
Overall education and community culture	10	29.58969	10.48648	<i>Market Culture</i>

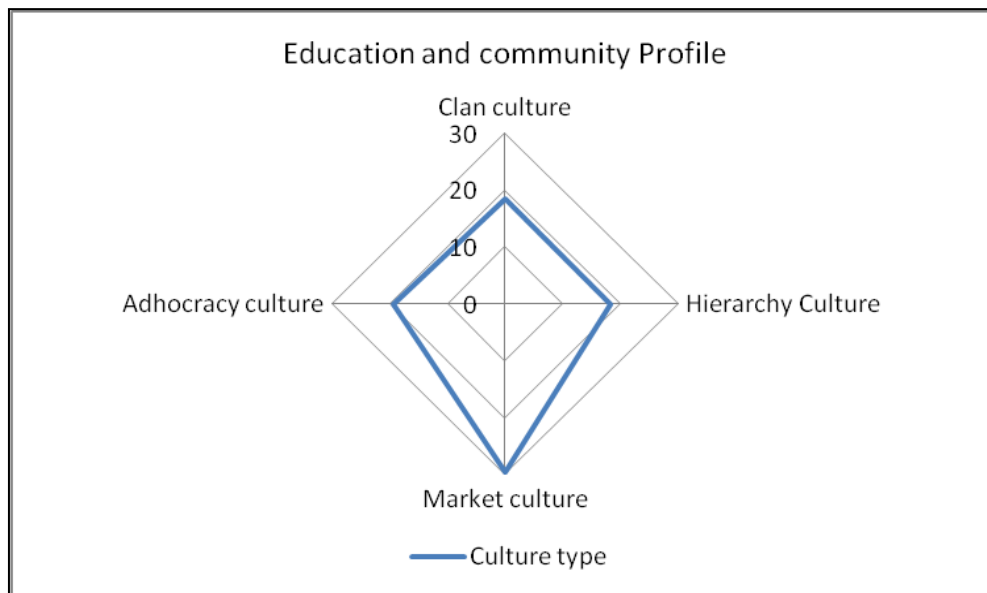
Table 4.8 shows the organisational culture profile of the education and community sector of SMEs in Jeddah according to the characteristics of the sample. It could be seen from the table 4.8 that SMEs are dominated by the market culture according to the age, education level, IT background, education from abroad and Internet access. However, males in this sector are dominated by the clan culture where females are dominated by the market culture. SMEs that have more than 10 employees are dominated by market culture where SMEs who have less than 10 employees are dominated by the clan culture. Moreover, people who are the decision makers of their organisation are dominated by the clan culture where people who are not in charge in their organisation are dominated by the market culture. Finally, SMEs who are involved in this sector with equity capital more than 5000,000 Saudi Riyal (SR) are dominated by the hierarchy culture where SMEs with less than 5000,000 SR are dominated by the market culture.

Table 4.9 Organisational culture profile of education and community participants

Culture type	N	Mean	S.D.
Clan culture	10	18.3000	10.29617
Adhocracy culture	10	19.4000	6.70323
Market culture	10	29.7000	11.23536
Hierarchy Culture	10	18.2000	5.99630

Table 4.9 shows the overall organisational culture profile of the education and community SMEs in Jeddah. It is clearly evident that, market culture is dominating this sector with the highest mean (29.7000) as shown in table 4.9. **Figure 4.5** presents the highest mean of the dominant organisational culture of this sector. All of the average scores were plotted on the two-dimension graph with four quadrants as shown in figure 4.5. The dominant culture is the quadrant where the graph shifts more away from the centre point. See **figure 4.5**.

Figure 4.5 Organisational culture profile of education and community participants



4.4.1.5 Organisational culture profile of food and beverages industry sector participants

Tables 4.10, 4.11 and figure 4.6 indicate that, food and beverages SMEs who participated in this study are mainly dominated by the clan culture. Food and beverages SMEs always run together as teamwork. That could be the reason for being dominated by the clan culture. Organisations dominated by the clan culture is characterised as places a premium on teamwork, participation and consensus (Cameron and Quinn, 1999). In order to be well connected with their suppliers and consumers SMEs involved in the food and beverages industry could be a good environment to adopt the latest Internet technology like WiMax. Adopting such a technology will keep them updated with the latest information about food recipes. Also, it could be useful for them to inform consumers about their products and services.

Table 4.10 The dominating organisational culture profile for food and beverages sector participants according to their characteristics

Category	N	Mean	S.D.	Dominant culture
Age				
Less than 35 years	1	25	-	Clan Culture
More than 35 years	2	32.0000	5.65685	Clan Culture
Gender				
Male	1	25	-	Clan Culture
Female	2	32.0000	5.65685	Clan Culture
Education level				
High school	1	36	-	Clan Culture
First degree	2	26.5000	2.12132	Clan Culture
IT background				
Yes	2	32.0000	5.65685	Clan Culture
No	1	25	-	Clan Culture
Education abroad				
Yes	1	25	-	Clan Culture
No	2	32.0000	5.65685	Clan Culture
Decision Maker				
Yes	3	29.6667	5.68624	Clan Culture
No	0	0	0	-
Internet access				
Yes	2	26.5000	2.12132	Clan Culture
No	1	36	-	Clan Culture
Number of staff				
1 to 4	2	32.0000	5.65685	Clan Culture
5 to 9	1	25	-	Clan Culture
Equity capital				
Up to 999, 000	3	29.6667	5.68624	Clan Culture
Overall food and beverages culture	3	30.259	4.878	<i>Clan Culture</i>

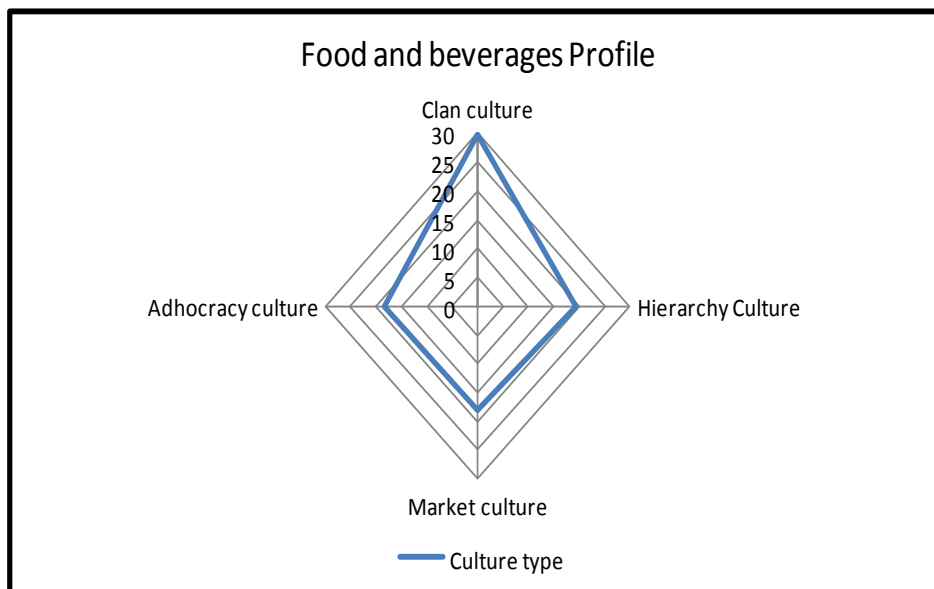
Table 4.10 shows the dominant culture of the food and beverages trading sector SMEs in Jeddah based on the characteristics of the sample. SMEs who are involved in food and beverages industry are clearly dominated by the clan culture according to the age, gender, education level, IT background, education from abroad, decision making, Internet access, number of staff and the equity capital of the SMEs.

Table 4.11 Organisational culture profile of food and beverages participants

Culture type	N	Mean	S.D.
Clan culture	3	29.6667	5.68624
Adhocracy culture	3	18.3333	4.93288
Market culture	3	18.0000	5.29150
Hierarchy Culture	3	19.3333	4.72582

Table 4.11 shows the overall organisational culture profile of the SMEs who are involved in food and beverages trading sector in Jeddah. These SMEs are strongly dominated by the clan culture with highest mean 29.6667 as shown in table 4.11. **Figure 4.6** presents the dominant culture of food and beverages trading sector where the dominant culture is the quadrant where the graph shifts more away from the centre point.

Figure 4.6 Organisational culture profile of food and beverages participants



4.4.1.6 Organisational culture profile of health & beauty industry sector participants

Health and beauty SMEs are clearly dominated by the clan culture as seen from tables 4.12 and 4.13. Clan culture is presenting the highest mean value as shown in figure 4.7. The health and beauty SMEs in Jeddah who participated in this study are showing some tendency towards hierarchy culture. Similar to clan culture, hierarchy culture is internally focused but this culture is concerned with long term stability. However, friendly workplace, goals, beliefs with shared values, participation and unity are the main characteristics of the clan culture. In the clan culture internal issues are focused than stability (Cameron and Quinn, 1999). Using Internet technology such as WiMax in SMEs who involve health & beauty industry could be helpful as they could be aware about various health issues and modern beauty tips. Moreover, they could be well connected with their suppliers and clients.

Table 4.12 The dominating organisational culture profile for health and beauty sector participants according to their characteristics

Category	N	Mean	S.D.	Dominant culture
Age				
Less than 35 years	3	32.6667	12.66228	Clan Culture
More than 35 years	0	0	0	-
Gender				
Male	0	0	0	-
Female	3	32.6667	12.66228	Clan Culture
Education level				
High school	1	47	-	Clan Culture
First degree	2	25.5000	3.53553	Clan Culture
IT background				
Yes	2	25.5000	3.53553	Clan Culture
No	1	47	-	Clan Culture
Education abroad				
Yes	0	0	0	-
No	3	32.6667	12.66228	Clan Culture
Decision Maker				
Yes	3	32.6667	12.66228	Clan Culture
No	0	0	0	-
Internet access				
Yes	2	37.5000	13.43503	Clan Culture
No	1	24	-	Clan Culture
Number of staff				
5 to 9	2	37.5000	13.43503	Clan Culture
10 to 49	1	24	-	Hierarchy Culture
Equity capital				
Up to 999, 000	2	25.5000	3.53553	Clan Culture
1000,000 – 1999,000	1	47	-	Clan Culture
Overall health and beauty culture	3	31.188	9.433	<i>Clan Culture</i>

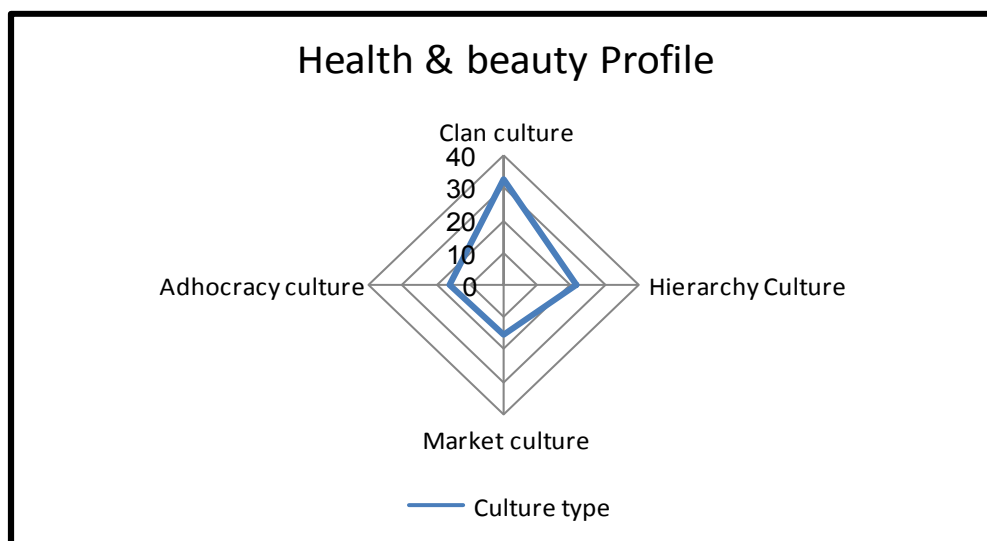
Table 4.12 shows the dominant organisational culture profile of the SMEs who are involved in health and beauty trading sector in Jeddah. Based on the age, gender, education level, IT background, education from abroad, Internet access, number of staff and equity capital of the SMEs it is clearly evident that these SMEs are dominated by clan culture. However, SMEs with a number of staff between 10 and 49 are dominated by the hierarchy culture.

Table 4.13 Organisational culture profile of health & beauty participants

Culture type	N	Mean	S.D.
Clan culture	3	32.6667	12.66228
Adhocracy culture	3	16.0000	3.60555
Market culture	3	15.6667	6.50641
Hierarchy Culture	3	21.6667	4.04145

Table 4.13 shows the overall organisational culture profile of SMEs who are involved in the health and beauty trading sector. It can be seen from the table 4.13 that these SMEs are strongly dominated by the clan culture with highest mean (32.6667). **Figure 4.7** shows the dominant culture where the graph shifts more away from the centre point.

Figure 4.7 Organisational culture profile of health and beauty participants



4.4.1.7 Organisational culture profile of manufacturing industry sector participants

Tables 4.14, 4.15 and figure 4.8 indicate that, manufacturing SMEs in Jeddah are dominated by the clan culture. On the other hand, table 4.18 indicates that these SMEs in Saudi Arabia are dominated by the market culture very little. Moreover, some of the SMEs are showing tendency towards adhocracy culture in comparison with the hierarchy and market culture. Adhocratic organisations are considered to be a creative and dynamic workplace. The leaders are innovators and risk takers and success means gaining unique and new products or services (Cameron and Quinn, 1999). However, clan culture is a friendly workplace and the leaders are for mentoring, facilitating and nurturing. SMEs who are dominated by these two types of cultures could be good environment to adopt latest Internet technologies like WiMax. Such a technology could be a powerful tool in order to gain the competitive advantage by these SMEs.

Table 4.14 The dominating organisational culture profile for manufacturing sector participants according to their characteristics

Category	N	Mean	S.D.	Dominant culture
Age				
Less than 35 years	3	31.3333	10.50397	Clan Culture
More than 35 years	3	33.3333	6.65833	Clan Culture
Gender				
Male	3	31.3333	10.50397	Clan Culture
Female	3	33.3333	6.65833	Clan Culture
Education level				
Secondary school	1	29.0000	-	Adhocracy Culture
High school	1	30.0000	-	Clan Culture
First degree	4	35.7500	6.70199	Clan Culture
IT background				
Yes	4	35.7500	6.70199	Clan Culture
No	2	25.5000	6.36396	Clan Culture
Education abroad				
Yes	0	0	0	-
No	6	32.3333	7.94145	Clan Culture
Decision Maker				
Yes	6	32.3333	7.94145	Clan Culture
No	0	0	0	-
Internet access				
Yes	4	36.0000	6.37704	Clan Culture
No	2	29.0000	0.00000	Adhocracy Culture
Number of staff				
1 to 4	3	30.6667	10.01665	Clan Culture
10 to 49	3	34.0000	7.00000	Clan Culture
Equity capital				
Up to 999, 000	3	30.6667	10.59874	Clan Culture
1000,000 – 1999,000	1	41.00	-	Clan Culture
2000,000 – 2999,000	1	31.00	-	Clan Culture
3000,000 – 4999,000	1	30.00	-	Clan Culture
Overall manufacturing culture	6	32.200	6.964	<i>Clan Culture</i>

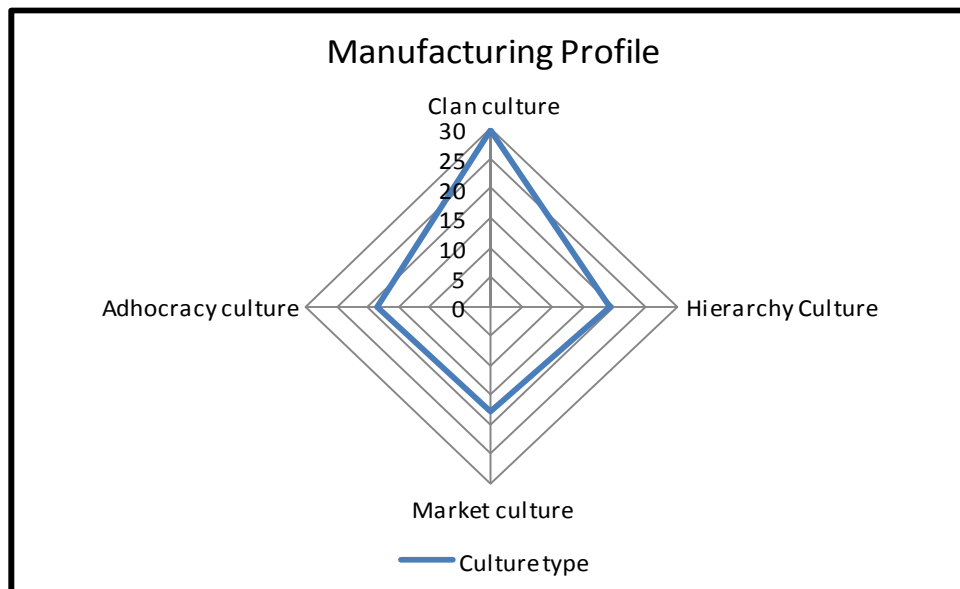
Table 4.14 illustrates the dominant organisational culture type of the manufacturing trading sector of SMEs in Jeddah according to their characteristics. Table 4.14 indicates that manufacturing SMEs are dominated by the clan culture according to employees' age, gender, IT background, education abroad, decision making, number of staff and equity capital. However, there are some differences with respect to the education level and the Internet access. SMEs that do not have Internet access are dominated by the adhocracy culture where SMEs who have Internet access are dominated by the clan culture.

Table 4.15 Organisational culture profile of manufacturing participants

Culture type	N	Mean	S.D.
Clan culture	6	32.3333	7.94145
Adhocracy culture	6	23.0000	5.32917
Market culture	6	13.3333	4.36654
Hierarchy Culture	6	17.0000	3.28634

Table 4.15 shows the overall organisational culture of the manufacturing trading sector of SMEs in Jeddah. It can be seen from table 4.15 that SMEs who are involved in the manufacturing industry are dominated by the clan culture with the highest mean (32.3333). **Figure 4.8** presents the dominant organisational culture where graph shifts more away from the centre point.

Figure 4.8 Organisational culture profile of manufacturing participants



4.4.1.8 Organisational culture profile of other services industry sector participants

From tables 4.16, 4.17 and figure 4.9, it can be seen that clan culture is dominating Saudi SMEs in Jeddah related to other services. Highest mean value of table 4.17 also indicates that other services are very little dominated by the hierarchy culture. Similar to the manufacturing SMEs as mentioned earlier, the other services SMEs are mostly dominated by the clan and adhocracy culture. These two cultures could encourage SMEs in this field to adopt new Internet technologies like WiMax for improving their way of doing business.

Table 4.16 The dominating organisational culture profile for other services sector participants according to their characteristics

Category	N	Mean	S.D.	Dominant culture
Age				
Less than 35 years	4	33.7500	11.14675	Clan Culture
More than 35 years	5	26.4000	7.30068	Clan Culture
Gender				
Male	9	29.6667	9.39415	Clan Culture
Female	0	0	0	-
Education level				
Diploma	1	29	-	Adhocracy Culture
First degree	5	33.0000	10.44031	Clan Culture
PG	3	27.6667	6.65833	Clan Culture
IT background				
Yes	8	29.3750	9.99911	Clan Culture
No	1	32	-	Clan Culture
Education abroad				
Yes	5	33.0000	9.38083	Clan Culture
No	4	26.0000	9.93311	Market Culture
Decision Maker				
Yes	9	29.6667	9.39415	Clan Culture
No	0	0	0	-
Internet access				
Yes	7	28.4286	10.40604	Clan Culture
No	2	34.0000	2.82843	Clan Culture
Number of staff				
1 to 4	3	33.0000	13.52775	Clan Culture
5 to 9	2	34.0000	2.82843	Clan Culture
10 to 49	4	25.0000	7.61577	Clan Culture
Equity capital				
Up to 999, 000	7	30.0000	10.14889	Clan Culture
1000,000 – 1999,000	1	29	-	Hierarchy Culture
5000,000 +	1	35.00	-	Clan Culture
Overall other services culture	9	30.261	8.597	<i>Clan Culture</i>

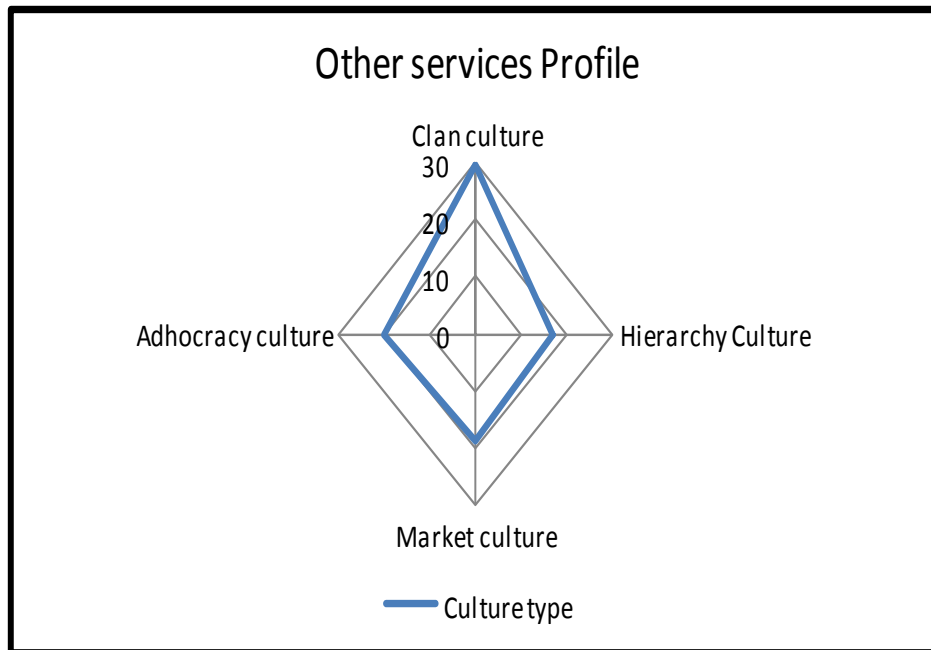
Table 4.16 illustrates the dominant organisational culture type of the other services trading sector of SMEs in Jeddah, broken down according to the characteristics of the sample. Table 4.14 indicates that manufacturing SMEs are dominated by the clan culture according to employees' age, gender, IT background, decision making, Internet access and number of staff. However, there are some differences with respect to the education level, education abroad and equity capital. SMEs that have equity capital between 1000,000 SR and 1999,000 SR are dominated by the hierarchy culture. Moreover, employees who had not their education abroad are dominated by the market culture where employees with diploma are dominated by the adhocracy culture.

Table 4.17 Organisational culture profile of other services participant

Culture type	N	Mean	S.D.
Clan culture	9	29.6667	9.39415
Adhocracy culture	9	20.2222	5.26255
Market culture	9	19.1111	9.51899
Hierarchy Culture	9	16.7778	6.62906

Table 4.17 shows the overall organisational culture of the other services trading sector. It indicates that SMEs who are involved in other services trading sector are strongly dominated by the clan culture. **Figure 4.9** presents the highest mean of the dominant organisational culture. See **figure 4.9**.

Figure 4.9 Organisational culture profile of other services participants



4.4.1.9 Organisational culture profile of transportation industry sector participants

Tables 4.18, 4.19 and figure 4.10 show that transportation SMEs of Saudi Arabia are dominated by the market culture and they are least dominated by the clan culture. SMEs which are dominated by the market culture focus on the external issues with a need for stability and control. Their strategy is for measuring customer preferences, improving productivity, enhancing competitiveness and involving customers and suppliers (Cameron and Quinn, 1999). Adopting new Internet technologies such as WiMax could be useful for achieving their strategic objectives. SMEs which are involved in transportation could use WiMax technology for monitoring their competitors and connecting with customers as well as suppliers.

Table 4.18 The dominating organisational culture profile for transportation sector participants according to their characteristics

Category	N	Mean	S.D.	Dominant culture
Age				
Less than 35 years	2	27.5000	6.36396	Market Culture
More than 35 years	1	35	-	Adhocracy Culture
Gender				
Male	3	25.6667	5.50757	Market Culture
Female	0	0	0	-
Education level				
High school	1	30	-	Adhocracy Culture
First degree	2	27.0000	7.07107	Market Culture
IT background				
Yes	1	30	-	Clan Culture
No	2	27.0000	7.07107	Market Culture
Education abroad				
Yes	2	26.0000	12.72792	Adhocracy Culture
No	1	32.0000	-	Market Culture
Decision Maker				
Yes	3	25.6667	5.50757	Market Culture
No	0	0	0	-
Internet access				
Yes	3	25.6667	5.50757	Market Culture
No	0	0	0	-
Number of staff				
1 to 4	1	30.00	-	Clan Culture
5 to 9	1	32.00	-	Market Culture
10 to 49	1	35.00	-	Adhocracy Culture
Equity capital				
Up to 999, 000	1	32.00	-	Market Culture
1000,000 – 1999,000	1	30.00	-	Clan Culture
5000,000 +	1	35.00	-	Adhocracy Culture
Overall transportation culture	3	26.267	7.577	<i>Market Culture</i>

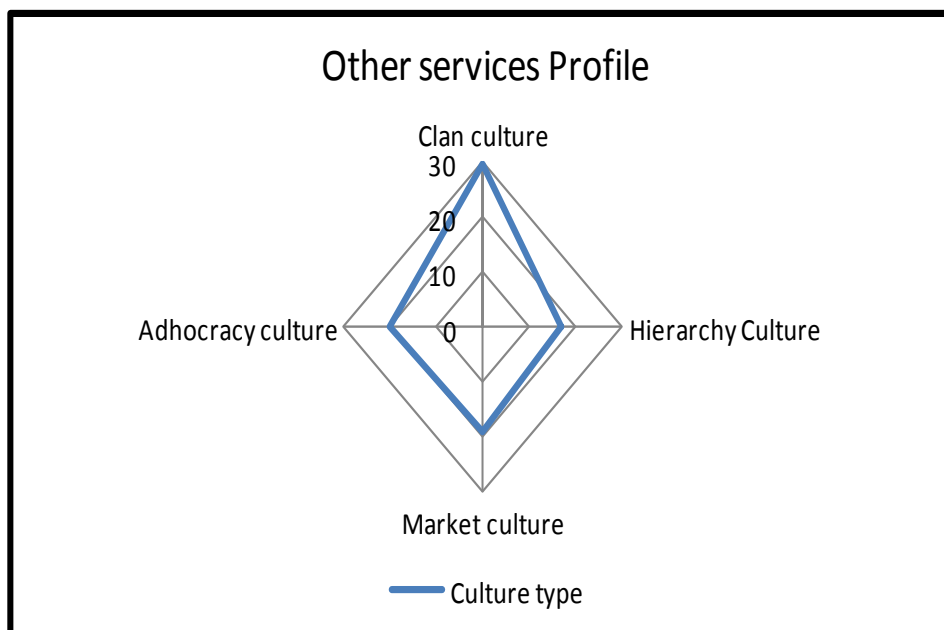
Table 4.18 illustrates the dominant organisational culture type of the transportation trading sector in Jeddah, broken down according to the characteristics of the sample. Table 4.18 indicates that SMEs who are involved in transportation industry are dominated by the market culture according to employees' gender, decision making and Internet access. However, there are some differences with respect to the age, education level, IT background, education abroad, number of staff and equity capital.

Table 4.19 Organisational culture profile of transportation participant

Culture type	N	Mean	S.D.
Clan culture	3	19.0000	9.84886
Adhocracy culture	3	20.3333	13.31666
Market culture	3	25.6667	5.50757
Hierarchy Culture	3	21.0000	7.00000

An analysis of the highest mean showing in **table 4.19** represents the dominant organisational culture of transportation sector. It is clearly evident that, market culture is dominating this sector with the highest mean (25.6667) as shown in table 4.19. **Figure 4.10** presents the highest mean of the dominant organisational culture of transportation trading sector. All of the average scores were plotted on the two-dimension graph with four quadrants as shown in figure 4.10. The dominant culture is the quadrant where the graph shifts more away from the centre point.

Figure 4.10 Organisational culture profile of transportation participants



4.4.1.9 Organisational culture profile of wholesale and retail industry sector participants

Tables 4.20, 4.21 and figure 4.11 indicate that wholesale and retail sector of the Saudi Arabia in Jeddah are mainly dominated by the clan culture. From the table 4.21 it is clear that, some of them are also dominated by the market culture. In comparison to the clan, market culture is externally focused with a need for stability and control. Leaders of the market culture are hard drivers, competitors and producers. However, in the clan culture leaders are family mentoring where the organisation is held together by tradition or loyalty (Cameron and Quinn, 1999). The commitment with the clan culture is very high. New Internet technology like WiMax could be useful for these SMEs to be well connected with their customers and suppliers. Also, such a technology can help SMEs those are involved in wholesale and retail trading to distribute their goods and products by taking orders through Internet. Internet technology such as WiMax could be a good tool to inform their consumers with their latest products and services.

Table 4.20 The dominating organisational culture profile for wholesale and retail sector participants according to their characteristics

Category	N	Mean	S.D.	Dominant culture
Age				
Less than 35 years	4	28.5000	8.18535	Clan Culture
More than 35 years	2	29.0000	4.24264	Clan Culture
Gender				
Male	6	28.6667	6.62319	Clan Culture
Female	0	0	0	-
Education level				
Diploma	2	28.0000	11.31371	Clan Culture
First degree	4	29.0000	5.47723	Clan Culture
IT background				
Yes	3	26.0000	7.93725	Clan Culture
No	3	31.3333	5.03322	Clan Culture
Education abroad				
Yes	3	28.0000	6.24500	Clan Culture
No	3	29.3333	8.32666	Clan Culture
Decision Maker				
Yes	6	28.6667	6.62319	Clan Culture
No	0	0	0	-
Internet access				
Yes	3	26.0000	7.93725	Clan Culture
No	3	31.3333	5.03322	Clan Culture
Number of staff				
1 to 4	1	35.00	-	Clan Culture
5 to 9	4	28.5000	7.00000	Clan Culture
100 +	1	24.00	-	Adhocracy Culture
Equity capital				
Up to 999, 000	4	28.5000	7.00000	Clan Culture
1000,000 – 1999,000	1	35.00	-	Clan Culture
5000,000 +	1	24.00	-	Adhocracy Culture
Overall wholesale and retail culture	6	28.606	7.084	<i>Clan Culture</i>

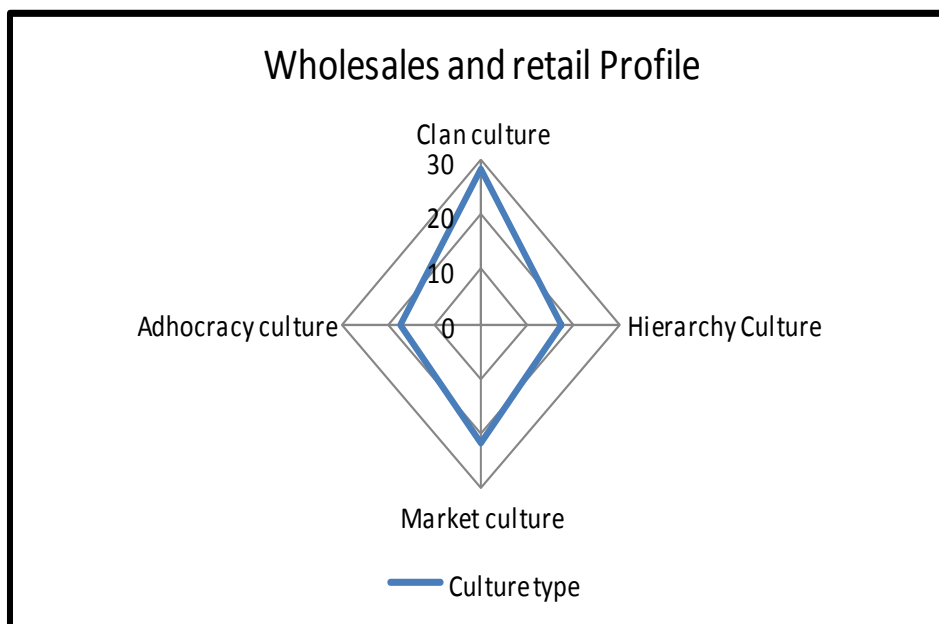
Table 4.20 presents the dominant organisational culture profile of the wholesale and retail trading sector in Jeddah, broken down according to the characteristics of the sample. Table 4.20 indicates that all of employees in all ages, genders, education level, different IT background, education from abroad, decision making and Internet access share the same clan culture. However, there are some differences according to the number of staff and the equity capital. SMEs that have more than 100 employees and more than 5000,000 SR as equity capital are dominated by the adhocracy culture.

Table 4.21 Organisational culture profile of wholesale and retail participants

Culture type	N	Mean	S.D.
Clan culture	6	28.6667	6.62319
Adhocracy culture	6	17.5000	4.13521
Market culture	6	22.0000	2.36643
Hierarchy Culture	6	17.3333	5.85377

Table 4.21 presents the overall dominant organisational culture of the wholesale and retail trading sector of SMEs in Jeddah. It can be seen from table 4.21 that SMEs in this sector are clearly dominated by the clan culture. **Figure 4.11** shows the highest mean of the dominant organisational culture of the wholesale and retail sector. All of the average scores were plotted on the two-dimension graph with four quadrants as shown in figure 4.11. The dominant culture is the quadrant where the graph shifts more away from the centre point.

Figure 4.11 Organisational culture profile of wholesale and retail participants



4.4.1.10 Organisational culture profile of all trade type of participants

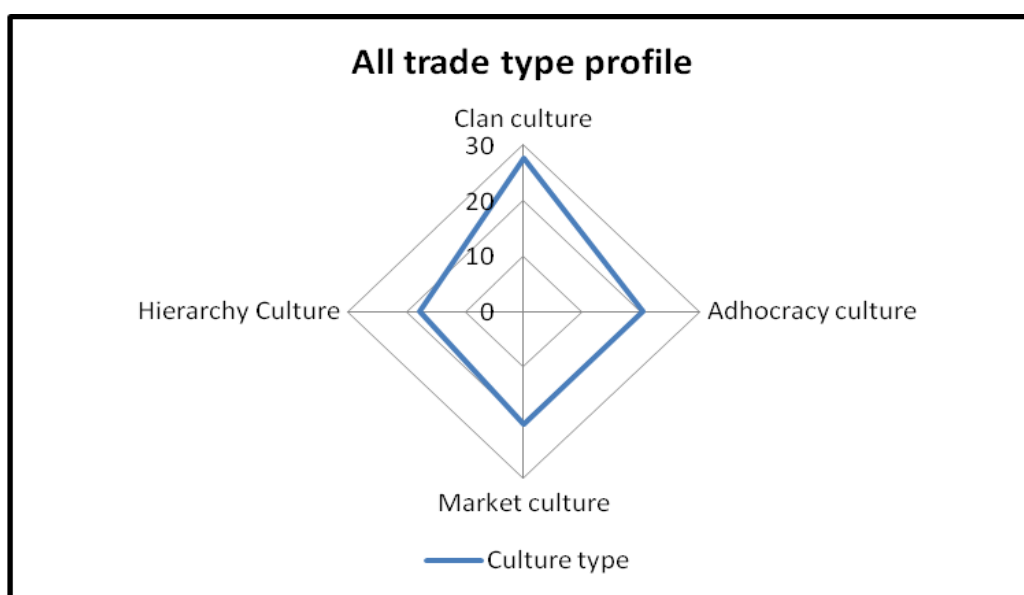
From the table 4.22 and figure 4.12 it is clear that all trade types of Saudi SMEs in Jeddah are mainly dominated by the clan culture. Moreover, they are also dominated by the adhocracy and market culture slightly. It is clearly indicated from the table 4.22 that SMEs who are involved in all trade types fit in the upper left quadrant with a significant greater average as shown in figure 4.12. Unlike the rules and procedures of adhocracy or the competitive profit centres of market culture, typical characteristics of clan culture are coordinative, involve teamwork, cooperative and fewer management levels. SMEs in clan culture are characterised as a friendly workplace, with shared values, goals, unity beliefs and participation. Rather than looking for stability this type of culture focuses on internal issues, flexible values and carefulness (Cameron and Quinn, 1999). SMEs are naturally small in size and their workplace is like a family. These could be the reasons for the SMEs in Jeddah to be dominated by the clan culture. Clan culture is internally focused as mentioned earlier and that could be useful for adopting new Internet technology like WiMax. Leaders of clan culture are concerned about their staff. They work as team with them and they do the best for their employees to facilitate the way of working. That could be a reason to encourage leaders to adopt new technology in order to keep them up to date with the latest information about the business. Moreover, adopting a new Internet technology such as WiMax will improve the staff skills and organisational performance.

Table 4.22 All trade type organisational culture profile

Culture type	N	Mean	S.D.
Clan culture	63	27.5238	9.41320
Adhocracy culture	63	20.1746	6.17889
Market culture	63	20.3333	8.23838
Hierarchy Culture	63	17.6508	5.49827

Table 4.22 indicates that all trade types of Saudi SMEs in Jeddah are mainly dominated by the clan culture. Moreover, they are also dominated by the adhocracy and market culture slightly. **Figure 4.12** shows that all trade types of SMEs in Jeddah fit in the upper left quadrant with a significant greater average where the graph shifts more away from the centre point.

Figure 4.12 **Organisational culture profile of all trade type**



4.4.2 Organisational Culture Profile of SMEs According to their Internet Connection Type

Tables 4.23 to 4.31 show the dominant organisational culture type for Saudi SMEs in Jeddah based on their Internet connection types. From the survey it was found that, there are mainly four types of Internet connection including DSL, WiMax, Wi-Fi and VSAT are adopted by the Saudi SMEs in Jeddah. Considering the characteristics of the sample tables 4.23 (WiMax), 4.25 (Wi-Fi), 4.27 (DSL) and 4.29 (VSAT) are being broken down accordingly. SMEs with the different Internet connection are clearly dominated by the clan culture. Tables 4.23, 4.25, 4.27 and 4.29 indicate that, all of employees of all ages share the same clan culture, demonstrating that they are with similar beliefs, attitudes and values. Tables 4.23, 4.25, 4.27 and 4.29 show that, there are no differences based on the gender. All males and females are also dominated by the clan culture as shown in the table 4.23, 4.25, 4.27 and 4.29.

The result indicates that, all the people involved in the SMEs with different Internet connections are clearly dominated by the clan culture according to their education level, education abroad and with IT background. Moreover, all the decision makers within the Saudi SMEs with the four types of Internet connections (WiMax, Wi-Fi, DSL and VSAT) are dominated by the clan culture as shown in table 4.23, 4.25, 4.27 and 4.29. From the tables 4.23, 4.25, 4.27 and 4.29 also indicate that, all the SMEs with different types of Internet connections and with small number of staff are dominated by the clan culture. Furthermore, SMEs with small equity capital are clearly dominated by the same culture.

From tables 4.23, 4.25, 4.27 and 4.29 is also found that, all the SMEs with different types of Internet connections and with small number of staff are dominated by the clan culture. Moreover, SMEs with small equity capital are clearly dominated by the same culture. However, SMEs who have DSL and VSAT Internet connections with more than 5000,000 SR are dominated by the market and adhocracy culture. SMEs in Jeddah with market and adhocracy cultures are considered to be competitive and risk taker. That could be the reason for SMEs with large equity capital and number of staff to be dominated by the market and adhocracy culture. As, these SMEs are different from others because of their external focus with control, stability, flexibility and individuality (Cameron and Quinn, 1999).

4.4.2.1 Organisational culture profile of WiMax technology adopters

From tables 4.23, 4.24 and figure 4.13 it was found that, Saudi SMEs who are adopting WiMax technology in Jeddah are significantly dominated by the clan culture and slightly dominated by the market culture. SMEs those are dominated by the clan culture focus on the internal issues, flexible values and carefulness rather than looking for stability (Cameron and Quinn, 1999). Using Internet technology such as WiMax in clan culture could be helpful because it focuses on people's capability to enhance interpersonal communications and support through networked systems such as electronic mail, group support systems, and group decision support (Cooper and Quinn, 1993; Davison & Jordan, 1996). However, since this could work against the human-touch aspect, any technology would have to be user friendly.

As mentioned earlier in chapter 2, that WiMax technology has numerous advantages which are the driving force behind opting for WiMax broadband technology such as: improved performance and robustness, end-to-end Internet protocol-based networking, secure mobility, and broadband speed for voice, data and video (Ahson and Ilyas, 2007; Vaughan-Nichols, 2004). However, the result shows (chart 4.9) that only 1.6% SMEs have adopted WiMax technology which is a very low percentage comparing with the DSL.

Thus, a further investigation by in-depth interview with WiMax technology vendors, WiMax technology adopters and non-adopters SMEs and government representative will be carried in chapter five to find out the obstacles that holding SMEs from adopting such an Internet technology.

Moreover, examination will be performed to verify how SMEs perceive WiMax as an Internet technology in term of ease of use, compatibility and so on.

Table 4.23 The dominating organisational culture profile for WiMax technology adopters' participants according to their characteristics

Category	N	Mean	S.D.	Dominant culture
Age				
Less than 35 years	1	44.00	-	Clan Culture
More than 35 years	0	0	0	-
Gender				
Male	1	44.00	-	Clan Culture
Female	0	0	0	-
Education level				
PG	1	44.00	-	Clan Culture
IT background				
Yes	1	44.00	-	Clan Culture
No	0	0	0	-
Education abroad				
Yes	0	0	0	-
No	1	44.00		Clan Culture
Decision Maker				
Yes	1	44.00	-	Clan Culture
No	0	0	0	-
Internet access				
Yes	1	44.00	-	Clan Culture
No	0	0	0	-
Number of staff				
5 to 9	1	44.00	-	Clan Culture
Equity capital				
Up to 999, 000	1	44.00	-	Clan Culture
Overall WiMax culture	1	44.00	-	<i>Clan Culture</i>

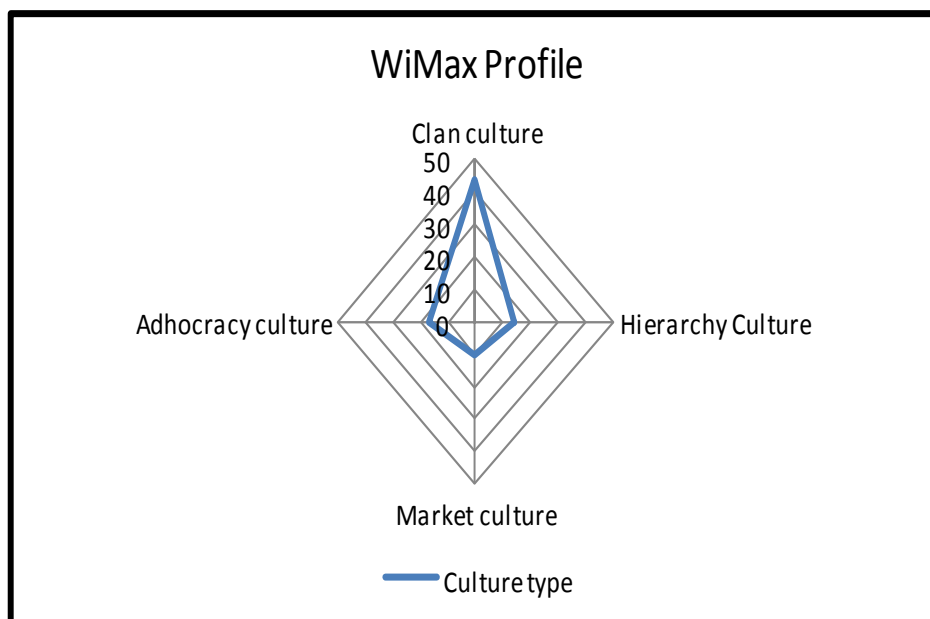
Table 4.23 indicates the dominant organisational culture profile of WiMax technology adopters. It shows that SMEs who are WiMax technology adopters are strongly dominated by the clan culture according to the age, gender, education level, IT background, decision making, Internet access, number of staff and equity capital of the SMEs.

Table 4.24 Organisational culture profile of WiMax technology adopters

Culture type	N	Mean	S.D.
Clan culture	1	44.0000	-
Adhocracy culture	1	17.0000	-
Market culture	1	10.0000	-
Hierarchy Culture	1	14.0000	-

Table 4.24 presents the overall organisational culture profile of the Saudi SMEs in Jeddah who are WiMax technology adopters. It shows that, these SMEs are clearly dominated by clan culture with the highest average in comparison to the other types of cultures. WiMax adopters are fit in the upper left quadrant, or clan culture with a significant greater average as shown in **figure 4.13**.

Figure 4.13 Organisational culture profile of WiMax technology adopters



4.4.2.2 Organisational culture profile of Wi-Fi technology adopters

Tables 4.25, 4.26 and figure 4.14 indicate that, SMEs with Wi-Fi Internet connection in Jeddah are clearly dominated by the clan culture. In the clan culture, maintenances are focused internally with concern for the people, sensitivity of customers and also with flexibility of working environment, as is characteristic of this culture. Wi-Fi is considered to be a viable and practicable broadband technology for wireless local area networking applications in both business and home environments (Houliston and Sarkar, 2005; Pentland et al., 2002). Broatch (2003) highlights that, within the flat hi-tech landscape of the last few years, Wi-Fi stands out as one technology that still attracts a great deal of interest. In recent years, Wi-Fi has undoubtedly revolutionised wireless networking and is now widely adopted by business and domestic users. However, there are several limitations attached to Wi-Fi such as: weak security, which is one of the main challenges in Wi-Fi technology. Wi-Fi network requires some expertise that wired network engineers are not likely to possess, inconsistent performance, and business value. Taking into consideration the limitations of Wi-Fi, WiMax technology came with the promises to overcome these limitations. WiMax enables broadband access anywhere, anytime and on virtually any device contrasting to Wi-Fi. That could be a reason that, SMEs who Wi-Fi adopters are more likely to adopt WiMax technology to overcome these limitations.

Table 4.25 The dominating organisational culture profile for Wi-Fi technology adopters' participants according to their characteristics

Category	N	Mean	S.D.	Dominant culture
Age				
Less than 35 years	0	0	0	-
More than 35 years	1	29.00	-	Clan Culture
Gender				
Male	1	29.00	-	Clan Culture
Female	0	0	0	-
Education level				
Diploma	1	29.00	-	Clan Culture
IT background				
Yes	1	29.00		Clan Culture
No	0	0	0	-
Education abroad				
Yes	0	0	0	-
No	1	29.00	-	Clan Culture
Decision Maker				
Yes	1	29.00	-	Clan Culture
No	0	0	0	-
Internet access				
Yes	1	29.00		Clan Culture
No	0	0	0	-
Number of staff				
5 to 9	1	29.00	-	Clan Culture
Equity capital				
3000,000– 4999,000	1	29.00	-	Clan Culture
Overall Wi-Fi culture	1	29.00	-	<i>Clan Culture</i>

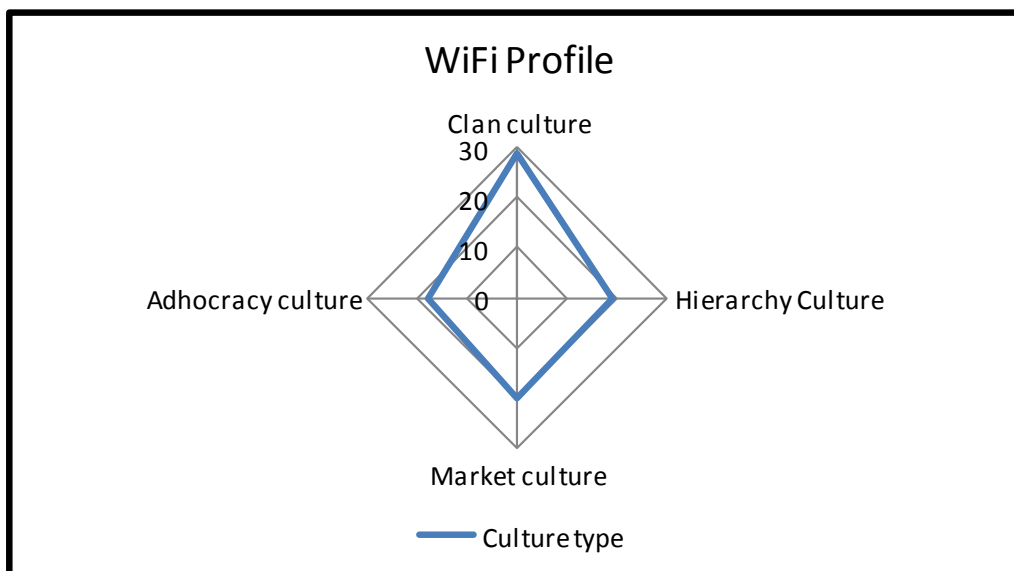
Table 4.25 indicates the dominant organisational culture profile of Wi-Fi technology adopters. It shows that SMEs who are Wi-Fi technology adopters are strongly dominated by the clan culture according to the age, gender, education level, IT background, decision making, Internet access, number of staff and equity capital of the organisations.

Table 4.26 Organisational culture profile of Wi-Fi technology adopters

Culture type	N	Mean	S.D.
Clan culture	1	29.0000	-
Adhocracy culture	1	18.0000	-
Market culture	1	20.0000	-
Hierarchy Culture	1	19.0000	-

Table 4.26 presents the overall organisational culture profile of the Saudi SMEs in Jeddah who are Wi-Fi technology adopters. It shows that, these SMEs are clearly dominated by clan culture with the highest average in comparison to the other types of cultures. **Figure 4.14** shows that, the clan culture is fit in the upper left quadrant with a significant greater average as shown below in figure 4.14.

Figure 4.14 Organisational culture profile of Wi-Fi technology adopters



4.4.2.3 Organisational culture profile of DSL technology adopters

Tables 4.27, 4.28 and figure 4.15 show that, SMEs with DSL Internet connection type in Saudi Arabia are dominated by the clan culture and the second dominator is the adhocracy culture. Even though with the DSL limitations such as pricing, distance sensitivity and reliability; the results show that 65.1% from the Saudi SMEs who participated in this study have DSL as Internet connection. All these issues might have negative implications on the Internet adoption by SMEs. It also could be a reason that most of SMEs are not aware of new Internet technologies in the Saudi market such as WiMax that might overcome the limitations of current Internet connections. Therefore, a further discussion regarding these issues will be carried out in chapter 5 to find the reasons behind it.

Table 4.27 The Dominating organisational culture profile for DSL technology adopters' participants according to their characteristics

Category	N	Mean	S.D.	Dominant culture
Age				
Less than 35 years	29	26.7241	10.20818	Clan Culture
More than 35 years	12	27.8333	8.97302	Clan Culture
Gender				
Male	26	27.7308	8.76154	Clan Culture
Female	15	25.8667	11.53174	Clan Culture
Education level				
High school	3	32.0000	14.10674	Clan Culture
Diploma	6	25.5000	7.60920	Clan Culture
First degree	28	26.9286	10.42052	Clan Culture
PG	4	26.5000	5.91608	Clan Culture
IT background				
Yes	28	27.2857	9.16457	Clan Culture
No	13	26.5385	11.33296	Clan Culture
Education abroad				
Yes	17	27.4706	8.99387	Clan Culture
No	24	26.7500	10.45591	Clan Culture
Decision Maker				
Yes	36	28.5000	9.19472	Clan Culture
No	5	28.0000	3.80789	Market Culture
Internet access				
Yes	41	27.0488	9.76461	Clan Culture
No	0	0	0	-
Number of staff				
1 to 4	11	31.7273	8.90046	Clan Culture
5 to 9	9	27.5556	8.95979	Clan Culture
10 to 49	17	26.7647	9.20957	Clan Culture
50 to 99	1	27.00	-	Market Culture
100 +	3	29.6667	4.04145	Market Culture
Equity capital				
Up to 999, 000	25	26.6800	8.42477	Clan Culture
1000,000 – 1999,000	9	29.8889	13.35519	Clan Culture
2000,000 – 2999,000	1	31.00	-	Clan Culture
3000,000 – 4999,000	2	28.0000	2.82843	Clan Culture
5000,000 +	4	26.7500	15.15201	Market Culture
Overall DSL culture	41	27.726535	9.1788357	<i>Clan Culture</i>

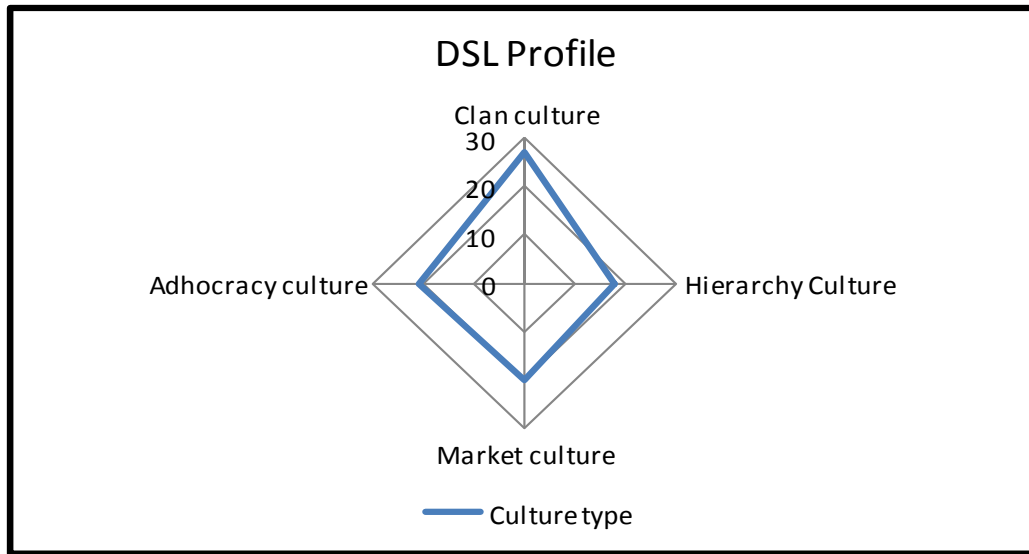
Table 4.27 shows the dominant organisational culture profile of DSL technology adopters. It indicates that SMEs who are DSL technology adopters are strongly dominated by the clan culture according to the age, gender, education level, IT background and Internet access. However, people who are not decision makers in their SMEs are dominated by the market culture. Moreover, SMEs who have number of staff more than 50 employees and equity capital more than 5000,000 SR are dominated by the market culture.

Table 4.28 **Organisational culture profile of DSL technology adopters**

Culture type	N	Mean	S.D.
Clan culture	41	27.0488	9.76461
Adhocracy culture	41	20.8537	6.63536
Market culture	41	20.0976	8.21829
Hierarchy Culture	41	17.7073	6.06731

Table 4.28 presents the overall organisational culture profile of the Saudi SMEs in Jeddah who are DSL technology adopters. It shows that the majority of organisational cultures of Saudi SMEs who are DSL adopters are clearly dominated by clan culture with the highest average in comparison to the other types of cultures. **Figure 4.15** shows that clan culture is fit in the upper left quadrant with a significant greater average (27.0488). See **figure 4.15**.

Figure 4.15 Organizational culture profile of DSL technology adopters



4.4.2.4 Organizational culture profile of VSAT technology adopters

SMEs with VSAT Internet connection in Jeddah are significantly dominated by the clan culture as seen from the tables 4.29, 4.30 and figure 4.16. SMEs in the clan culture work as team, leaders are concerned about people and workplace is friendly in comparison to the other cultures (Cameron and Quinn, 1999). VSAT connection is expensive comparing with other Internet connections such as WiMax technology. That could be a reason to encourage SMEs to adopt new Internet technologies like WiMax that provides them with higher mobile environment, cost-effective, wider coverage, non-line-of-sight operations and high capacity (WiMax Forum, 2005).

Table 4.29 The dominating organisational culture profile for VSAT technology adopters' participants according to their characteristics

Category	N	Mean	S.D.	Dominant culture
Age				
Less than 35 years	3	31.6667	9.60902	Clan Culture
More than 35 years	0	0	0	-
Gender				
Male	3	31.6667	9.60902	Clan Culture
Female	0	0	0	-
Education level				
High school	1	30.00	-	Clan Culture
First degree	2	32.5000	13.43503	Clan Culture
IT background				
Yes	0	0	0	-
No	3	31.6667	9.60902	Clan Culture
Education abroad				
Yes	2	26.5000	4.94975	Clan Culture
No	1	42.00		Clan Culture
Decision Maker				
Yes	3	31.6667	9.60902	Clan Culture
No	0	0	0	-
Internet access				
Yes	3	31.6667	9.60902	Clan Culture
No	0	0	0	-
Number of staff				
1 to 4	1	30.00	-	Clan Culture
5 to 9			-	
10 to 49	1	42.00	-	Clan Culture
50 to 99	0	0	0	-
100 +	1	24.00	-	Adhocracy Culture
Equity capital				
Up to 999, 000	1	42.00	-	Clan Culture
1000,000 – 1999,000	1	30.00	-	Clan Culture
5000,000 +	1	24.00	-	Adhocracy Culture
Overall VSAT culture	3	30.944467	9.4701433	<i>Clan Culture</i>

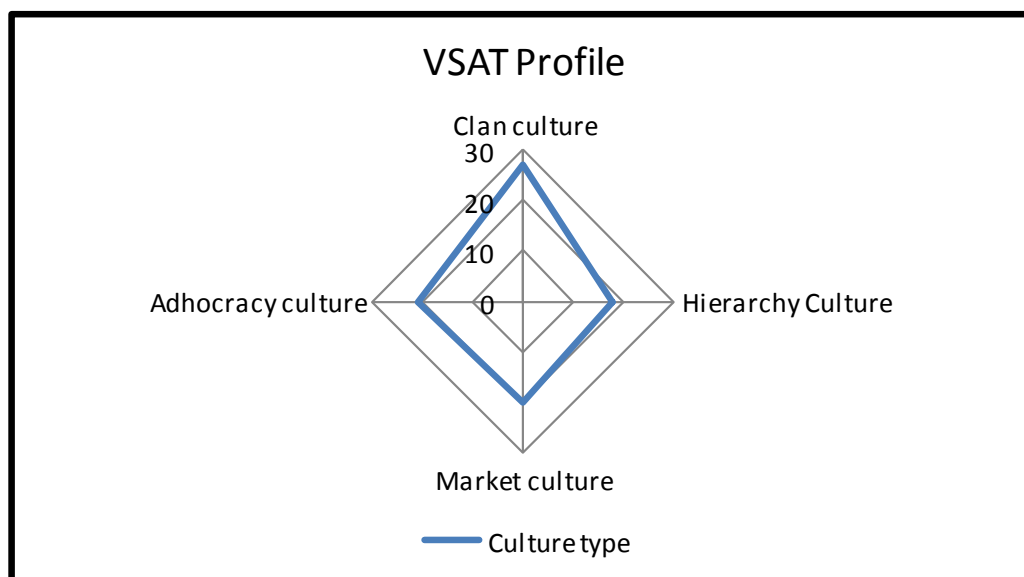
Table 4.29 indicates the dominant organisational culture profile of VSAT technology adopters. It shows that SMEs who are VSAT technology adopters are strongly dominated by the clan culture according to the age, gender, education level, IT background, decision making, education from abroad and Internet access. However, SMEs who have number of staff more than 100 employees and equity capital more than 5000,000 SR are dominated by the adhocracy culture.

Table 4.30 Organisational culture profile of VSAT technology adopters

Culture type	N	Mean	S.D.
Clan culture	3	31.6667	9.60902
Adhocracy culture	3	19.0000	4.35890
Market culture	3	17.6667	7.57188
Hierarchy Culture	3	18.0000	1.73205

Table 4.30 presents the overall organisational culture profile of the Saudi SMEs in Jeddah who are VSAT technology adopters. It shows that, these SMEs are clearly dominated by clan culture with the highest average (31.6667) in comparison to the other types of cultures. **Figure 4.16** shows that clan culture is fit in the upper left quadrant with a significant greater average as shown below.

Figure 4.16 Organisational culture profile of VSAT technology adopters



4.4.2.5 Organisational culture profile of all types of Internet connections adopters

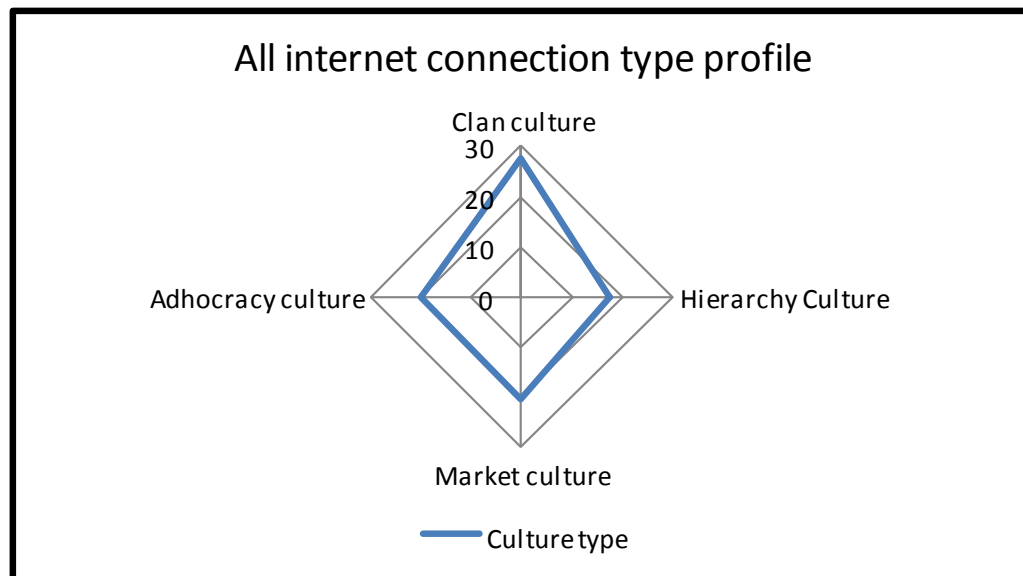
Table 4.31 and figure 4.17 indicate that, types of all Internet connection profile are dominated by the clan culture. According to Cameron and Quinn (1999) organisation with clan culture are concentrated on internal maintenance with flexibility, sensitivity for customers and concern for people. Tables 4.23 to 4.30 show that, the SMEs who are adopting or not adopting WiMax technology are dominated by the clan culture with the highest average of the mean as shown in figure 4.17. This indicates that Saudi SMEs in Jeddah are willing to adopt latest Internet technologies such as WiMax. The researcher will take into consideration all the issues that arose from the survey findings and will discuss them in details in chapter 5 as in-depth interviews have been carried out with the main people who are responsible of WiMax technology diffusion to SMEs in Saudi Arabia.

Table 4.31 Organisational culture profile of all Internet connections types adopters

Culture type	N	Mean	S.D.
Clan culture	63	27.52	9.413
Adhocracy culture	63	20.17	6.179
Market culture	63	20.33	8.238
Hierarchy Culture	63	17.65	5.498

Table 4.31 indicates that all Internet connections types of Saudi SMEs in Jeddah are mainly dominated by the clan culture. Moreover, they are also dominated by the adhocracy and market culture slightly. **Figure 4.17** shows that all trade types of SMEs in Jeddah fit in the upper left quadrant with a significant greater average where the graph shifts more away from the centre point.

Figure 4.17 Organisational culture profile of all Internet connections types adopters



4.4.3 Organisational Culture Profile of All SMEs Industries and All Internet Connections Types

Table 4.32 shows the dominant organisational culture profile of all SMEs trade types and their Internet connection type. The SMEs that have been considered in this study are from different industries with different types of Internet connections. The Saudi SMEs in Jeddah who participated in this research are strongly dominated by clan culture as shown in **table 4.32**.

Table 4.32 The dominant organisational culture profile of overall SMEs industries and Internet connections types

SMEs		Dominant organisational culture profile							
industries & Internet connections	N	Clan Culture		Adhocracy Culture		Market Culture		Hierarchy culture	
		Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Advertising & PR and Marketing	6	33.1667	8.13429	19.1667	4.26224	15.6667	5.81951	17.8333	5.23132
Constructions	3	30.6667	4.16333	18.000	3.60555	19.3333	5.85947	17.6667	7.37111
Creative industries	14	27.3571	7.76191	22.7857	7.29782	19.2857	4.53073	16.2143	5.68640
Education & community	10	18.3000	10.2961	19.4000	6.70323	29.7000	11.2353	18.2000	5.99630
Food & Beverages	3	29.6667	5.68624	18.3333	4.93288	18.0000	5.29150	19.3333	4.72582
Health & Beauty	3	32.6667	12.6622	16.0000	3.60555	15.6667	6.50641	21.6667	4.04145
Manufacturing	6	32.3333	7.94145	23.0000	5.32917	13.3333	4.36654	17.000	3.28634
Other services	9	29.6667	9.39415	20.2222	5.26255	19.1111	9.51899	16.7778	6.62906
Transportation	3	19.0000	9.84886	20.3333	13.31666	25.6667	5.50757	21.0000	7.0000
Wholesale & Retail	6	28.6667	6.62319	17.5000	4.13521	22.0000	2.36643	17.3333	5.85377
All industries	63	27.5238	9.4132	20.1746	6.17889	20.333	8.23838	17.6508	5.49827
WiMax	1	44.000	-	17.000	-	10.000	-	14.000	-
Wi-Fi	1	29.000	-	18.000	-	20.000	-	19.000	-
DSL	41	27.048	9.76461	20.853	6.63536	20.0976	8.2182	17.7073	6.06731
VSAT	3	31.666	9.60902	19.0000	4.35890	17.6667	7.57188	18.0000	1.73205
All Internet connections types	63	27.52	9.413	20.17	6.179	20.33	8.238	17.65	5.498

 Dominant culture

4.5 Conclusion

A total of 63 organisations from different industry sectors of SMEs participated in this study. The majority of the participants were Saudi natives who were in charge in their organisations. 87.3 % of the participants are the decision makers in their organisations. 74.6% of the SMEs have internet access and the majority of them (65.1%) are DSL adopters.

Both males and females were participants of this survey. Research data indicates that, more than 60% participants of SMEs owners/managers are male. Possible explanation is that, the researcher has collected data from a male dominated region or number of women participants could be lower because of cultural issue like religion. From the survey it could be also noticed that, middle aged group are highly involved in SMEs. Additionally, it was found that, more than half of the SMEs in Jeddah who participated in this study have their equity capital up to 999, 000 SR. SMEs with limited financial resources might consider the price of technology as an obstacle that is holding them back from adopting Internet technologies.

Considering the characteristics of the SMEs sample, the data has been analysed accordingly. Moreover, each type of SMEs trading sectors and their Internet connection types have been analysed individually using the organisational culture assessment instrument (OCAI). Largely, the dominant organisational culture type of Saudi SMEs in Jeddah is the clan culture based on the characteristics of the sample in relation to the SMEs trading sectors and Internet connection types. SMEs are naturally small in size and their workplace is like a family. These could be the reason for the SMEs in Jeddah to be dominated by the clan culture.

The research findings indicate that, 25.4% SMEs have no Internet access and 74.6% are using Internet. This indicates that most of the SMEs are using Internet for their business. From the research data it was also found that various types of Internet connections are available in different SMEs. A large number of the participants (65.1%) are using DSL connection. On the other hand, percentage of VSAT user is 4.8 and only a few users are using Wi-Fi (1.6%) and WiMax (1.6%). It indicates that, SMEs owners/managers are willing to adopt the latest Internet technology available in the Saudi market. Overall, according to the research result, Saudi SMEs who adopted Wi-Fi, VSAT and DSL are more likely to adopt WiMax.

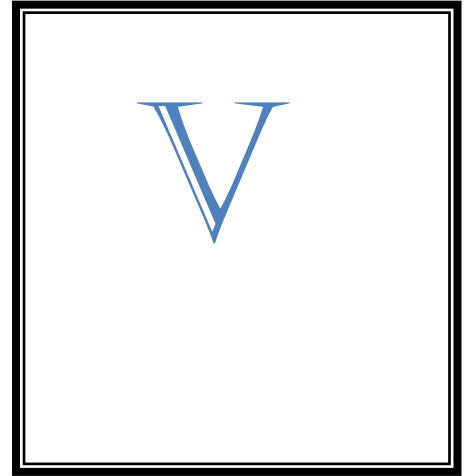
SMEs who are adopters and non-adopters of WiMax technology are clearly dominated by the clan culture. It could be assumed that, Saudi SMEs in Jeddah are showing readiness to adopt latest Internet technologies such as WiMax.

The SMEs that have been considered in this study are from different industries. It has been found from the research findings that, the organisational culture type for majority of Saudi SMEs according to their trading sectors in Jeddah is clearly dominated by the clan culture. Clan culture is flexible and friendly workplace and that could be helpful for adopting new Internet technologies like WiMax.

It has also been found that, some of SMEs are also dominated by the market culture. In comparison to the clan, market culture is externally focused with a need for stability and control. Leaders of the market culture are hard drivers, competitors and producers. That could be a reason to adopt Internet technologies as SMEs leaders who are dominated by market culture are competitors and producers.

It was clear that, creative industries who participated in this study are the most with 22.2% among the total participants who are dominated by the clan culture. Moreover, some of them are showing tendency towards adhocracy culture. It is found from this research that, SMEs with the combination of clan and adhocracy cultures such as creative industries are more likely to adopt latest Internet technology such as WiMax. SMEs in adhocracy culture are more creative than the other SMEs with different types of organisational cultures. Consequently, SMEs who are dominated by both clan and adhocracy cultures are more likely to adopt new Internet technology such as WiMax.

SMEs who adopted the WiMax in Saudi Arabia are dominated by the clan culture and they are less dominated by the market culture. Furthermore, the result shows that only 1.6% SMEs have adopted WiMax, which is a very low ratio comparing with the DSL. It could be a reason that most of the SMEs of Saudi Arabia are not aware about new communication technology like WiMax. Moreover, pricing, quality and availability could be other barriers to adopt WiMax. Thus, a further investigation will be carried in the next chapter to find out the obstacles that is holding SMEs back from adopting WiMax technology. Moreover, examination will be performed to verify how SMEs perceive WiMax as a technology in term of ease of use.



CHAPTER 5: QUALITATIVE FINDINGS

5.1 Introduction

The framework of the research indicated three main dimensions that might have an impact on the WiMax technology adoption by SMEs in the context of KSA as mentioned in chapter 2. These dimensions are the organisational culture profile, vendors' commercialisation strategies and government policies. In order to carry out the proposed framework that has been discussed in chapter 2, a survey has been conducted on the SMEs to assess the dominant organisational culture type that has an impact on the WiMax adoption by SMEs as shown in chapter 4. In this chapter the description of the second phase of the research is presented using data obtained from semi-structured interviews involving representatives from WiMax technology vendors, government agencies and SMEs.

The ease of use dimension, which is focused on the low-end disruption strategy of disruptive innovation (Christensen et al., 2004; Schmidt and Druehl, 2008), has been identified to investigate the WiMax technology adoption by SMEs in terms of convenience, customisation and cost of use. Each dimension has been analysed considering critical sub-dimensions related to WiMax adoption by SMEs. King et al. (1994) opined that examining government intervention in the adoption of WiMax by SMEs in Saudi Arabia requires the study of the forces of demand–pull and supply–push which can be done through six main actions of institutional theory. These actions are knowledge building; knowledge deployment; subsidy; mobilisation; standard setting; and innovation directive. These dimensions have been discussed according to the Saudi government's ICT initiatives. Moreover, a combination of the disruptive and institutional theories dimensions has been used to analyse the SMEs perspectives towards WiMax technology adoption. Some additional issues related to WiMax technology adoption by Saudi SMEs that arose during this research are also analysed.

SMEs who participated in this study are not fully involved in the WiMax technology adoption. Moreover, a large number of SMEs are not using the Internet technology as discussed in chapter 4. 65.1% of SMEs who participated in the first phase of the research are using DSL connection while WiMax adopters are 1.6%. Therefore, for the purpose of this thesis, in-depth interviews have been conducted in Saudi Arabia during the period August 2010 and January 2011, in the cities of Jeddah and Riyadh. The researcher has carried out interviews with three vendors of WiMax technology and they are the only providers for WiMax technology in Saudi Arabia. Additionally, five government representatives from different government agencies such as the Communications and Information Technology Commission (CITC) and Ministry of Communications and Information Technology (MCIT) have been interviewed. Only five SMEs in Jeddah who took part in the first phase of the empirical investigation of this research have agreed to also be involved in the second phase of this

research as well. **Table 5.1** lists organisations, the interviewees' positions, duration of the interviews and the related codes.

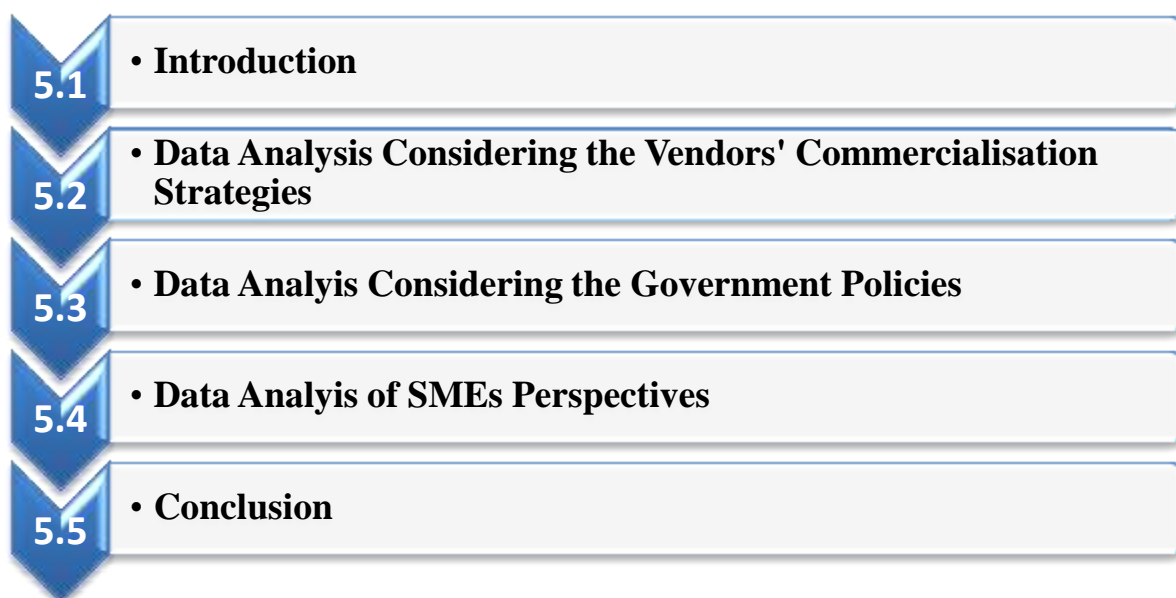
Table 5.1 Interviewees, duration of the interview, related cods

Organisation	Interviewee position	Code	Duration (minutes)
Vendor 1	Strategy & Business development	Firm A	30
Vendor 2	Store manager	Firm B	36
Vendor 3	Sales manager	Firm C	30
SME	Partner	SME1	80
SME	Partner	SME2	90
SME	Business owner	SME3	45
SME	Business Manager	SME4	39
SME	Business Manager	SME5	60
Government agency	Advisor	G1	39
Government agency	Deputy Governor	G2	36
Government agency	Consultant	G3	30
Government agency	Infrastructure	G4	50
Government agency	e-government program	G5	90

The researcher has applied the semi-structured qualitative interviews for data collection and has used thematic process of data analysis. For the purpose of reducing the bulk of data, the researcher persistently read the transcript several times. Reading the transcripts several times aided the researcher in identifying the main themes and sub-themes particularly those which are related to answer the research questions. Thematic data analysis has been used widely. According to Morse and Field (1995), thematic analysis helps researchers to focus on the core meaningful data which is performed through defining certain themes and analysing them. Moreover, this study used constant comparative approach which helped the researcher to compare SMEs perspectives with vendors and government point views. The main goal of constant comparative approach is to compare a piece of in-depth interviews with another piece in the data (Straus and Corbin, 1998). The whole process of analysing the qualitative data has been discussed earlier in details in chapter 3. Appendix C contains the semi-structured list of subjects-questions that served as basis for the interviews carried out during the second phase of this research.

Some important information and recommendations have been achieved from different interviewees in this chapter. Data analysis considering the vendors will be discussed in section 5.3. Government representatives and SMEs findings will be presented in section 5.4 and 5.5 accordingly. Moreover, additional findings will be presented at the end of each section of WiMax vendors, government representatives and SMEs. Finally, a conclusion will be provided in section 5.6 at the end of this chapter. **Figure 5.1** presents the structure of this chapter.

Figure 5.1 **Structure of the Chapter 5**



5.2 Data Analysis Considering the Vendors' Commercialisation Strategies

This section presents the perceptions of the vendors in relation to the three dimensions of competition on the WiMax technology market. This is to enhance a proper investigation on the applicability of the low-end disruption argument of WiMax technology adoption by SMEs proposed by Christensen et al., (2004). This argument is based on the point that the low-end disruption strategy could be a function of the ease of use dimension which is measured in terms of convenience, customisation and cost of use (Christensen et al., 2004; Schmidt and Druehl, 2008).

The only 3 WiMax technology vendors in Saudi Arabia, which are coded as firms A, B and C, have taken part in the interviews. Firm A is an Internet and telecommunication service provider which provides various national and international data connectivity such as Internet services, WiMax technology, VSAT and data centre services. Firm B is providing various telecoms and Internet services including WiMax technology. Firm C is providing WiMax facilities, Internet phone and fixed line in Saudi Arabia. **Table 5.2** shows the profile of each firm, code of the firm, duration of the interview and interviewee's role in the firm.

Table 5.2 **The profile of the selected vendors**

Firm	Code	Services	Interviewee role	Duration Minutes
Internet and telecommunication service provider	Firm A	National and international data connectivity, Internet, WiMax, VSAT and Data centre services	Strategy & Business Development	30
Telecom and Internet service provider	Firm B	WiMax, Telecom and Internet services, 3G & 4G broadband	Store manager	36
Telecom and Internet service provider	Firm C	WiMax facilities 4 th generation wireless, fixed line, Internet phone	Sales manager	30

A qualitative approach was chosen to facilitate this study which is exploratory with the aim of understanding emerging issues within the context of the phenomena as discussed in chapter 3. The

researcher sought to study things in their natural environments which will enable the researcher to make sense of the phenomena based on the meanings people bring to them. Thus, the author set out to collect information about WiMax technology service delivery by making direct contact with the key market players.

Different perspectives were sampled in order to strength the understanding of WiMax technology market. In particular, 3 WiMax technology providers, in total representing 100% of WiMax technology market in Saudi Arabia, were chosen. These firms were chosen because they are the only WiMax technology providers in Saudi Arabia. The stakeholder participants in the investigation were comprised of two main groups representing two distinctive viewpoints. Those were, *established firms* in the telecommunications industry either offering WiMax technology as an extra service together with the Internet service provision which is their main business activity (firms A and B), or *new entrants* (firm C) that were exclusive WiMax technology providers.

Data collection was carried out using semi-structured qualitative interviews based on the presumption of the researcher having much in common with the subject, in terms of living in the same epoch and culture, and speaking common language (Lacity and Janson, 1994). The interviews were conducted over a two (2) month period lasting between 30-36 minutes, and were recorded and subsequently transcribed. a total of 36 open-ended questions in three parts formed the interview guide used for the data collection . The first part consisted of 5 general questions focusing on the firm's history, profile and business activities (5 questions). The second part was composed of 10 questions that focused on the benefits of WiMax technology use by SMEs (2 questions), WiMax technology diffusion (3 questions), organisational culture (1 question), which included the firm's strategy focused on the positioning and services offered to the SMEs (4 questions). The third part consisted of 21 questions that looked at the three dimensions of competition from the vendor's perspectives. The price factors were also looked at from the Vendors' perspective through 9 questions which focused on the customers' views on pricing strategies, awareness of consumers' need of low price, policies to keep the price of WiMax technology service low and their main plans to attract consumers such as SMEs. The views of the participants on *customisation* were also examined using 7 questions which focused on the simplicity of the service in terms of technical capability needed to use WiMax technology and maturity in using the technology. Perceived *convenience* (5 questions) was explored by asking interviewees about flexibility of WiMax technology, compatibility with the existing hardware/software to switch to WiMax technology, advantages of WiMax technology over other Internet technologies and about the quality of the service.

The aim of the initial analysis of the data set collected was the identification of how vendors strategise for the adoption of WiMax technology. This alternative reading of the field data helped in developing

the researcher interest in using the disruptive innovation theory which necessitated the application of the ease-of-use dimension, argued as the foremost theoretical tool in the analysis. The evolvement of the analysis also prompted the researcher to apply a “second read” data analysis approach (Barrett and Walsham, 1999; Walsham, 2002; Christiansen and Vendelø, 2003).

The “second read” approach gave the opportunity for further analysis through careful reading. The field notes and transcribed interviews were reflected upon to extract the key perceptions underlying diffusion of WiMax technology for SMEs. The relevant themes were therefore extracted based on the three dimensions of competition that formed the theoretical base.

Moreover, issues related to the importance of WiMax technology to SMEs, the organisational cultural profile and issues raised during the interviews will be discussed as well. The findings from the vendors’ perspective are discussed in the following sections. **Table 5.3** presents the factors that are investigated regarding the vendors commercialisation strategies. This section has been used to discuss the study approach of this research the next section therefore will present the vendors’ views on disruptive nature of WiMax technology for SMEs and the analysis.

Table 5.3 Factors investigated regarding vendors' commercialisation strategies

Framework Dimensions	Factors investigated	Source	Further issues found during interviews
Vendors' commercialisation strategies	<ul style="list-style-type: none"> • Convenience <ul style="list-style-type: none"> ○ Flexibility ○ Compatibility ○ Advantages of WiMax technology over other services ○ Quality of service • Customisation <ul style="list-style-type: none"> ○ Simplicity of WiMax and awareness of consumers' requirements (Technical capability needed to use WiMax technology, maturity in using WiMax technology) • Cost of use <ul style="list-style-type: none"> ○ Pricing of the services ○ Awareness of consumers' need of low price ○ Policies to attract consumers such as economic packages or bundles ○ Awareness of other competitors 	<p>Christensen et al. (2004)</p> <p>Schmidt and Druhl, (2008).</p>	<ul style="list-style-type: none"> • Benefits of WiMax technology use by SMEs • People involved in WiMax technology diffusion to SMEs • Organisational issue

5.2.1 Convenience of WiMax Technology

The World Wide Web has started its journey only two decades ago, but its connectivity is transforming daily in countless ways. Reliable and faster connection can make various activities like education and business easier. Earlier networks allowed people to communicate as they moved about town, but the fourth-generation WiMax technology now makes it possible to deal with nearly any online task while on-the-go. Fast and easy wireless Internet connection can provide better facility for shopping and checking any update. Improved convenience is virtually helping every area of life. Convenience of WiMax technology is related to the wireless connection and from the vendor's agenda it was backward compatibility with wireless network effects (Enderle, 2007).

There is also a relationship between flexibility of product use and its compatibility with other communication services due to the prevailing effects of the networking. This relationship is also noted to determine the convenience of the product (Katz and Shapiro, 1994). SMEs may wish to adopt WiMax technology but they may not be willing to change their existing hardware/software. Thus, for WiMax technology to be successful, its compatibility with existing hardware/software is crucial as this will also enhance the reduction of the importance of critical mass for WiMax technology diffusion (Mahler and Rogers, 1999). This will also ensure that consumers will not lose the benefits of their existing hardware/software as they switch to the new service. In addition, compatibility may reduce WiMax technology vendor's investments focused on attracting new customers from the existing operator's market base (Shapiro and Varian, 1998). This research elaborates on convenience and issues affecting it, in the case of WiMax technology by looking at vendors' perceptions of compatibility, flexibility, advantages of WiMax over other Internet technologies and quality of service.

- **Flexibility of WiMax technology adoption**

Research findings indicate that, using the existing hardware and software and spending almost same amount of money as DSL, WiMax technology could be adopted by SMEs. Based on this compatibility, it is considered that WiMax adoption is flexible enough. WiMax could be varied depending on the requirements and expectations of customers (Jasinskas & Simanaviciene, 2008). A VP of Strategy & Business Development in firm A said "*flexibility of WiMax depends on the offered product and services. In general, WiMax technology can offer QOS (Quality of Service) that might be of the need to the customer*". He added that, the speed and quality of WiMax is better than DSL. All the vendors mentioned similar views to that of firm A. The findings showed that WiMax provides reliable service for customers. Also, customers in Saudi Arabia have more than one vendor for WiMax. So, that will increase market competition and may lead to better service and not monopoly.

However, they have only one vendor for DSL that creates a monopoly in the market. Moreover, DSL is distance sensitive whilst with WiMax the issue is better managed through proper planning. Considering these issues all WiMax vendors claimed that, the adoption of WiMax technology by SMEs could be flexible.

- **Customer satisfaction in terms of compatibility**

Customer satisfaction is almost dependent on the technological compatibility. According to Murillo & Lozano, depending on the implementation of the updated technologies, hardware and software could be changed and it can lead to extra budget for any organisation (2006). A respondent of firm A said *“WiMax is compatible as connectivity done through standard Ethernet interface and because of IP native technology”*. Firm B added that *“WiMax is very compatible with any PC that’s why it is better than DSL and there is no difficulty to use this technology”*. All vendors think that, WiMax does not require any additional training or program for assistant. Firm C also mentioned that, WiMax is very compatible with any PC. Clients need only the provided modem and the device will start to work after plugging into electricity. According to the sales manager in firm C *“Anybody with a simple idea of using computer will be able to use WiMax”*.

All vendors have customer care and support section that is made available to help their clients with any technical enquiries. Clients can phone them up or go themselves to get such help. Also, all the firms are providing the necessary information that their clients need to know about WiMax before purchasing the service. Moreover, if the signal is poor in the customer area, vendors provide them a special device to strengthen the signal. Additionally, SMEs can come to the vendor’s technical department if they have any problem with devices like modem and vendors fix it for clients free of charge. WiMax providers are providing many services and support to the consumers by their existing policy. All vendors think that the user has the right to test and try the WiMax before subscriptions.

All WiMax technology vendors claimed that they are providing a good service and WiMax technology could be compatible among a large number of customers especially for the SMEs.

- **Advantages of WiMax technology over other services**

Technology is making any business easier and creating good communications among firms, customers and suppliers. According to firm A *“if it is retail, then WiMax can serve well in Point of Sale solution requirements”*. Buying and selling via the Internet, e-commerce could be faster. Similarly, firm B expressed that, *“if SMEs need the Internet, WiMax remains the best for them”*. The respondent of firm C has commented similarly to the second respondent. According to him, any company including

SMEs needs Internet, fax and telephone and all of these are provided by these vendors. WiMax will help SMEs to trade faster and easier via the Internet and will link the branches together. He added, *“WiMax technology can help to save time, money and effort”*.

There are some features of the WiMax technology that is going to be expanded through various organisations. According to firm A *“This technology is not distance sensitive and can provide various facilities easier than DSL”*. The result showed that WiMax facilitates reliable service and has more than one vendor in Saudi Arabia. WiMax is increasing market competition which would lead to better service. It is being used because of its flexibility and can be accessed anywhere as long as there is a WiMax tower. Moreover, it is hassle free and easy to use. It does not need cables or landlines and is a fully Wireless technology. This technology is faster than the DSL and reliable and works on any computer. Its Quality of service is better than DSL and flexible packages suit everyone’s needs. The speed of WiMax comes to 512 MB – 1GB, 2 MB and DSL 4 MB. However, WiMax speed is reliable and DSL is distance sensitive that affects the speed. WiMax vendors claim to provide faster and reliable services among various types of customers including SMEs with affordable prices.

- **Quality of the service**

Quality of the Internet service is very important for any business. In the small and medium enterprises quality of service is used effectively and so it is considered as an important factor (Perrini, et al., 2007). During the interviews the quality of WiMax service has been highlighted by all the vendors’ representatives as an important issue for WiMax adoption. Firm A said that, *“We are providing good quality services to our SMEs customers in order to please them”*. WiMax is considered as being better quality in the market in comparison to other Internet connections. A store manager in firm B said that *“WiMax compared to DSL being a suitable price for the quality of service”*. According to the firm B this quality depends on various factors such as the strength of the WiMax signal and reliability of service. For firm B *“quality of WiMax service depends on the deployment of WiMax around the country”*. This vendor has special devices that help to strengthen the signals when it is poor. So, if the user lives in the area with good coverage he/she will receive a good quality of service. According to him, to attract more consumers they need to provide strong signal with faster speed and good coverage. Quality of WiMax service is good if the users live in a good coverage area. Some additional devices like internal and external modem could be used for increasing the speed of the connection. The respondent of firm C mentioned that *“quality of service is good as long as the WiMax tower coverage is good”*.

The result showed that quality of WiMax is very important for the vendors to be able to compete with the other Internet services. It demonstrates that WiMax provides clients with good quality

communication service over the other Internet connections in Saudi Arabia. All vendors claimed that, the good quality service could attract a large number of Internet users including SMEs.

5.2.2 Cost of WiMax Technology

Business success, most of the time, depends on the pricing policies of any particular organisation (Sueyoshi et al., 2010). Therefore, pricing of WiMax could be an important factor that might hinder SMEs from adopting the technology in Saudi Arabia. WiMax could be expanded faster in KSA if the service providers offer a good service with a similar price to DSL. The ease of use dimension is related to the low-end disruption strategy (Christensen et al., 2004; Schmidt and Druehl, 2008). In this research, it is measured in terms of convenience, customisation and cost of use. Organisations attempt to compete on the ease of use dimension after having competed on functionalities and reliability of the product that offered added value to consumers. Price competition therefore seems to be the strongest signal of low-end disruptive strategy in the ease of use dimension. Improvements on convenience and customisation create value for the users and indicate business opportunities for vendors to generate revenue by serving the undershot segment (Christensen et al., 2004). This research focuses on the issues of price in the case of WiMax technology by examining vendors' perceptions of cost of the services, awareness of consumers' need of low price, policies to attract consumer such as economic packages or bundles and awareness of other competitors as discussed earlier.

Pricing of the services

In the technological issue price is considered as an important factor (Vijay and Subhash, 1993). Different opinions are found from the respondents of this research. According to the respondent from firm A, "*WiMax connection is not cheaper than DSL and prices are almost the same*". That means, in some instances where DSL bundles are considered, WiMax can be more expensive than DSL. Moreover, firm B expressed that "*WiMax compared to DSL being a suitable price for the quality of service*". This firm offers WiMax with reasonable price comparing to the good quality service. The respondent from firm C expressed a similar opinion to firm B's representative. However, comparing the quality of the service WiMax is better than DSL. Depending on the pricing policies services could be varied. Pricing policies of these three vendors also differ from one another. From firm A, it was found that their pricing is 200 SR (Saudi Riyal) per 2Mbps per month and from firm B it costs 269 SR. The second firm also provides 24 hours free to experience the service in terms of coverage and speed. There is also the flexibility to subscribe for a month or more, depending on customer needs. Various additional packages are available in firm C. This firm is providing various ranges of services considering speed, price and duration.

Cost of services varies depending on the vendors and services. It is one of the most important issues for expanding the WiMax business over the Kingdom of Saudi Arabia.

- **Awareness of consumers' need of low price**

Pricing is an important issue for satisfying customer expectations. All the vendors think about it before delivering services to customers and are always aware of pricing strategies (Rauterkus, 2009). The respondent of firm A mentioned that, they are aware of the consumer's need of low price. Some firms have particular department for price control. According to firm B, *"we have a special department in our company that monitors the competitors' offers so that we can keep up with the market"*. Most of the companies are trying to provide services with reasonable prices considering the competitors. Based on it, firm C expressed, *"we are trying to offer customer a reasonable price"*.

All of the WiMax Internet service providers are aware of providing services with lower prices and it could lead to some barriers for the WiMax vendors to expand their technology over the whole country.

- **Policies to attract consumers such as economic packages or bundles**

In order to attract more consumers, many firms try to keep their prices affordable to the consumers. For keeping the prices affordable to all users most of the firms are trying to implement their own policies (Pedersen, 2009). Firm A mentioned that, *"we offer reasonable prices from day 1 of the product definition and our differentiation is true for customer support and value added services"*. Firm B said that *"we do not have our specific policies but we offer reasonable prices from day 1 that we introduced the service"*. This firm tries to keep the prices affordable for all of their clients. The respondent of firm C said that, they have no specific policies. This firm needed to raise the price of WiMax at the beginning to cover the cost of production. However, price was reduced after WiMax became known and the vendors had subscribers.

"Lower pricing policies could be helpful for organisations to attract more customers especially SMEs. So, every organisation should have effective pricing policies considering their competitors and current demand. We maintain the quality of service differentiation with affordable pricing, in order to keep our exiting consumers and attract new ones" (VP Strategy & Business development, firm A).

Moreover, economical packages could attract more customers than general packages (Rogoff, et al., 2004). Vendors of WiMax in Saudi Arabia try to please their clients from the beginning. *"We try to please the clients from the beginning so we offer them good with a good quality of service to gain their satisfaction and to keep them as valued customers"*, (sales manager, firm C). Firm A mentioned

that, “*we are providing multi-site connectivity solution for various types of customers in the SMEs sector*”. The respondent B expressed that they are trying to offer their customer reasonable prices and the same answer is found from the respondent C. “*For the new clients, we have very good offers in comparison to DSL*” (store manager, firm B). For example if any client is subscribed with one vendor for one month they give the client 10 days free, for 6 months 2 months free and for one year contract 5 months free. Some of them also attract new users by offering mobile devices as an optional with the Internet services.

The vendors are making some efforts in order to attract new customers. Yet, SMEs have been especially targeted from these vendors. “*Promotional offers or lower prices bundles could catch the attention of the new customers such as SMEs but the vendors could make more efforts to attract them. Vendors need to pay more attention to SMEs by have a special offers that suites their needs and goes with their low budget*” (Store manager, Firm B).

- **Awareness of other competitors**

For providing the services among a large number of customers most of the companies are following their competitor’s pricing and pricing policies (Yu et al., 2006). Vendors are also imposing prices on their services considering competitors. Firm A was agreeing with it and according to this respondent “*there are some additional departments in many organisations for monitoring competitor’s activities*”. Moreover, the firm B mentioned that “*we have a special department in our company for monitoring the competitors’ offers so, that we can keep up with the market*”. Almost the same information from firm B was found in firm C. These firms are comparing their prices with competitors in order to keep the WiMax prices affordable to consumers. They are trying to reduce the prices of their products to attract the largest possible number of customers.

It was found from various respondents that all of them are aware of their competitors and their pricing policies. That could help to keep the price of WiMax service affordable to a large number of consumers including SMEs.

5.2.3 Customisation of WiMax Technology

Customisation therefore examines the fitness and how a product meets up with the requirements of the customers’ idiosyncratic jobs (Christensen et al., 2004: pp.12). WiMax technology presents bases for direct comparison with other Internet technologies giving the consumers the opportunity to refer to the latter while evaluating the former which underlines the importance of switching costs (Klemperer, 1987). An example is where consumers cannot easily use the new technology because of the requirement for training where the value of customisation may decrease. It becomes more

complicated where the consumers are not familiar with computing technology and there is large incompatibility between WiMax technology and existing experience with other Internet technologies. The diffusion process in the residential market may thereby be slowed down by the high switching costs experienced by consumers (Varshney et al., 2002; Corrocher, 2003). Customisation of WiMax service is mostly focused on meeting the consumers' need to effectively access the services through the provision of required technology and infrastructure (Nielsen and Thomsen, 2009). Thus, this research addresses customisation in the light of vendors' perceptions of the simplicity of WiMax in terms of technical capability needed to use WiMax technology by SMEs and maturity in using the technology.

Simplicity of WiMax technology and awareness of consumers' requirements

Easy use or simplicity can help any organisation to be favourable among all types of customers and in the technological sector it could have significant impact (Tse and Soufani, 2003). It will be discussed in terms of technical capability required by the consumer to use the service and maturity in using the WiMax technology.

- ***Technical capability needed to use WiMax technology***

The respondent of firm A said, "*WiMax is compatible as connectivity done through standard Ethernet interface and is IP native technology*". Firm B added that "*WiMax is very compatible with any PC and that's why it is better than DSL*". Moreover, the respondent from Firm C mentioned that "*WiMax is very compatible with any PC and clients need only the provided modem*". WiMax customers do not need any training programs and anyone with a simple idea of using computer will be able to use it. This simplicity of use can help WiMax to be expanded easily among large number of customers including SMEs.

Various strategies could be helpful for the service providers for the diffusion of WiMax as mentioned in the literature review chapter. According to the respondent from Firm A, "*WiMax is quicker to rollout and based on that, its diffusion is faster than other wire line technologies*". The respondent from Firm B added that, "*there is an agreement between all WiMax service providers to work on comprehensive WiMax coverage for all the regions in Saudi Arabia*". It will help in WiMax diffusion in Saudi Arabia. The respondent from Firm C is not aware about any plan, they might have but as the respondent is a sales manager and he denied talking about this issue. However, their company aim is to become one of the largest telecommunication service providers by optimizing their resources and introducing world leading technologies. These organisations are committed to serving the community by revolutionising the telecommunication standards in the Kingdom of Saudi Arabia. They are also committed for providing world class services to their customers.

All vendors claimed that, WiMax technology is compatible with any PC and it does not need any training programs for the consumers and SMEs could adopt it even with limited computer skills.

- ***Maturity in using WiMax technology***

There are various policies to implement new technologies over other technologies (Murillo and Lozano, 2006). According to the vendor A *“the technology consideration will directly impact price and quality of service”*. Firm B mentioned that *“our company has policy to focus on a technology over another whenever required”*. For example, they were not focusing on WiMax on the last few years because their service was not ready and good enough to present it to the users. But this year they are focusing on WiMax broadband more than they had in the previous years. They had a problem with coverage in the beginning; therefore they did not carry out any advertisements/marketing for WiMax. This firm did not want to provide poor service to their customers unless they can cover the areas with the WiMax signals particularly in Jeddah and Riyadh. From the respondent of firm C it was found that their company is providing WiMax (4th Generation Wireless) since it established in 2007. So, their main focus was WiMax technology from the beginning.

Firm B claimed that, WiMax vendors who are established for a long time focusing on the WiMax or their main business is to provide WiMax services could be more matured to deal with issues that might affect the adoption of this new technology. Moreover, vendors could be more aware of their consumer's expectations and demands.

5.2.4 Further Issues Raised During the Interviews with the Vendors

The researcher has found some issues that surfaced during the interviews with the WiMax vendor representatives in Saudi Arabia. These issues will be discussed in this section.

- ***Benefits of WiMax technology use by SMEs***

All of the Saudi WiMax vendors who participated in this research strongly recommended the WiMax technology for many reasons. *“SMEs requirements such as speed and connectivity can be perfectly met by WiMax technology”* (Firm A representative, 2011). WiMax vendors believe that, the wireless broadband which is offered by WiMax technology has more features than other Internet connections in Saudi Arabia. According to WiMax vendors, WiMax technology is easier to use than DSL and more flexible. Saudi WiMax overcomes the problems of the other Internet connections such as DSL considering the poor infrastructure. Also, WiMax comes at an affordable price that suits the majority of business budgets including SMEs. *“WiMax is very good service to help SMEs to improve the way of doing business. WiMax clients don't need a land line to able to receive the services. So, it's more*

flexible than DSL” (Firm C, 2011). *“WiMax is a wireless technology which does not need any extension and easy to use for SMEs. It is better than DSL and does not need training to be able to install it”* (Firm B, 2011). They believe that WiMax has a quicker rollout than other Internet connections. So, its diffusion is faster than other wire line technologies. Consequently, there is a WiMax demand from SMEs but it is not as expected. *“As WiMax vendors, we are not targeting SMEs; we always focus on big companies and individuals. That might be the reason of the slow rate of WiMax adoption by SMEs”* (Firm B, 2011).

- **WiMax technology diffusion to SMEs**

The research findings from the vendor perspectives indicate that, there are lot of people involved in the diffusion of WiMax to SMEs. All the WiMax vendors believe that, they are the main responsible factor for WiMax diffusion to SMEs. Moreover, Firm B believes that, CITC as a government sector has a role in the ICTs deployment in Saudi Arabia. As CITC is responsible for licensing of new technologies, it could also play an important role in spreading citizen awareness about new technologies. Social culture and negative or positive reputation of the WiMax service could play a role in the WiMax diffusion. Another factor that could encourage SMEs to adopt WiMax is advertisement via various social media such as TV, newspaper, radio, websites, Facebook and twitter.

It seems that, WiMax vendors’ opinion is divided regarding the current government policies. Firm A think that, the existing Saudi government policies support the WiMax diffusion. *“In Saudi Arabia, the government follow a technology neutral regulation which helps a lot to diffuse new technologies such as WiMax”* (Firm A, 2011). However, firm B think that, the current Saudi government policies are not effective enough to support the WiMax diffusion to SMEs. *“The current regulations and restrictions that have been imposed by CITC and the bureaucracy system are hindering the spread of WiMax service in the Kingdom comparing with other countries. For example, the government has restricted the WiMax towers in certain areas. That’s causing weakness in signals of the WiMax coverage”* (Firm B, 2011).

- **Organisational culture issue**

Furthermore, all of the Saudi WiMax vendors believe that the adoption of WiMax by SMEs could be driven by the type of their organisational culture and type of their business. For them WiMax adoption depends on the SMEs’ needs for the technology. Therefore, norms, beliefs and attitudes of the people in the SMEs could have impact on the adoption of WiMax. People in SMEs are few and they are less complex than bigger organisations and that helps in taking quick decision for adopting new technologies such as WiMax. However, they need to be educated and ready to adopt the new technology as well. *“SMEs ICTs requirements are usually less complex than bigger organisations”*

(Firm A, 2011). Consequently, this confirms the findings that have been discussed in chapter 4 regarding the impact of organisational culture type.

5.3 Data Analysis Considering the Government Policies

This section presents Saudi government's views and perceptions of the six identified dimensions of institutional theory by King et al. (1994) on WiMax technology diffusion to SMEs as discussed in chapter 2. The researcher has carried out interviews with five government representatives from different government agencies such as the Communications and Information Technology Commission (CITC) and Ministry of Communications and Information Technology (MCIT)

Different views and perspectives were taken and examined for a better understanding of WiMax technology diffusion to SMEs. The researcher has conducted interviews among five government representatives. In particular, 1 MCTI and 4 CITIC representatives were chosen. These representatives were chosen because they are the main government agencies that are responsible for ICTs diffusion and regulation in Saudi. The government representatives are coded as G1, G2, G3, G4 and G5. G1 is the senior advisor of the CITC, G2 is the Deputy Governor, G3 is a consultant, G4 is the manager of licensing and G5 is the director general for the e-government program. **Table 5.4** shows the profile of each government representatives.

Table 5.4 The profile of the selected government agencies

Government Agency	Respondent coding	Interviewee role	Duration (Minutes)
CITC, Riyadh, SA	G1	Advisor	39
CITC, Riyadh, SA	G2	Representative from Deputy Governor	36
CITC, Riyadh, SA	G3	Consultant	30
CITC, Riyadh, SA	G4	Infrastructure	50
MCIT, Riyadh, SA	G5	Representative from the e-government program	90

Semi-structured qualitative interview was used as the main technique for data collection based on the presumption of the researcher having much in common with the subject, in terms of living in the same epoch and culture, and speaking common language (Lacity and Janson, 1994). The interviews were conducted over a two (2) month period. The interviews lasted between 39-90 minutes, and were recorded and subsequently transcribed. The interview guide is composed of a total of 14 open-ended questions in two parts. The first part consisted of 3 general questions focusing on the government's agents profile and their roles. The second part included 11 questions that focused on the benefits of Internet technology use by SMEs (2 questions), Internet technology diffusion to SMEs (3 questions), as well as 6 questions that examined government views of the six dimensions of institutional theory by King et al. (1994).

The aim of the initial analysis of the data set collected was the identification of how vendors strategise for the adoption of WiMax technology. This alternative reading of the field data helped in developing the researcher interest in using the institutional theory, argued as the foremost theoretical tool in the analysis of the six dimensions. These dimensions as described by King et al. (1994) are knowledge building, knowledge deployment, subsidy, mobilisation, innovation directive and standard setting dimensions. Most of these dimensions possess sub dimensions and have been considered for the effectiveness of the research. Moreover, some issues that have been discovered during the interviews would be analysed as well. The field data were analysed by careful reading. The field notes and transcribed interviews were also reflected upon to extract the key perceptions underlying diffusion of WiMax technology for SMEs. The relevant themes were therefore extracted based on the six dimensions of competition that formed the theoretical base. The findings from the government representatives will be discussed in the following sections. **Table 5.5** presents the factors that have been investigated regarding government policies.

Table 5.5 Factors investigated regarding government policies

Framework Dimensions	Factors investigated	Source	Further issues found during interviews
Government policies	<ul style="list-style-type: none"> • Knowledge building <ul style="list-style-type: none"> ○ Investments in extending the WiMax infrastructure nationwide ○ Investments in scientific and technical research • Knowledge deployment <ul style="list-style-type: none"> ○ Training programs • Subsidy <ul style="list-style-type: none"> ○ Indirect and direct finance • Mobilisation <ul style="list-style-type: none"> ○ Awareness of new technology • Standard setting <ul style="list-style-type: none"> ○ Infrastructure ○ Pricing • Innovation directive <ul style="list-style-type: none"> ○ e-government 	King et al. (1994)	<ul style="list-style-type: none"> • SMEs and Internet use • People involved in WiMax diffusion to SMEs • Taxation

5.3.1 Knowledge Building

Knowledge building is usually undertaken to provide the base of scientific and technical knowledge that would enhance any exploitation of innovations or production,. Knowledge building therefore is typically in the form of sponsored research carried out by universities or research institutions. It generally happens in the form of the supply side influences (King et al., 1994).

Most of the developed countries like UK have their updated technological policies and these policies are imposed by the government of those countries (Choudrie and Papazafeiropoulou, 2007)

Technological policies are also found in the Kingdom of Saudi Arabia. However, findings show that, they do not have updated policies for the development of technological infrastructure. In this dimension investments in extending the WiMax infrastructure would be analysed based on the different opinions of the government representatives.

- **Investments in extending the WiMax infrastructure nationwide**

Most of the Western European countries are investing in technological infrastructure development (Nielsen and Thomsen, 2009) and as a developing country the investment of KSA is lower compared to other developed countries. The Saudi government has set up the communication and information technology commission (CITC) as a regulatory body for the telecommunication and information technology industries of the entire country.

The Saudi government is seeking to extend the Internet infrastructure development by establishing new policies, plans and strategies in the entire country (CITC, 2011). Moreover, the government of Saudi Arabia is fully aware of the importance of the access of ICT service for all segments of Saudi society. Therefore, in 2006, the Saudi government has established the Universal Access and Universal Service Policy (USF) to ensure ICT services among 100% of the population. . The USF shall focus on funding new services and/or networks to provide universal access or universal service to geographic areas that are in the commercially unprofitable and the undeserved zone. These funds are provided for pursuant to either: (i) a roll-out obligation included as a license condition for one or more service providers or, (ii) a designation of one or more service providers by the commission as a “Universal Service Provider” under the telecommunication Bylaw (CITC, 2012).

Research findings show that all of the government representatives also believe that there are some strategies, plans and also funds for developing Internet infrastructure in Saudi Arabia including rural areas. According to G2, Saudi government has two main strategies to ensure widespread availability of the Internet connection. Firstly, they have implemented the universal service fund which depends on taking 1% revenue from all the Internet operators. This collected revenue is used to create network in rural areas that are not feasible businesswise. The Saudi government has 200 million dollars budget for Internet service providers who are going to extend their services in the rural areas. Secondly, this government representative mentioned that, the Saudi government is trying to increase the rate of broadband adoption within the country. They do not have strategies for widespread wireless broadband connection such as WiMax in Saudi Arabia.

- **Investments in scientific and technical research**

Saudi government has therefore recognised the role and importance of technology in knowledge building and has made provision for the funding of scientific and technical studies. The Kingdom of Saudi Arabia is witnessing remarkable growth and development in information and communication technology sector. Therefore, the Saudi government has taken some effective actions to promote an enabling environment for information and communication technologies within the country. In response to this directive, the Saudi government has invented a comprehensive ICT plan for the Kingdom. The National Communications and Information Technology Plan (NCITP) have been prepared by the Saudi government through direct participation of academics, private sector and governmental agencies. The ICT plan consists of a long term vision for twenty five years which is segmented into two sections. In the first section the vision is predicted for twenty and in the second section it is predicted for five years for ICT in the Kingdom of Saudi Arabia (MCIT, 2011).

The Saudi government recently announced a budget in the information and communication technologies sector that would hit SR50 billion by the year 2015 (Reid, 2011). Moreover, CITC sector in Saudi Arabia is following the National ICT plan which holds a number of initiatives. Under the umbrella of national ICT plan, there are a number of initiatives in the pipeline. These initiatives include various studies on Internet research, general studies in the development of ICTs marketing in Saudi Arabia and studies related to technical and scientific development. Moreover, the Saudi government is providing research facilities in the health and education sector. The government is also ensuring the research for the centre of statistics and ministry of family and planning. Saudi government also shares research with various Internet service providers to help them be aware of their consumer's demands.

The Saudi government possesses some institutions including King Abdul Aziz City for Science and Technology (KACST), Dhahran Techno-Valley (DTV), Riyadh Technology Incubation Centre (RTIC) and the Saudi Arabian Business Innovation Research Program (SBIR).

KACST is located in Riyadh and has funds to support research on science in general and IT in particular. DTV was established by King Fahd University of Petroleum and Minerals (KFUPM) to encourage more active research, researchers and for development centres of both local and international companies to enhance new business development. The main aim of the SBIR program is to encourage the foundation and growth of technology-based companies. Moreover, they are providing solutions to government needs and encouraging competition between firms. The program supports the development of Saudi through funding for initiative research and technology development (KACST, 2012).

G4 also claimed that, *“there are on-going studies about Internet usage in Saudi Arabia. The government is using advisors to help them with these studies to identify the requirements of Saudi ICT market”*. These studies could be helpful for service providers in diffusion of the Internet service including WiMax. Moreover, these studies would help Internet service providers to extend their services in the rural areas and to solve the issues regarding Internet usage in Saudi Arabia.

The wireless technologies turn out to be critical in our modern society. As highly accentuated by several researchers – ‘Wireless’ is the future of broadband technology (Ganapati and Schoepp, 2008; Jindal et al., 2005). It certainly offers several advantages over the wired connections for Internet access such as greater mobility and flexibility, so that wireless devices can be used in the field for various purposes (Ganapati and Schoepp, 2008).

However, findings show that there are no updated policies or investment planning of KSA government for technological infrastructure development. The respondent G1 mentioned that *“in terms of telecom infrastructure and broadband, the government do not have any infrastructure and operation. We do only policy and regulation. We leave all it completely to the investors in private sectors”*. Respondent G1 thinks that Saudi government should invest in extending the Internet infrastructure within the country. He also recommended such a project to help Saudi people to adopt the Internet. Moreover, he added that such a project would help the SMEs to adopt new technologies. *“In Saudi Arabia we do not have any plan to invest in extending the wireless broadband Internet connection infrastructure like other developed countries”* (G1, Advisor).

The adoption of wireless broadband connection is increasing in Saudi Arabia. 51% of all broadband connections in Saudi Arabia are wireless broadband (Maravedis, 2010). Despite this high rate of wireless Internet connections adoption, WiMax is still at low rate. Though some strategies and plans are made for extending Internet infrastructure as mentioned earlier, the WiMax technology is still not adopted much by Saudi citizens including SMEs. Therefore, Saudi Government could pay more attention to the wireless Internet connections such as WiMax to enhance economic competition and improve the quality of life. All government agents claimed that, adoption of Internet technologies such as WiMax could help SMEs to improve their business activities which could help the development of Saudi economy.

5.3.2 Knowledge Deployment

Dissemination of new knowledge is stimulated by knowledge deployment. General provision of education to people or through the official system such as universities, schools is the most common and acceptable form of knowledge deployment. Temporary training is also included in the knowledge

deployment (King et al., 1994). Under the knowledge deployment dimension the researcher has analysed various plan initiatives for assisting the government for fulfilling its goal.

Recently, the government of Saudi in acknowledging the role and importance of technology in knowledge deployment has made provision for the funding of education on ICTs. It is implemented by various government departments such as the ministry of Information Technology (MCIT) and the Economy and Planning Minister for the Kingdom.

In order to minimise computer illiteracy in Saudi Arabia, MCIT has launched e-training caravans. This program is targeting the low-income people in the rural areas and students at the beginning and intermediate level in the general education. The e-training caravan provides effective training to the targeted people to learn the basic skills of using computer and Internet (MCIT, 2012).

Moreover, the MCIT has initiated the Dissemination of Digital Culture and Knowledge Lectures (DDCKL). This initiative promotes the importance of implementation of information technology to types of community members with focusing on young generation. This project is targeting school, college and university students including visitors of local festivals, sports clubs visitors, exhibitions and variety of conferences and symposia. DDCKL has several training programs for the targeted segments. It is introducing the importance and applications of telecommunications and information technology in society. It is also increasing the awareness of the positive and negative aspects of the use of communication and information technology to the targeted groups. Moreover, DDCKL is providing information about Internet user's security/privacy; computer crimes issues and the concerned regulations and legislation (MCIT, 2012).

The Economy and Planning Minister for the Kingdom of the Saudi Arabia recently announced a budget in the information and communication technologies sector that would hit SR50 billion by the year 2015. The ministry of the Economy and Planning noted that the ICT investment in applications and services should reach SR 37 billion until 2013, which will help create the opportunity for more growth and enhance development (Reid, 2011).

Among all the initiatives mentioned earlier, the researcher has not found any ICT training program which is targeting SMEs. The Saudi government has recognised the importance of SMEs and their requirements including training, finance and business services. Moreover, the country has the largest number of support programs for public and private sector SME (SUSRIS.com, 2011). However, the research result shows that, there is a lack of ICTs knowledge deployment to SMEs. None of these programs are targeting SMEs and their ICTs needs. According to G2 *"We don't have policies of ICTs or technological support for SMEs; we are just doing research about them. We are trying to develop a project to understand how SMEs work and to identify why SMEs don't use technology but we could*

not execute because of cost". Various financial sources could help in new technologies adoption in Saudi Arabia. According to the respondent G1 *"There are a lot of talks to enhance government to invest in education on ICTs"*. However, he is not aware of any investments that have been made in Internet and ICTs education in public schools. He said *"it should be a mission to target all schools from the elementary school to high school and also private school should take care of ICTs applications"*. He thinks more efforts should be made in this field.

It seems that the government agents' opinion is divided-- 3 of them think that, Saudi government has not effectively addressed the needs of ICTs to SMEs and a new approach could be developed for tackling these issues.

5.3.3 Subsidy

Subsidy is related to support for innovators for helping them minimise the risks or costs related to information technology adoption (King et al., 1994).

Sometimes government provides various extra facilities to the technology providers. Service providers could be funded for promotional activities in order to extend ICTs activities to large number population (Pedersen, 2009). This subsidy dimension of the government will be discussed considering the funding for any research projects related to technology adoption and some issues related to awareness and promotions of new technology.

Most of the governments of the developed countries have specific funding for research works and this funding could be helpful for adoption of new technology (Nielsen and Thomsen, 2009). There are some organisations like Dhahran Techno- Valley in KSA for doing research on technology. Some funds are also provided by the government for running technological research. The Saudi government is indirectly helping others through their research but not helping directly by giving effective initiatives to SMEs.

The second respondent G2 pointed out that *"King Abdul Aziz City for Science and Technology in Riyadh has funds to support research on sciences in general and IT is a part of this research"*. He also added that, King Abdul Aziz City for Science and Technology have allocated funds to support such kind of research in other cities such as Jeddah. Currently, numbers of funds in values have been allocated to develop research bodies. Such as Dhahran Techno-Valley (DTV) is a business cluster located in Dhahran, Saudi Arabia. DTV was recently established by the King Fahd University of Petroleum and Minerals (KFUPM) to encourage research and the development centres of local and international companies and to enhance new business development. It is to be regarded as a leading research and technology development nucleus to be given comprehensive business support. There is

also a project called SBIR which is a portal setup by the government for Small Business Innovation Research (SBIR) Information. Such projects could be indirectly encouraging SMEs to adopt Internet connection to their business.

In Saudi Arabia, Internet subscription including DSL, wireless broadband such as WiMax and other fixed lines have been increased to around 2.13 million at the end of 2011 (MCIT, 2012). With the response of the public demand for wireless and fixed broadband connections, a market-led approach is favoured by the Saudi government (MCIT, 2012). Therefore, various subsidies have been initiated by Saudi public/private sectors such as USF. As mentioned earlier, the USF is funding new services and/or networks that are provided by innovators to deliver universal access or universal service to geographic areas that are in the commercially unprofitable and the underserved zone. These funds are provided for pursuant to either: (i) a roll-out obligation included as a license condition for one or more service providers or, (ii) a designation of one or more service providers by the commission as a “Universal Service Provider” under the telecommunication Bylaw (CITC, 2012). *“We have implemented the universal service fund that take 1% revenue from all the operators and this revenue is used to create network in rural areas that are not business wise feasible. The government has 200 million dollars budget to support Internet vendors to extend their services in the rural areas”*, (G2, Representative from Deputy Governor).

The SMEs sector is being given increasing importance and financial support in Saudi Arabia. Through training and guidance to help SMEs contribute to the development of the economy, many subsidies have been provided by the Saudi government as well as the private sectors (Tago, 2012). For example, in financing SMEs, the Saudi Credit and Savings bank are playing important roles. They have invested SR4 billion for supporting 21,000 SMEs. For Saudis, these banking sectors are also providing job opportunities. Moreover, a program launched by the Ministry of Finance for Saudi SMEs in order to support them financially has been extended to around SR5 billion. The Saudi Industrial Development Fund (SIDF) is also helping in financing SMEs (Tago, 2012).

“Our target in 2030 is to raise the role of SMES to account for 33% of total national output and 57% for the Saudi workforce. And to achieve this target, we propose to take a number of initiatives”

(Minister of Finance Ibrahim Al-Assaf, Saudi Arabia, Arab News, Feb 8, 2012 00:41).

The Saudi government has recognised the funding problems of the inventors. Consequently, the government has taken a program for this purpose which is now under study. The Agricultural Development Fund is supporting the SMEs who are involved in the agricultural sector. Moreover, various private sectors are involved in financing SMEs such Bab-Rizq Jamil and many others (Tago, 2012).

However, there is no a particular funds to support SMEs to become more competitive by adopting reliable Internet connections such as WiMax. Even though, all the subsidies that have been given by the Saudi public and private sectors to support SMEs, there is no particular effective action for the ICTs deployment to them. The research findings indicate that, there no policies have been implemented by the Saudi government in relation to Internet diffusion to SMEs. Moreover, from the research findings it was found that, government policies towards ICTs diffusion to Saudi SMEs could be a major factor to encourage them to adopt suitable Internet connections such as WiMax. *“Number of countries have allocated government funds to help spread broadband network including wireless, fibre and other Internet connections to SMEs. However, in the Saudi Arabia we do not have any subsidies to support SMEs Internet adoption. I think that, such a subsidy would help SMEs to adopt new technologies like WiMax”* (G1, 2011). It has been mentioned by another government representative that there is no policies to support for SMEs to help them to adopt ICTs facilities. *“We don’t have policies of ICTs or technological support for SMEs”* (G2, 2011).

5.3.4 Mobilisation

Mobilisation is responsible for encouraging decentralisation and it encourages those organisations to take innovation in a positive way. Awareness and promotional campaigns are the main institutional tools for mobilisation (King et al., 1994).

The Saudi government uses different promotional campaigns to boost Internet use among the Saudi citizens. These promotional policies and campaigns involve Internet literacy and IT literacy programs that targeting particular segments of Saudi population. These segments include the low-income people in the rural areas and students at the beginning and intermediate level in the general education excluding SMEs. For example, the Saudi MCIT has launched *e-training caravans*. It provides the effective training to the targeted people to learn the basic skills of using computer and Internet (MCIT, 2012).

Moreover, the Saudi government has initiated another project called *DDCKL* that targets school, college and university students including visitors of local festivals, sports clubs visitors, exhibitions and variety of conferences and symposia. The main goal of this project is to promote the importance of implementation of information technology to variety of community members with a focus on the young generation (MCIT, 2012).

Furthermore, the government of Saudi Arabia has recognised the importance of media role in wide-spreading the technological awareness amongst populations. In response to this issue the government has established a foundation for media processors to look at issues of communication and information technology (MCIT, 2012). This program is targeting editors of local newspapers particularly with

technical information pages are encouraged publish articles for increasing the public awareness of ICT. It is also encouraging editors to publish in selected journals particularly in ICTs. The main goal of this program is to outline the roles played by information and communication technology in the contemporary societies. Moreover, it is also to have a proper understanding of the needs of media coverage in terms of the application of communication and information technology which will also provide the awareness and understanding of how ICT can help out in the media. This creates required skills and necessary public awareness. This program also converses the mechanisms for obtaining the targets of the media contribution in society awareness (MCIT, 2012).

The above mentioned initiatives were established in the end of 2011. However, these initiatives are taken by the Saudi Arabia but not effective to date. The research that has been conducted during 2010-2011 indicates that, Saudi SMEs are not aware of the latest technology such as WiMax technology that has been launched in the country. The researcher has found from the research data that, there is no particular technological awareness program for SMEs. According to a government advisor, *“In Saudi Arabia we don’t have any plan to ensure SMEs awareness of ICTs. I think we should have such a plan to give more technological options to SMEs in order to help them for adopting the suitable technology”* (G1, 2011).

5.3.5 Standard Setting

As a form of regulation the main aim of the standard setting is to indicate the constraining options of actors that are decentralised and organisations involved in the defined larger social or institutional objectives. It can have the force of law or can be by voluntary completely (King et al., 1994).

For making any effective infrastructure most of the European countries and Korea are reviewing their current technologies for implementing new technologies (Hauser, 2003). For standard setting current infrastructure and pricing policies are important and these two issues will be discussed under this dimension.

In the Saudi Arabia CITC is the regulator of the information and communications technology sector. In order to provide the basis for regulatory framework of the CITC sector, the Telecommunications Act and its Bylaws have been enacted in 2001-2002. These include a wide range of objectives including provision of advanced, sufficient and affordable communications services; creating the proper climate to encourage fair competition; utilising frequencies efficiently, transferring telecommunications technology and keeping breast with its developments, and realising clarity and transparency in processes procedures, in addition to achieving the principles of equality and non-discrimination and protecting the public interest as well as the interests of users and investors (CITC, 2012).

CITC has many important responsibilities related to ICTs regulations in Saudi Arabia. For example, CITC is responsible of licensing, pricing of ICTs services, protection of users' right, supervision and management of the national numbering plan, setting service quality standards and managing frequency spectrum. As a form of regulation the main aim of the standard setting is to indicate the constraining options of actors that are decentralised and organisations involved in the defined larger social or institutional objectives. It can have the force of law or can be by voluntary completely (King et al., 1994).

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In the Saudi Arabia CITC is the regulator of the information and communications technology sector. In order to provide the foundation for the required regulatory framework of the CITC sector, the Telecommunications Act and its Bylaws have been enacted in 2001-2002. These include a wide range of objectives such as the provision of affordable communications services that are advanced and sufficient for the needs of the society; the creation of a fair competition encouraging climate; efficient use of frequencies, transferring and keeping abreast with telecommunication technology developments, and realising clarity of processes and transparency of procedures. This is done with a view of establishing equality and non-discrimination principles as well as providing protection for the public and users/investors' interest (CITC, 2012).

CITC has many important responsibilities related to ICTs regulations in Saudi Arabia. For example, CITC is responsible of licensing, pricing of ICT's services, users' right protection, monitoring and management of the national numbering plan, setting service quality standards and managing frequency spectrum.

For setting service quality standards, CITC has established regulatory standards to ensure a minimum quality of service provided by ICT services providers. Moreover, the CITC is ensuring the international standard of safety radiation levels by conducting periodic field measurements of radiofrequency (RF) radiation levels (field measurement programs) in collaboration with academic and research institutions in the Saudi Arabia. The measurements are meant to verify the performance of wireless operators and service providers in meeting CITC guidelines for limiting exposure from wireless base stations. Moreover, CITC has developed the National Frequency Plan (NFP) to allocate the radio frequency spectrum bands (CITC, 2012).

Pricing is one of the most important factors for adopting any new technology. Technological adoption could be faster if prices are kept affordable. If good pricing policies are implemented then adoption of new technology could be adopted easily (Passerini et al., 2004).

The research findings indicate that, no policies have been implemented by the Saudi government in related to pricing of Internet services for SMEs. *“The price of Internet service is high. By CITC regulations only educational institutions get special rates from Internet providers but not other organisations such as SMEs. Government cannot force Internet service providers to keep the price affordable to SMES and they don’t have the right to do that”* (G1, 2011). The representative G2 opined similarly to the respondent G1 by saying that, Saudi government does not have policies to support SMEs. They only have policies for education institutions. *“The service providers should give at least 30% discount for educational and research institutions. For SMEs we don’t do that, but we try to achieve that by competitors”*. He also mentioned that, to keep the price affordable for consumers in general, it depends on the highest service providing operator in stock in the market like STC provider. This operator puts a price limit on Internet services. *“The top Internet service provider in Saudi market is controlling the cost by putting a price cap so that other providers cannot charge above that price cap. Other providers have to comply with price cap. Service providers have policies just to keep the price not too high for the consumers but they are not targeting SMEs”* (G2, 2011).

As mentioned earlier CITC is the responsible body for managing tariffs of information technology services. The duty of CITC is to provide high quality and affordable ICT services in all parts of the Kingdom by monitoring the permanent and temporary telecom service tariff offers to ensure affordable ICTs services prices that are based on CITC regulations and are fair for all users (CITC, 2012).

CITC publishes all approved service providers’ offers and prices in their website. However, these offers might be not available for various people including SMEs. Only people who have Internet access will be aware of these regulations. The research findings indicate that majority of the Saudi SMEs are not aware of the approved service providers prices. *“If you want to look at the ICT bundle or ICT price baskets you need to have computer and Internet access”* (G3, 2011).

Research findings indicate that, increasing the number of the Internet service providers in Saudi Arabia will make the prices of Internet more affordable to the populations including SMEs. It might encourage SMEs to adopt new technologies such as WiMax. *“Having many Internet service providers in the Saudi market indirectly has helped to reduce the Internet prices”* (G3, 2011).

5.3.6 Innovation Directive

Innovation directive is a command to produce innovations and to use these innovations to specifically facilitate production by engaging in some activities. Innovative and effective direction could be helpful for the adoption of new technology (King et al., 1994). Under the innovation directive mainly the e-government initiatives and its role in new technologies adoption such as WiMax will be discussed in this section.

Some effective initiatives can make any new technology adoption easier and most countries of the world are taking some initiatives for adoption of new technology (MacInnes et al., 2002). The Kingdom of Saudi Arabia is not far from it. Various e-government initiatives have been taken by several sectors in Saudi Arabia. *“The Saudi government has collaborated with educational institutions to provide IT literacy for primary school and vocational institutions. In last 3 years the government has a program to connect various primary schools through network to share information. An on-going project for higher education to collaborate is taken by the Saudi government. SA is hungry for knowledge so, for development the government has taken some initiatives such as e-government”*, (G3, 2011).

The e-government program ‘Yesser’ is a part of many initiatives and projects adopted by the Saudi government designed to achieve sustainable growth and development in all aspects of Saudi life. Saudi life. The main objective of ‘Yesser’ is to raise the productivity and efficiency of the public sector. Moreover, it is responsible for providing better and easier services for individual and business customers. It is also responsible for providing the updated required information to the public. The executive plan for the e-government program is published on the website in both English and Arabic (MCIT, 2012).

Some additional important initiatives to develop the information technology sector have been implemented by the CITC. CITC plays a vital role in developing IT sector in the Kingdom of Saudi Arabia by implementing nationally adopted policies, plans and programs; stimulating and encouraging investment in the IT industry; and closely working with relevant authorities to promote the use of e-commerce. CITC works with the public and private organisations in order to implement the IT strategies. These IT strategies are implemented through launching some e-commerce initiatives, conducting studies and holding conferences, seminars and workshops (CITC, 2012).

However, the research finding indicates that, the Saudi e-government program has a slow progression. *“There are a few number of government applications that could be done online. The e-government programme has impetus goals but the progress is not fast as anybody would expect”* (G1, 2011). Moreover, an effective e-government program could be a reason to enforce the population including

SMEs to adopt reliable Internet services such as WiMax. *“If all the government transactions go online, surely that will encourage SMEs to adopt the Internet connection such as WiMax. Gradually, that will lead SMEs to use another applications including e-commerce”* (G1, 2011). The role of the e-government in the adoption of Internet connections by SMEs has been emphasised by the most government representatives who have participated in this research. *“Government will force SMEs to adopt new technologies by automating all the Ministries and also integrating the system as one. So, the government play a great role in diffusion IT by SMEs”* (G2, 2011). The Saudi government should streamline procedures to facilitate web service to SMEs such as licensing. These procedures could force SMEs to adopt new technologies to help them to do their e-government activities effectively. *“The licensing activity through Internet could force SMEs to adopt Internet. The e-government should activate electronic transactions between individual and government, government to government and government to business to push public and private sectors such as SMEs to be online”* (G5, 2011).

5.3.7 Further Issues Surfaced from the Government Representatives during the Research

The researcher has identified some further issues that surfaced during the interviews with the government representatives of Saudi Arabia. These issues will be discussed in this section.

- **SMEs and Internet use**

All of the government representatives who participated in this research strongly recommended the Internet for SMEs including WiMax. *“I don’t imagine any SMEs without Internet connection because it is very important nowadays”* (G5, 2011). *“Using IT in general is a basic requirement to improve any kind of business”* (G2, 2011). The research findings also indicate that, reliable Internet service with good quality and affordable price would encourage population including SMEs to adopt it. *“Businesses including SMEs don’t care about the types of Internet connections whether Wi-Fi, WiMax, DSL. Consumers care about quality of service, cost and reliability”* (G5, 2011).

Moreover, these government representatives strongly believe that using Internet is essential part of SMEs for improving their business. They also think that would enable e-commerce activities in future. *“I recommend Internet for SMEs to increase the access of information to the market, could be connected to their suppliers. Internet adoption could make SMEs to go online and enable e-commerce”* (G1, 2011). However, SMEs should employ the Internet connections such as WiMax for achieving their target and improving the way of their business. A good Internet connection such as WiMax could encourage SMEs for e-commerce implementation. *“Internet gives SMEs the ordinary mechanism to do their business but it doesn’t improve their troop. SMEs need to use the Internet effectively for their business”* (G2, 2011).

Furthermore, CITC government representatives were neutral in their opinion about types of Internet connections. They have not recommended any one particular Internet connection over another such as WiMax. *“CITC is neutral about any kind of ICTs technologies. SMEs have to pick the technology that suits their needs and the best Internet connections available for them”* (G4, 2011). *“We don’t consider a type of technology over another. We announced a ‘Watan’ regime talks about being a technology moral”* (G1, 2011).

- **Internet technologies diffusion to SMEs**

The research findings from the government perspectives indicate that, there are lot of people involved in the Internet technologies diffusion to SMEs. For example, CITC itself, Chamber of Commerce, service providers, suppliers, private sectors, private partnership and Ministry of Commerce are responsible for Internet deployment. Moreover, the educational institutions have roles to raise the awareness of ICTs to the Saudi population. Furthermore, the ministry of telecommunication has a responsibility for facilitating the availability of new services over the country. *“I think collective efforts from different stakeholders for Internet diffusion to SMEs”* (G1, 2011).

According to the representative G2, Chambers of Commerce and CITC and private sectors could be factors that encourage people to adopt technology including Internet. For example, Saudi Aramco as a giant petroleum company could play a role in e-commerce deployment in Saudi Arabia. By offering affordable online business opportunities for SMEs could attract them to adopt latest Internet connection such as WiMax to be able to cope with the current market competition. *“In Saudi Aramco if anybody wants to apply for any of their tenders for purchasing, they have to do it electronically, all the bidding happens electronically. This is because Aramco is a big power; they do billions and billions of dollars of purchasing per year. So anybody who wants to get a piece of the pie will have to be e-connected”* (G2, 2011).

However, representative G3 thinks that, not only private sectors can play a role in the Internet diffusion to SMEs in Saudi Arabia. He also, emphasises the importance of SMEs roles in Internet adoption by them. According to him, *“Anyone who has knowledge and wants to start business is responsible for Internet adoption. SMEs should educate themselves and needed to be aware of the latest technologies that can help them to improve their traditional way of doing business”*.

The research findings show that, the demand for new technology could be driven by awareness, SMEs understanding of the importance of this new technology for their business. The supply issues for the Internet vendors include speed of the Internet service, connectivity and consumer requirement awareness. *“The diffusion of Internet services to SMEs depends on supply and demand issues”* (G2, 2011). The market demand also has an impact on the Internet diffusion. *“Any new technology*

diffusion based on the business opportunity; in Saudi Arabia we have a few number of Internet operators that compete in the market. I think whenever, those operators feel there is a consumer demand for certain new technology they would jump on it” (G1, 2011).

- **Taxation**

If any new technology could be implemented over the whole country then, it could be familiar to all easily and availability can help to adopt new technology easily (Passerini and Patten, 2005).

The research findings indicate that, there might be a relation between tax and adoption of Internet in Saudi Arabia. The taxation system in Saudi Arabia is different from other countries. Tax is not imposed individually unless there is no commercial product included in their business. This Tax on commercial products is termed as Zakat under the religion obligation (DZIT, 2012).

Some of the government representatives believe that, applying efficient taxation system in Saudi Arabia could be helpful for Internet adoption. They think that, government could encourage different types of organisations including SMEs to adopt Internet by giving them more financial options. For example, they can exempt their tax for adopting ICTs. This government incentive could help SMEs in Saudi Arabia for adopting ICTs applications. *“One thing that we don’t have in Saudi Arabia and the other world has is tax. I think using efficient tax system or some additional options such as financial exemption could be helpful to motivate SMEs to adopt Internet connections such as WiMax ” (G1, 2011).*

5.4 Data Analysis of SMEs’ Perspectives

The SMEs that have been considered in this research are from varying sectors ranging from advertising, health and beauty, electronic retail, maintenance and creative industries. The researcher has interviewed 5 SMEs with 4 WiMax non-adopters and 1 WiMax adopter. These SMEs were chosen because they participated in the first phase of this study and they agreed to be interviewed in the second phase. These SMEs are coded as SME1, SME2, SME3, SME4 and SME5. The detail profiles of the SMEs are provided in the following **table 5.6**.

Table 5.6 The profile of the selected SMEs

Organisation	Code	Interviewee	Business sector	IT background	Internet connectivity	Duration (minutes)
Advertising & PR and Marketing	SME1	Partner	Organising celebrations, events	No	No	80
Health & Beauty	SME2	Partner	Skin Care	Yes	Yes, DSL	90
Wholesale and retail	SME3	Owner	Electric equipment	Yes	Yes, DSL	45
Other services	SME4	Manager	Air conditioner maintenance	Yes	Yes, DSL	39
Creative industry	SME5	Manager	Creativity in the arts in the field of vision, visual relationship	Yes	Yes, WiMax	60

An approach chosen for the exploratory study investigating WiMax technology adoption by SMEs was the qualitative. Different views and perspectives of consumers were examined have a better of the understanding of WiMax technology adoption by SMEs. In particular, 1 WiMax technology adopter and 4 non-adopters were chosen. The participants were sorted and grouped into two main groups: adopter and non-adopter of WiMax technology.

Semi-structured qualitative interview was used as the main technique for data collection with all interviews lasting between 39-90 minutes, were recorded and subsequently transcribed. The interview guide is composed of a total of 22 open-ended questions for the adopter of WiMax technology and 11 questions for non-adopters. The questions included views of the three dimensions of competition and government policies.

Semi-structured interviews have been conducted with the WiMax adopters/ non-adopter SMEs managers/representatives/owners in order to assess the reasons for adopting or non-adopting the technology. Based on the research framework as mentioned in chapter 2, the researcher has sampled various issues related to vendor's strategies, government policies to find out the impact of these factors on the WiMax technology adoption by SMEs. Issues related to organisational cultures that have been raised from the first phase of data analysis have been investigated as well.

The initial analysis of the empirical data was focused on the identification of vendors' strategies technology and the government policies that have an impact on the WiMax technology adoption by SMEs. This alternative reading of the field data helped in developing the researcher interest in using the disruptive innovation theory and applying the ease-of-use dimension, argued as the foremost theoretical tool in the analysis of the six dimensions. These dimensions are knowledge building, knowledge deployment, subsidy, mobilisation, innovation directive and standard setting dimensions. The field data were analysed by careful reading. The field notes and transcribed interviews were also reflected upon to extract the key perceptions underlying diffusion of WiMax technology for SMEs. The relevant themes were therefore extracted based on the six dimensions of competition that formed the theoretical base.

Adoption of new technology in the SMEs is affected by various factors like vendors providing the new technology, government rules, regulations and facilities and it is also related to various cultural activities. Analysis of the data considering the SMEs will be discussed based on the same dimensions of the distributive and institutional theories. Moreover, some issues that have been discovered during the interviews will also be discussed. The findings from the SMEs will be demonstrated in the following sections. **Table 5.7** presents the factors that are analysed in this section.

Table 5.7 Factors investigated regarding SMEs views on vendors' strategies & government policies

Framework Dimension	Factors investigated	Source	Further issues found during interviews
SMEs views on vendors' strategies	<ul style="list-style-type: none"> • Convenience • Customisation • Cost of use 	Christensen et al., (2004)	<ul style="list-style-type: none"> • Organisational culture issue • Social cultural issues: Herd culture / Bandwagon • Consumer right protection • Experience exchange • Customer service
SMEs views on government policies	<ul style="list-style-type: none"> • Knowledge building, • Knowledge deployment • Subsidy • Mobilisation • Standard setting • Innovation directive 	King et al. (1994)	

5.4.1 SMEs Views on Vendors Strategies

Considering the SMEs there are some issues like convenience, pricing and customisation of WiMax will be analysed in the next sections based on the opinions of respondents of the SMEs.

- **Convenience of WiMax**

Convenience of WiMax technology will be analysed based on the sub-dimensions under flexibility, compatibility, advantage of WiMax over other services and quality of service.

According to the SME5 manager, WiMax is very flexible, reliable, compatible and reasonable in terms of costs. He added no training is needed to use the service. There is no need of additional hardware and software to use WiMax. According to SME5, *“You just need a modem to receive the WiMax signal which is provided by the service provider”*.

Quality of the Internet service is very important for any business. In the small and medium enterprises quality of service is very important to surf the Internet. Therefore, quality of Internet service is considered as an important factor for Internet adoption such as WiMax by SMEs (Perrini, *et al.*,

2007). The research findings also indicate that, SMEs consider the quality of WiMax technology as an important issue that could have an impact on their adoption of this technology.

All of the SMEs believe that, if WiMax provides a good quality that can help them to improve their business, they would not hesitate to adopt it. *“If WiMax has good quality and make me able to contact with customers and suppliers efficiently, I will not hesitate to adopt this new technology”* (SME1, 2011). SME 4 said, *“If WiMax help us to communicate with wholesalers without travelling, save our time, money and comes with good quality I will definitely adopt it”* (2011). According to the SME3 *“Good quality of WiMax can help me to improve my business and it can efficiently create network between my business branches”* (2011).

The research results indicate that Saudi WiMax technology comes with good quality comparing with other existing Internet connections. SME5, who is WiMax adopter, highlighted that using WiMax has improved his work performance. SME5 is involved in creative industries which need high speed Internet connection. According to the SME5 manager, *“WiMax is reliable and comes with good quality service that improved our ability to communicate with other organisations and has saved up on the cost of sending post mail”* (2011). Furthermore, the WiMax quality and good speed of this technology might help SMEs who are involved in creative industries to download and upload the media files that they need for their business without any hassle. *“WiMax is time saving technology as we can do all our business activities online without the need to make a physical journey”* (SME5, 2011). By using WiMax this creative business is able to communicate with both their suppliers and customers online. For them WiMax is reliable, flexible, cheaper, easier to use and better quality than other Internet connections that they have used in the past.

Consequently, quality of WiMax technology seemed to be very critical issue for SMEs to adopt it. Both WiMax adopters and non-adopters of Saudi SMEs emphasised on the importance of the quality of Internet connection. Good quality of Internet connection service could encourage Saudi SMEs to adopt WiMax technology. From the research findings it could be concluded that, the quality of the Saudi WiMax is good enough which could encourage SMEs to adopt it.

From the research findings it was found that, in comparison to other Internet connections such as DSL in Saudi Arabia, WiMax service is considered to be better due to cost, speed of Internet, reliability, low risk of malfunctioning, customer satisfaction, less time consuming and good communication. The manager of SME5 said, *“WiMax is easy to move from one place to another comparing to other Internet connections, I had used the WiMax facilities in the same day with the same connection while transferring my workplace”*. He added that, *“the speed of WiMax is real and good, you will get same speed as provided”*. However, he has mentioned that, vendors should make WiMax service easy to

subscribe and it should be hassle free to join with the service provider. For SME5 customer service and technical support are very important issues. He said, *“in order to retain WiMax customer, service providers should make some efforts to build trust between them and their customers by providing honest and good customer service”*.

The research findings show that, WiMax in Saudi Arabia seems to be good enough in terms of flexibility, advantages of WiMax over other services and compatibility. It was also found that, the creative industry such as SME5 needs high speed Internet to upload and download information from the server. Therefore, creative industries SMEs are more likely to adopt high speed Internet connection like WiMax rather than other industries. *“You do not need any training to use WiMax. It is a great service and convenient and helping me to download and upload information easily. It saves your time because you don't have to wait for long time to be online like DSL”* (SME5, Manager).

The lack of computer literacy/IT background could be a reason hindering the adoption of new technology such as WiMax (Al-Gahtani, 2004). The SME1 mentioned that *“I have not adopted WiMax technology because I do not have IT background and do not know how to use the Internet”*. His negative experience with one of the telecommunications companies in Saudi Arabia kept him away from adopting any Internet service. His concerns were about high bills and insufficient services. From his experience it he found that the Internet service in Saudi Arabia has some problems. Among the problems are disruptions in service, speed of the service; lack of maintenance and customer service quality are the most important.

All SMEs who participated in this study think that, the lack of Internet knowledge and awareness of new Internet services also creates barriers for adopting the new technologies like WiMax. A partner of the SME2 said that *“if WiMax providers sent a representative who can explain me the benefit of using the technology then I will adopt it”*. Moreover, SME4 manager said almost same thing as SME2 and he also added that, *“people have fear from the things they don't know”*. For SME3 owner, the reliability of service is very important. Similar to SME1 he also added that, depending on the business needs he could be forced to adopt new technology such as WiMax to improve his business.

Research findings indicate that, SMEs who are non-adopters of WiMax technology could adopt it in the future in order to satisfy their clients. Also, business demand could enforce them to adopt a good quality Internet connection that can help them to expand their business. They could be WiMax adopters if they knew about the benefits of using this technology before purchasing the service. *“If I have more than one shop and I want to connect them to a single network then, it is better to adopt reliable Internet connection that would help me to improve my business”* (SME3 owner). *“I will be*

happy to adopt WiMax if my clients ask me to do so. I will do that just to please them and not to lose their loyalty”, (SME1, partner).

- **Cost of WiMax technology**

Pricing of WiMax will be analysed under the sub-dimensions cost of the service and policies that vendors use to attract SMEs such as economic packages or bundles. According to SME5, WiMax pricing is mostly reasonable, affordable for SMEs and fair enough for the quality of service considering cost. *“It is reasonable in price and it is affordable by 85%, a very good price, cheaper than DSL”* (SME5, Manager).

Convenience and pricing of WiMax are related to the adoption of new technology (Greenwood and Levin, 2008). The research findings also highlighted the importance of these two factors on the WiMax adoption by Saudi SMEs. All of the non-adopters WiMax Saudi SMEs representatives believe that, the cost of Internet service is an important factor to adopt new technology. Pricing and convenience of technology are related to each other. According to the SME3 *“if WiMax give a good quality and reasonable price I will adopt it”*. However, the SME4 managers said that, *“there is no guarantee if I paid lots of money, I will receive a good service in return”*.

Both SMEs adopter and non-adopter of WiMax believe that the service providers should make some efforts to target them. They believe that, they should have some economical bundles and SME2 representative said *“The WiMax providers should also provide us special offer such as giving a free month to try their service”*. He also added that *“we are always scared of the unfamiliar things including new technologies”*. According to the SME5, *“In order to encourage SMEs to adopt WiMax, service providers should provide economic bundles, packages, promotions and offers to attract more people and add values to their customers”*. From the result it could be deduced that, these offers will increase the rate of WiMax adoption by Saudi SMEs.

Moreover, all the SMEs who have participated in the research interviews believe that, vendors should have a return policy. According to them, that would help SMEs to experience WiMax before purchase, and they would be able to judge the service. This will not happen unless the WiMax providers have a plan to provide a free service for a period of time. *“We need to try WiMax before buy it, people always scared of the things that they don't know or unfamiliar with including new technologies”* (SME2, Partner).

- **Customisation of WiMax technology**

As mentioned earlier in the vendor's section, customisation of WiMax services is mostly focused on meeting the consumers' requirement and expectations in terms of their technology and infrastructure needs required to aid access to the services. This dimension will be analysed based on the simplicity of the service and consumer awareness.

The simplicity of the WiMax can be confirmed by the SMEs who are already using the service. The researcher has analysed this factor according to SME5's point of view. The research findings indicate that, WiMax is very easy to use in terms of simplicity. Additionally, it is not difficult to set up and install WiMax equipment in SMEs. According to SME5, *"WiMax is very simple and easy to use. There is no need to develop or buy any software/hardware to be able to use the service. Once you purchase the service you can start using it straight away"*. It was also found from the research data that, WiMax does not require any additional training programme. *"WiMax does not require technician to operate it and any person with basic knowledge of using computer can use it"* (SME5, Manager).

The SMEs awareness of WiMax technology have been analysed based on adopter and non-adopter of the technology. There are various respondents involved in the awareness of WiMax to SMEs and vendor is one of the important factors. All of the SMEs who participated in the research interviews have mentioned that there is a lack of awareness regarding WiMax technology. The SME1 said that *"as one of the owners of advertising & PR and marketing SMEs, I don't know that WiMax technology is existed or not in Saudi Arabia"*. Also, most of SMEs have mentioned that Internet service providers do not pay attention to SMEs. The SME3 expressed that *"I do not know about the WiMax technology at all and I know nothing about its prices"*. Moreover, SME4 added that the service providers have a significant role in the advertising. He said, *"I haven't seen any advertisement about WiMax; even as a normal user I didn't hear or see anything about WiMax"*.

From the research data it was also found that, the SME4 does not use the WiMax because he does not know about it. The manager of SME4 believes that, the service providers did not announce it properly. For example, SME2 pointed out that a sales representative of one of the telecommunication companies in Jeddah came to the organisation to tell him about Wi-Fi and its advantages. The representative offered the service and explained that it is free of charge if any customers have a mobile contract with their company. So, he joined them because it was free. *"If WiMax providers sent me a representative who explained me the benefit of using the technology and he convinced me to join the service, I will adopt it."* (SME2, Partner).

The first time the WiMax non-adopters SMEs heard about the technology was from the researcher. All SMEs who participated in this study believe that, for creating awareness the WiMax vendors should work on advertisement targeting their requirements. *“Vendors should make some efforts to ensure awareness of WiMax to SMEs. They also should care about providing a good service because the good reputation of the service encourages the people to adopt it”* (SME1, partner)

The owner of the SME3 who agreed with SME1 said *“the Internet service providers always target big companies”*. Both SMEs adopter and non-adopters of WiMax think that the reason behind the lack of awareness of WiMax technology is vendor’s strategies. According to the manager of SME5, *“Vendors are always looking for the great profit and SMEs are not included in their agenda”*. He added that, the WiMax vendors are not interested in SMEs because they have a good number of subscribers from other sectors. SME2 added that, *“I believe that the reason behind the low rate of Internet adoption by SMEs is because the Internet service providers don’t pay attention to us”*. SME2 added that *“WiMax service providers must pay more attention to advertising and customer service”*.

Additionally, the SME3 said *“the WiMax vendors do not pay attention to SMEs at all”*. The SME4 expressed his opinion like SME3 and according to him *“vendors do not pay attention to SMEs and I haven’t seen any ads made especially for SMEs”*. SME4 thinks that, SMEs will adopt the latest technologies that can help their organisation to exchange experiences with other organisations. *‘If WiMax technology improve the performance of their business then adoption could be easier’* (SME4, manager).

From the research findings it could be concluded that, WiMax is easy to use and does not need any additional equipment and training program to be able to use the service. Consequently, SME5 claimed that, SMEs could be encouraged to adopt the technology because of the simplicity and ease of use. Computer literacy is not a barrier for adoption of WiMax by Saudi SMEs, he added.

Moreover, all SMEs highlighted that, the rate of WiMax technology adoption by SMEs would be increased if WiMax providers ensure awareness to them. They think that, by putting some efforts in advertising on TV, newspapers or sending some representatives from WiMax vendors to SMEs may make Saudi SMEs aware of the new technologies that have been established in the country. All SMEs who participated in this study believe that, service providers should think to have some special offers for them that suits their budget and needs and that could encourage them to adopt the technology.

5.4.2 SMEs Views on Government Policies

Various dimensions like knowledge building, mobilisation, innovation directive and subsidy (discussed in the literature review) were found from the respondents of SMEs in Jeddah regarding the government policies. These dimensions are analysed below:

- **Knowledge deployment and mobilisation**

It has been found from the research findings that, the Saudi government has taken some steps for the knowledge deployment and mobilisation of ICTs. In order to minimise computer illiteracy in Saudi Arabia, MCIT has launched some initiatives such as caravans designed for e-training and the transfer / dissemination of Digital Culture and Knowledge Lectures. Furthermore, the government of Saudi Arabia has recognised the importance of media role in wide-spreading the technological awareness amongst populations. In response to this issue the government has established institutions to enhance the basic foundations of media processors to highlight the issues of communication and information technology (MCIT, 2012).

Moreover, all SMEs who participated in this study believe that, the major players that have a role in WiMax diffusion to them are government, service providers and private institutions. According to the SME3 *“The service providers through advertising; competitors and government have big roles in the technology diffusion”*. All of the SMEs strongly believe that, the roles of government and large private institution are very important in ICTs diffusion to SMEs as well. They think if ICTs training programs and latest technologies awareness could be provided by the Saudi public and private sectors then, it could be helpful for SMEs to adopt a new technology such as WiMax. *“If the government in corporation with the large companies and the communications technology providers in Saudi Arabia pay attention to SMEs and try to make an annual training courses for them that will increase the efficiency and development of the way of doing business. Also, it will increase the SMEs awareness of the latest available technologies in the Kingdom”* (SME2, 2011). He also mentioned that, in Saudi Arabia, there is a social service provided by the National Bank but it is not for all SMEs. They are only providing training sessions for the best hundred SME projects in KSA. He thinks that, these courses are good for SMEs to develop their projects and he hopes the Saudi government could provide fund for such training courses.

Even though, the government of Saudi Arabia has recognised the importance of media role in wide-spreading the technological awareness amongst populations, Saudi SMEs are not included in their plan. It has been found from the research findings that, all of the SMEs do not know about any new technologies that have been established in the country. Saudi SMEs highlighted that, there is no advertisement of these new technologies via mass media such as TV, radio and newspapers. *“It is the*

first time for me to hear that we have WiMax in Saudi Arabia. WiMax has not been announced well in Saudi Arabia” (SME2, 2011). SME 4 also added that “CITC as a government sector should play a role in the technology diffusion by ensuring the awareness among citizen. They should educate the people and tell them about any new technology without being biased” (2011).

- **Innovation directive**

Innovative and effective direction could be helpful for the adoption of new technology (Berger et al., 2003). Some effective initiatives can make any new technology adoption easier and most countries of the world are taking some initiatives for adoption of new technology (MacInnes et al. 2005). The Kingdom of Saudi Arabia is not far from it. Various e-government initiatives have been taken by several sectors in Saudi Arabia. . The e-government program ‘Yesser’ is a part of many initiatives and projects designed and adopted by the Saudi government to enhance sustainable growth and development in all spheres of life in Saudi.

However, the research finding indicates that, the Saudi e-government program has a slow progression. All SMEs who participated in this study also indicated that, e-government program in Saudi Arabia is not effective. They think that, activating the e-government applications could force them to adopt latest technology such as WiMax to cope with the e-government transactions. Having a good Internet connection such as WiMax is very important to efficiently serve the e-government websites. *“I think activating the role of e-government and enabling technology and communication via e-mail can force me for adopting WiMax if it is good enough” (SME2, 2011). “The existence of e-government and the presence of quick and easy services from them will encourage me to adopt the latest technology” (SME1, 2011). The SME4 mentioned that “many players such as the government by activating the e-government services, service providers, community and people can help to adopt any new technology like WiMax” (2011).*

Moreover, it is believed by the all SMEs who participated in this study that, the efficient e-government programme is considered as an important turning point in the community in all Saudi society. According to SME5, the Saudi society has a fast reaction on frequent changes of policies that might hinder them from using e-government portal in future. *“I think if the government started fragile electronic services, the citizens will be shocked and they will lose their faith on the services. Saudi people have fear of invasion of their privacy. So, e-government programme should start with a strong infrastructure which will have a good impact on the technology diffusion among people” (SME5, 2011).*

- **Subsidy**

Funding could be helpful for new technology adoption (Buch, 2003). Most of the government of the developed countries have specific funding for research works and this funding could be helpful for adoption of new technology (Nielsen and Thomsen, 2009). There are some organisations like Dhahran Techno-Valley in KSA for doing research on technology. Some funding is also provided by the government for running technological research. The Saudi government is indirectly helping others through their research but not helping directly by effective initiatives such as ICTs diffusion to SMEs.

However, the research findings indicate that SMEs are not getting any funds regarding ICTs adoption. SMEs in Saudi Arabia only get loans for establishing their business but there is no obligation to have ICT facility in their business. Some private sectors along with Saudi public sectors are providing loans to establish SMEs business such as Bab-Rizq Jameel. *“A loan could be taken from the Human Resources Development Fund (HRDAF) and Abdul Latif Jameel (Bab Rizq) programs to establish a new small to medium business but no loans for Internet adoption”* (SME2, 2011).

There is also the Centennial Fund which is an independent, non-profit organisation by Royal Decree from King Abdullah. This institution aims to support young generation to start their small businesses. However, it does not provide any loans for ICTs adoption by SMEs. SME1 thinks that *“based on my monthly report and performance they might fund me to adopt new technologies for improving the way of doing business”*. In addition, this private institution “Centennial Fund” gives SMEs free short training courses like public relations, marketing and accounting to improve the personal skills with no focus on ICT.

All SMEs who participated in this study have mentioned that, there are some obstacles in getting funds in Saudi Arabia. SME5 expressed that *“In our business we get some funds from companies and government institutions. However, we don’t get that much funds. The ministry of culture and information helps us but it is still not sufficient to sustain our business”* (2011).

Moreover, SME2 mentioned that, in Saudi Arabia, there is a social service provided by the National Bank but it is not for all SMEs. They are only providing free training sessions for the best hundred SME projects in KSA. He thinks that, such a program is good for ICTs development to SMEs. *“The Saudi government should invest in ICTs training courses that target SMEs”* (SME2, 2011).

5.4.3 Further Issues Found During the SMEs Interviews

The researcher has found some further issues that emerged during the interviews with the Saudi SMEs in Jeddah. These issues will be discussed in this section.

- **Organisational culture issue**

Management of any organisation or owner of any organisation is an important factor for new technology adoption (Nejati and Amran, 2009). Moreover, organisational culture profile could have an impact on the adoption of new technology such as WiMax as the results are shown in chapter 4. Related to the findings from chapter 4 SMEs have also emphasised the role of the management or owners on the adoption of new technology such as WiMax. All of the SMEs who participated in this study think that, the working environment of their business might affect the decision of ICTs adoption. The SME3 mentioned that *“I think different organisational cultures could have a large impact on new technology adoption”* (2011).

All of the SMEs think that, adoption of WiMax is affected by the beliefs and attitudes of the people within the organisation. According to them, adoption of new technology depends on the personality of the individual and varies from person to person. *“Some people accept the technology easily and some people get scared from trying it”* (SME4, 2011). They also think that, the knowledge and exchanging experience between staff could affect the adoption of new technology. The SME5 mentioned that, *“knowledge and experiences with others can affect the adoption of new technologies. However, I think adoption of any new technology depends on the needs of particular technology”* (2011).

Similar to the findings from chapter 4 all SMEs think that, norms, beliefs and attitudes of the people in their organisation could have impact on the adoption of WiMax technology. *“I think these factors have a significant impact on the adoption of WiMax”* (SME2, 2011). SME1 said, *“There is a great impact of norms, beliefs and attitudes on the adoption of WiMax. Every day there is a new technology and we need to cope with the change”* (2011). SME2 thinks that, advanced and modern attitudes help in the development of the way of doing business. Also, people from different cultural backgrounds within the organisation could bring new ideas to improve the business. *“I think people who are from different cultures can make me change the way of doing business. They can bring new and innovative ideas for the business that could help to adopt new technologies”* (SME2, 2011).

Moreover, SME3 think that, the owner/manager of SMEs play a big role in the adoption for any business development. SME3 think that *“There is an important role of the owner of SMEs in the technology adoption”* (2011). He also mentioned that he is the decision maker in his organisation. For example, *“I forced my staff to use the computer software to have database for the business”* (SME3, 2011). As one family, staff share ideas and views but sometimes he imposes his view on the crucial matters. Moreover, SME5 who is WiMax adopter said, *“Our management was hierarchy in the beginning and as a manager I took the risk for changing our DSL Internet connection to WiMax and I was lucky because the rest of the staff were happy about my decision”* (2011).

However, some of other SMEs think differently and according to SME1 *“owner’s role is not too important of new technology adoption. I take my staff’s opinion in everything that deals with our clients but, there are some major decisions that I make myself”* (2011). Majority of the Saudi SMEs are controlled by the clan culture as shown in the chapter 4. SMEs in a clan culture context exhibit the characteristic features of a friendly work environment, with shared values, beliefs, goals, unity and participation (Cameron and Quinn, 1999). Moreover, the interviews results indicate that most of Saudi SMEs who participated in this research have a friendly working place and they work as one family. SME2 mentioned that, *“We are working as one family, it is friendly place but in the same time everyone has role and job to do”*. SME4 also mentioned that, *“Our workplace provide family environment”* (2011). These characteristics of the clan culture could be a good environment to encourage SMEs to adopt WiMax. SME4 added that, this kind of organisational culture motivates the employee and make them come up with new ideas. SME1 said that *“if one of the staffs asked me to adopt WiMax, I will not hesitate to adopt it if it could help me to improve my business activities”* (2011). SME4 also mentioned that *“If the organisational culture is a family or friendly place it is possible that we will understand our business requirements and we will deal with any extra costs of adopting any new technology”* (2011).

Similar to the findings from chapter 4, all SMEs think that the clan organisational culture has a good impact on the adoption and use of new technology as people in the organisation share different views with each other and work as a family. According to SME5, who is a WiMax adopter, family or clan organisational culture could have an impact on the business performance. Moreover, this respondent thinks if SMEs are dominated by the hierarchy culture, the adoption of a new technology could be affected as the owner would take the decision individually. *“Our organisational culture type has been changed from hierarchy to the family culture which helped us to share ideas and we found it more effective”* (2011). Consequently, it could be concluded from the research findings that, clan culture has a positive impact on WiMax technology adoption by Saudi SMEs and that confirms the first phase findings.

- **Social cultural issues: Herd culture/Bandwagon**

The research findings indicate that, social culture could have an impact on WiMax diffusion among Saudi SMEs. All SMEs who participated in this research think that people in Saudi Arabia including SMEs get affected by each other’s opinion about any new technologies. Positive or negative impression about any kind of technology makes the people in the Saudi society think twice before purchasing it. *“People in the Saudi society play a very big role in the diffusion of the new technology. For example, BlackBerry services have expanded fast in Saudi Arabia because of people’s role”* (SME2, 2011). Additionally, the society culture and how people in Saudi Arabia perceive new

technologies might affect the adoption of WiMax by SMEs within the country. *“Service reputation among the people and if they talk about all the time makes me curious to try it”* (SME1, 2011). The other important factor that can play a possible role of the WiMax diffusion is the company's existing customers. *“When people who have adopted new technology gather and start talking about it that makes the service expansion fast. So, people help to spread the technology”* (SME3, 2011).

All SMEs who participated in this study believe that, there is a ‘herd culture’ in Saudi Arabia. For example, *“when people heard that Obama uses BlackBerry then a large number of people started to use it. If it happened with WiMax, then adoption could be easier in KSA”* (SME2, 2011). SME5 who is WiMax adopter said, *“We have a ‘herd culture’ in Saudi Arabia.” In Saudi Arabia, people copy each other’s without thinking about the advantages and disadvantages of the technology. For example lots of people bought the blackberry without knowing that much. So, people play a big role in technology diffusion”* (2011).

- **Consumer right protection**

In Saudi Arabia CITC is the regulator of the information and communications technology sector. CITC is responsible for many regulations of ICTs including the provision of affordable communications services that are advanced and sufficient for the needs of the society; the creation of a fair competition encouraging climate; efficient use of frequencies, transferring and keeping abreast with telecommunication technology developments, and realising clarity of processes and transparency of procedures. This is done with a view of establishing equality and non-discrimination principles as well as providing protection for the public and users/investors’ interest (CITC, 2011).

However, the research findings indicate that, still there is a lack of consumer right protection in Saudi Arabia. All SMEs who participated in this research strongly believe that, the Communications and Information Technology Commission (CITC) sector in the government does not apply their regulations effectively. SMEs in Saudi Arabia are not relying on new technologies because of insufficient government regulations in consumer protection. SMEs in Jeddah do not feel secure without having strict government roles that can protect them from vendors’ aggressiveness. All SMEs who participated in this study think that, the government should pay attention to this critical issue. They also think that, the government should have a special sector for monitoring the service providers. *“We need to feel secure in burying any new services and we should be ensured by the government. We need government to charge service provider if they provide poor service to citizens”* (SME2, 2011).

All SMEs believe that, the existing government regulation for consumer protection is not effective. SMEs think that, the Saudi government is not applying the data protection regulation appropriately.

“We need a consumer protection association in Saudi Arabia that is designed to ensure fair trade competition and the free flow of truthful information in the marketplace. People need to feel safe before purchasing any new product and vendors need to know their consumer rights” (SME5, 2011). SMEs think that, having an effective regulation regarding consumer right would encourage them to adopt new technologies such as WiMax without fear.

- **Experience exchange**

SMEs should collaborate and ally in order to surpass the barriers of the new economic and structural era. Due to their limited size SMEs should seek cooperation with other SMEs and related partner institutions (Karaev et al., 2007). The sharing of experience plays an important role to the creation of a useful database for practicing and exchanging experiences between SMEs and other organisations. That can help to adopt new innovations such as WiMax technology.

According to Huggins (1996) learning process of any organisation is an important issue which is formed from the cooperation. SMEs depend on their innovation capability for their survival in the marketplace (Charitoudi et al., 2011).

The research finding indicate that, exchanging experiences with the leading private institutions and other SMEs that are using the ICTs facilities could help SMEs to improve their business to be able to cope with the change. SMEs believe that, there is a gap between themselves and the large companies in Saudi Arabia. Large companies in Saudi Arabia do not cooperate with SMEs in terms of exchanging ICTs experience. Large companies and government institutions should make some efforts to encourage sharing knowledge between SMEs themselves and large organisations.

From the research it was found that, exchanging experience activities such as conferences, seminars and meetings could assemble both large companies and SMEs to share their knowledge of business and experience of ICTs usage. Moreover, according to the research finding all SMEs believe that, exchanging experiences with the leading private institutions that are using the ICTs facilities could help them to improve their business to be able to cope with them. *“The large companies in Saudi Arabia don’t help the SMEs nor cooperate with them or exchange experiences. We need such a thing to help us to improve the way of doing business and to learn from their experience”* (SME3, 2011).

All SMEs who participated in this study think that, they could be benefited from these activities by having peer to peer exchange of experience between SMEs managers themselves and large companies’ representatives. It also could create a connection between SMEs and large companies that are difficult to reach most of the time. It could also generate potential business facilities including ICTs experiences.

- **Customer service**

Customer service is the overall description of a desired relationship between a supplier and a customer. Customer satisfaction is the outcome of perceived value received by customer in a transaction or relationship, in relation to perceived service quality from the firm. This is compared to the value expected from transactions or relationships with competing related industries (Blanchard and Galloway, 2004).

In addition to that customer satisfaction should revolve around the customers and firms may have to enhance their services and go beyond meeting customer satisfaction (Scott, 2000). Customer service and satisfaction may therefore be defined by the service providers, thus customer service becomes a mean or a way to provide customer satisfaction. This implies that superior customer satisfaction may be built and enhanced with a good customer relationship (Azaddin, 2004).

Research findings also highlighted the importance of the customer service in technology adoption. It was found from the research that, Internet service in Saudi Arabia has some problems. Among these problems lack of maintenance and customer service quality are the most important issues for SMEs. For SMEs customer service and technical support are very important issues. All SMEs who participated in this study think that, in order to retain WiMax customer, service providers should make some efforts to build trust between them and their customers by providing honest and good customer service. *“The main thing that can make me change my Internet service provider is the customer service. I need honest and helpful customer service that can help me to get reliable service”* (SME5, manager).

5.5 Conclusion

In this chapter of the research various factors related to the adoption of WiMax technology are discussed. For making the research effective various respondents are interviewed. The researcher has conducted semi-structured interviews among three WiMax vendors, five government representatives and five SMEs who participated in the first phase of this research. Vendors' views are analysed based on the disruptive theory dimensions including convenience, cost and customisation of WiMax. Each dimension has been analysed considering critical sub-dimensions related to WiMax adoption by SMEs.

The research findings from vendors show that, WiMax technology has come with effective features that overcome the existing problems of other Internet connections in Saudi Arabia. WiMax is faster, cost effective, flexible and easy to use. As most of the vendors are providing good services, so

WiMax could be compatible among a large number of customers especially for the SMEs. WiMax vendors claimed to provide faster and reliable services among various types of customers including SMEs with affordable prices. It was found from various vendors that all of them are aware of their competitors and are making some efforts in order to attract new customers.

Moreover, it has also been found that, the Saudi government has established many initiatives towards ICTs diffusion to the population. The SMEs sector is being given increasing importance and financial support in Saudi Arabia. Through training and guidance, the Saudi government and the private sectors have made many subsidies to help SMEs contribute to the development of the economy.

However, the research findings indicate that SMEs have not been especially targeted by the WiMax vendors and Saudi government. Among all the subsidies that have been made by the Saudi's public and private sectors to support SMEs, there is no particular effective action for the ICTs deployment to them. It has been found from the research that, no effective policies have been implemented by the Saudi government in relation to Internet diffusion to SMEs. Moreover, from the research findings it was found that, government policies towards ICTs diffusion to Saudi SMEs could be a major factor to encourage them to adopt suitable Internet connections such as WiMax. Moreover, WiMax vendors need to pay more attention to SMEs by having special offers that suit their needs and goes with their low budget.

Some additional important issues such as customer service, herd culture, taxation, customer right protection, experience exchange and effective government roles related to WiMax adoption by SMEs have been found during the research interviews. The importance of these issues for WiMax adoption have been emphasised by WiMax vendors, SMEs and government agencies. Discussion on the findings from chapters 4 and 5 would be presented in chapter 6.



CHAPTER 6: DISCUSSION

6.1 Introduction

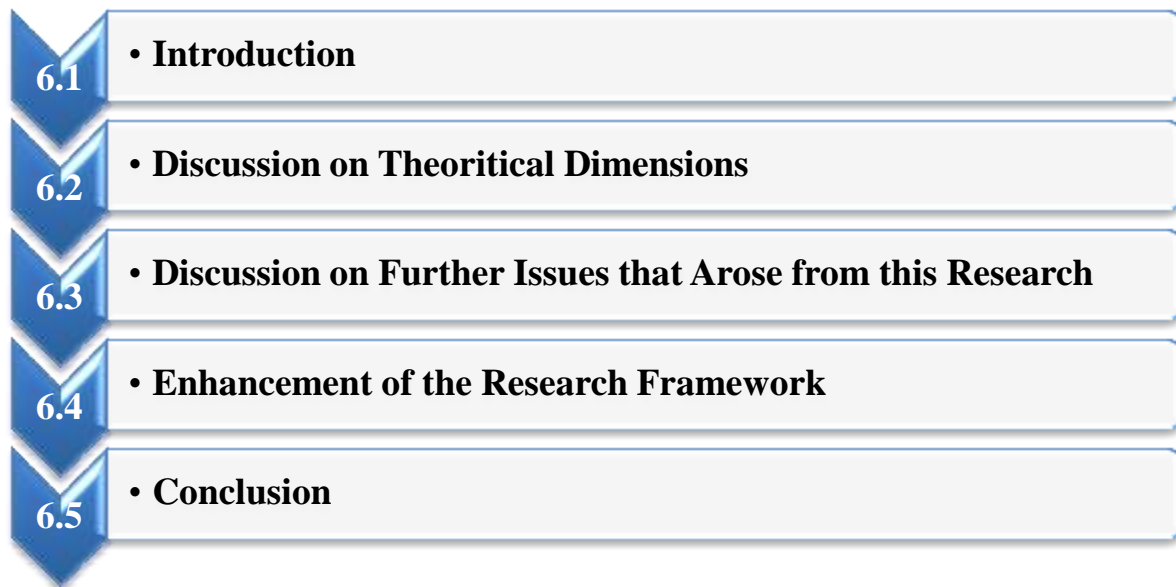
The framework of the research indicated three main factors that might have an impact on the WiMax technology adoption by SMEs in the context of KSA as mentioned in chapter 2. These factors are the organisational culture profile, vendors' commercialisation strategies and government policies. In order to carry out the proposed framework that has been discussed in chapter 2, a survey has been conducted on the SMEs to assess the dominant organisational culture that has an impact on the WiMax technology adoption by SMEs as shown in chapter 4. Moreover, semi-structured interviews among WiMax vendors, government representatives and SMEs have been conducted in order to complete the second phase of the data collection as discussed in chapter 5.

In this chapter the discussion is carried out using data obtained from survey questionnaire and semi-structured interviews involving representatives from WiMax vendors, government agencies and SMEs. The research findings are discussed in relation to existing research in areas of broadband Internet adoption and the adoption of related technologies such as WiMax. The results of the first phase of the research indicate that, the dominant organisational culture profile of Saudi SMEs and their characteristics that have an impact on WiMax adoption and will be discussed based on the organisational culture theories.

Vendors' views are discussed based on the disruptive theory dimensions including convenience, cost and customisation of WiMax technology. Based on the institution theory dimensions the researcher has discussed the government views taking into consideration the dimensions of knowledge building, knowledge deployment, subsidy, mobilisation, innovation directive and standard setting dimension. These dimensions have been discussed according to the Saudi government ICTs initiatives. Moreover, the SMEs expectations from vendor and government intervention are discussed based on combination of the disruptive and institutional theories dimensions.

Discussion considering the research dimensions including organisational culture, WiMax vendors' competition dimensions, Saudi government policies towards ICTs adoption and SMEs perspectives will be discussed in section 6.2. Moreover, additional issues that arose from the research findings will be discussed in section 6.3. The enhancement of the proposed research framework is discussed in section 6.4. Finally, a conclusion will be provided at the end of this chapter in section 6.5. **Figure 6.1** presents the structure of this chapter.

Figure 6.1 Structure of the Chapter 6



6.2 Discussion on Theoretical Dimensions

In this section, the researcher will discuss the dimensions that have been mentioned in the research framework in chapter 2. The research indicated three main dimensions that might have an impact on the WiMax adoption by SMEs in the context of KSA. These dimensions that have been identified are the organisational culture profile of Saudi SMEs, Saudi WiMax vendors' strategies and Saudi government policies. Some additional issues that have emerged from this research will be discussed as well.

6.2.1 Organisational Culture

Hofstede (1980) defines organisational culture "as the values, attitudes, beliefs and behaviours that represent an organisation's working environment, organisational objective, and vision". However, other definitions of culture are in terms of people's ideologies, contextual sets of beliefs, prevailing basic assumptions, share sets of core values, important understandings among the people, and the collective will of the society (Sackmann, 1992). Moreover, others have opined that culture includes more explicit, observable cultural artefacts such as norms and practices (DeLong and Fahey, 2000), symbols (Burchell et al., 1980), which may also include language, ideology, rituals, myths, and ceremony (Pettigrew, 1979). Although there are many definitions of culture, Twati and Gammack, (2006) highlight that, organisational culture has therefore been viewed as holistic, traditionally

decided, and socially built, which encompasses beliefs, values and behaviour, that are manifested in various characteristic features of the organisation at various levels (Krumbholz and Maiden 2000).

In the adoption of new technology like WiMax there is a great impact of organisational culture and it was found from this research. It has been found from the research findings that, norms, beliefs and attitudes might affect the adoption of WiMax by SMEs as their ICT requirements are usually less complex than bigger organisations. It was also found that, adoption of WiMax by Saudi SMEs depends on the types of business and their needs.

Chai and Pavlou (2004) report that, organisational culture is considered as a moderating factor while taking the decisions for accepting and adopting information systems. Organisational culture which is created and managed by effective leadership is therefore the key to organisational success (Twati and Gammack, 2006). Schneider (2000) asserts that comprehending organisational culture is therefore a vital activity for managers to enhance strategic development, productivity and learning at all management levels. The author considers the organisational cultural theories (Allaire and Firsirotu, 1984) for understanding the cultural factors (such as artefacts, espoused values and basic underlying assumptions) influencing WiMax adoption by SMEs in KSA.

The research findings highlighted that, various factors are responsible for the adoption of new technology by SMEs such as organisational culture. Saudi SMEs believe that, each generation has new technology and they need to cope with the change. For Saudi SMEs, changing culture in the organisation could be helpful for adopting new technology. According to this research, the impact of competition between SMEs helps organisations to develop new services. Ways of thinking of new technology adoption by SMEs could be changed from generation to generation. Depending on the organisational culture various factors like knowledge, exchanging experiences could have an impact on the adoption of new technologies. Moreover, adoption of new technologies by SMEs depends on the needs of any particular technology to improve the business. From this research it was also found that, most of the Saudi SMEs are willing to adopt new technologies as long as it provides good service quality to help them develop their business.

Schein (1992) asserts that, a strong organisational culture is typically considered as a conventional force. Mallak et al. (2003) also accentuate that, strong culture means enhanced performance but may impact the propensity of organisations to adapt to transformation. The employees of SMEs may meet the introduction of WiMax in an organisation with a strong culture, like the Arabic culture, some resistance to change. Therefore, it is vital to know the organisational culture type of the organisations in the region of KSA before starting the adoption process of WiMax. Cameron and Quinn (1999) argue that because of the nature of organisational culture which is complex, rationale, broad, with

unclear set of factors, the possibility to include every applicable issue in analysing and measuring organisational culture is difficult. Hofstede (1991) developed six dimensions that assist in understanding different kinds of organisational cultures such as: process versus results, employee versus job-oriented, parochial versus professional, open versus closed system, loose versus tight control, and normative versus pragmatic. Hofstede's (1991) organisational culture dimensions were influenced by his conceptualisation of societal culture. He also claims that, whereas societal culture manifests more in values and less in practice, organisational culture is exhibited more in practice and less in values.

From the research findings it was found that, norms, beliefs and attitudes are playing an important role in the adoption of technology by Saudi SMEs. SMEs in Saudi Arabia may have just adopted Internet recently, so for them to move to advanced technology might take time. For SMEs the most important factors are good quality, affordable price and good speed of Internet connection.

The research indicates that, in Saudi Arabia there are various types of Internet connections available for SMEs. However, only few numbers of SMEs have adopted latest Internet connection such as WiMax. Organisational culture could be a factor for creating barrier to adopt anything new by Saudi SMEs. It could be for lack of knowledge about updated technology or for high costing. Some of the SMEs in Saudi Arabia do not know the effectiveness of Internet technology in their business and for this reason they are not adopting WiMax. As the benefit of Internet technology is unknown to them, so adoption of new technology is not too easy in these organisations.

The result of Al-Gahtani's study showed that various characteristic features of organisational culture such as gender, education background and age influential to the people's perception of technology (2004) and it was also found from this research. Dholakia and Hamilton (2006) claimed that, there is a distinct cultural difference for adoption of technology on the base of gender at the global level. Research findings indicate that, more than sixty per cent participants of SMEs owners/managers are male. It could be a reason that, the researcher has collected data from male dominated region, or number of women participants could be lower because of cultural issue like religion or beliefs.

Different trends are found from the different age groups in Internet usage. According to some studies the age gap is going to be closing over time in Internet using and the number of people who are over 50 is not even decreasing (Dickinson et al., Kiel, 2005; Nayak et al., 2006). According to some researchers (Iyer and Eastman, 2006; Nayak et al., 2006); Reisenwitz, et al., 2007), age group discrepancies within the communication technology like Internet exist not only because of less access to the technology but also to a lack of social network. From the findings it could be noticed that, middle aged group are highly involved in SMEs.

The adoption of Internet use and e-commerce could be affected by education status. The likelihood of increased computer and Internet access is correlated to the increasing levels of education. Lower Internet opportunity could be because of lower education level (Lee et al., 2003). From the research findings it was found that, the majority of the Saudi SMEs owners/managers are well educated with IT background. However, not all of them have adopted Internet connections for their business.

The challenges confronted by SMEs most often exceed those by large organisations. Typically, the SMEs have a lack of a coherent IT investment strategy coupled with lack of standards and interoperability thereby increasing the risk in technology decisions and investments. The advantage however is that the smaller the number of employees in SMEs, the easier the decision making process and the implementation of organisational changes; the internal communication is also friendlier and cooperation with other SMEs becomes easier. SMEs could decide to adopt new technology if they were aware of it. Research findings indicate that more than three quarter SMEs participants were responsible for taking the organisational decision. According to Beckinsale and Levy (2004), SMEs' decision to adopt Internet or not lies on the perceived benefit and relative advantage they might get. While it might not be possible to reap the profits of investing in new technology immediately, the long-term effect could turn out to be immensely beneficial to the SME. Sandler and Bogg (2001) demonstrate that, the use of Internet could put SMEs on a platform where they are able to compete with larger companies.

According to the Yankee Group cited from Worhach (2000) connectivity, consumer connections and consumers are the main phases of e-commerce involvement. Similar types of suggestions are found from the Cahners Group. Depending on the SMEs, Internet access could be varied and from this research it was found that, majority of the Saudi SMEs are using Internet for their business. It was also found that various types of Internet connections are available in different SMEs. However, wireless broadband such as WiMax has not been adopted widely by Saudi SMEs. Only few Saudi SMEs have adopted the WiMax technology. It could be a reason that, most of the SMEs of Saudi Arabia are not aware about new communication technology like WiMax.

Teo and Tan (1998) claimed that, adoption of e-commerce could be influenced by the type of businesses. According to these researchers the main reason for adopting new technology like WiMax is internal expertise of organisations. The findings indicate that, majority of the SMEs who were involved in this research are from the creative industries. Creative industries involving media file upload/download that needs high speed Internet connection with good quality. That could be a reason to encourage SMEs involved in the creative industries for adopting new technologies like WiMax to improve their way of doing business.

According to Ofcom (2007), 62% of SMEs within the UK used broadband for their Internet connection. SMEs with 50-250 employs were the higher adopters of broadband. Depending on the organisations, employees are varied as mentioned in chapter 2. The research findings show that, the majority of SMEs in Jeddah have employees between 1-4 and 9-49. It indicates that, the working place for SMEs in the Saudi Arabia is like a family environment and that could be a reason to adopt new technology such as WiMax.

Due to nature and size and slow pace in adopting technological solutions, SMEs may be unable to invest substantial sums of money on adopting technologies to support the thriving of their business. This argument is also supported by Oni (2008), who reports that the decision to adopt certain technologies might depend on the varying sizes and nature of SMEs. Equity capital varies depending on the business types and from this research it was found that, more than half of the SMEs in Jeddah who participated in this study have their equity capital up to 999, 000SR. This financial limitation could be a reason for not adopting new technology like WiMax unless it is affordable.

The SMEs that have been considered in this study are from transportation, Creative industries; Advertising & PR and Marketing; Wholesale & retail; Manufacturing; Food and beverages; Construction; Education and Community; other services and Health and Beauty. The organisational culture formula has been used to analysis the organisational culture for each sector as mentioned earlier. Overall, organisational culture type for all Saudi SMEs according to their trading sectors in Jeddah is clearly dominated by clan culture. Clan culture is internally focused as mentioned earlier and that could be helpful for adopting new technology like WiMax. Also, it was found from the research findings that SMEs with the combination of clan and adhocracy cultures, such as creative industries, are more likely to adopt WiMax technology.

From the research findings it was also found that, there are mainly four types of Internet connection including DSL, WiMax, Wi-Fi and VSAT that are adopted by the Saudi SMEs in Jeddah. Moreover, the dominant organisational culture type for Saudi SMEs in Jeddah based on their Internet connection types is clan culture. Overall, the results show that Saudi SMEs who adopted Wi-Fi, DSL and VSAT are more likely to adopt the latest technologies such as WiMax.

In the following sections the researcher will discuss the research findings depending on the organisational culture of Saudi SMEs according to their trading sectors and Internet connections types individually.

- **Organisational culture profile of SMEs according to their trading sectors**

The research data indicated that, all trade types of Saudi SMEs in Jeddah are mainly influenced by the clan culture. Moreover, they are also influenced by the adhocracy and market culture slightly. Unlike the rules and procedures of adhocracy or the competitive profit centres of market culture, typical characteristics of clan culture are coordinative, involve teamwork, cooperative and fewer management levels. SMEs in clan culture are characterised as a friendly workplace, with shared values, goals, unity beliefs and participation. Rather than looking for stability this type of culture focuses on internal issues, flexible values and carefulness (Cameron and Quinn, 1999). SMEs are naturally small in size and their workplace is like a family. These could be the reasons for the SMEs in Jeddah to be dominated by the clan culture. Clan culture is friendly workplace and employees share their ideas with their leaders as mentioned earlier and that could be helpful for adopting Internet technologies like WiMax. Team leaders of clan culture are concerned about their employees. They work as team with them and they do the best for their employees to facilitate the way of working. That could be a reason to encourage leaders to adopt new technology in order to keep them up to date with the latest information about the business. Moreover, adopting new Internet technologies such as WiMax will improve the employees' skills and organisation performance. In the following sections the researcher will discuss each SMEs industry sector individually.

Advertising & PR and marketing industry organisational culture profile

It is clearly evident that, clan culture is dominating the advertising & PR and marketing sector of Saudi SMEs. The nature of this sector requires an Internet connection with high speed that could help to improve the advertising & PR and marketing business. This could be a reason to encourage such SMEs to adopt latest technology like WiMax. In order to adopt a new technology such as WiMax, nature of clan culture could help to make decision effectively as it is characterised as a friendly workplace in comparison with hierarchy culture where workplace is very formalised and structured (Cameron and Quinn, 1999). Their collaborate (clan) SMEs operated more like families and the leaders of this type of culture is mentoring and responding to their employee needs. Instead of the hierarchical culture where success is determined and expressed in terms of dependable delivery, smooth scheduling and low cost, the clan culture is more concerned about customer's requirements. Consequently, clan culture could be very good environment to adopt new technology like WiMax easily and advertising & PR and marketing sector could be able to provide good services to satisfy consumers.

Construction industry organisational culture profile

The research findings indicated that, construction sector of the Saudi SMEs in Jeddah is dominated by the clan culture. Unlike the rules and procedures of hierarchies or the competitive profit centres of market culture, typical characteristics of clan culture are cooperative, coordinative, involve teamwork, and fewer management levels. SMEs in clan culture are characterised as a friendly workplace, with shared values, beliefs, goals, unity and participation. This type of culture is concerned with internal issues, flexible values and carefulness instead of being concerned for stability (Cameron and Quinn, 1999). Using WiMax in the construction sectors could be helpful to communicate with their suppliers as well as customers.

Creative industries organisational culture profile

It was clearly found that, clan culture is dominating the creative industries of Saudi Arabia in Jeddah. SMEs participated in this research are the most with 22.2% among the total participants. Moreover, some of the SMEs are showing tendency towards adhocracy culture in comparison with the hierarchy and market culture. SMEs in adhocracy culture are more creative than the other SMEs with different types of cultures like market and hierarchy. Adhocratic leaders are known to be innovators prepared to take risk and their workplace is creative, dynamic and entrepreneurial. Additionally, in long term growth and acquiring new resources are being emphasised by SMEs with adhocracy culture. Adhocratic SMEs' main goal is to gain unique and new service or product. Also, the organisation encourages individual initiatives and freedom (Cameron and Quinn, 1999). Furthermore, Saudi SMEs in creative industries are involved in business activities like arts, music, design, filming, architecture and other media. Consequently, this industry is dominated mostly by adhocracy where people are more creative and innovators than the others SMEs sectors. Moreover, they are dominated by clan culture where it is a very friendly place and people share lots of ideas among themselves due to the nature and size of SMEs. Subsequently, SMEs who are dominated by both clan and adhocracy cultures could lead to a good work environment to adopt new technology like WiMax.

Education and community industry organisational culture profile

Education and community profile of the Saudi Arabia is dominated by the market culture with the highest average. According to Cameron and Quinn (1999), market culture highlights external maintenance with the need for stability and control. Leaders involved in this culture are tough and demanding. Their main concern is the reputation and to get the job done as SMEs who involved education and community do. In the market culture pricing and market leadership are very important. These characteristics could be a reason for holding them away for adopting new costly technology. If they find WiMax technology is more expensive than other Internet connections then, they might not

adopt it.

Food and beverages industry organisational culture profile

The research findings indicate that, food and beverages SMEs of Saudi Arabia in Jeddah are mainly dominated by the clan culture. Food and beverages SMEs always run together as teamwork. That could be reason for being dominated by the clan culture. Organisations dominated by the clan culture are characterised as friendly places that put a premium on a premium on teamwork, participation and consensus (Cameron and Quinn, 1999). In order to be well connected with their suppliers and consumers SMEs involved in the food and beverages could be a good environment to adopt the latest technology like WiMax. Adopting such a technology will keep them updated with the latest information about food recipes. Also, it could be helpful for them to inform consumers about their products and services.

Health and beauty industry organisational culture profile

Health and beauty SMEs are clearly dominated by the clan culture. Moreover, the health and beauty SMEs in Jeddah are showing some tendency towards hierarchy culture. Similar to the clan culture, hierarchy culture is internally focused but this culture is concerned with long term stability. However, friendly workplace, goals, beliefs with shared values, participation and unity are the main characteristics of the clan culture. In the clan culture internal issues are focused than stability (Cameron and Quinn, 1999). WiMax adoption could be helpful for SMEs to be known about various health issues and modern beauty tips. Moreover, they could be connected with their suppliers and clients. Moreover, customers could be informed about the health and beauty SMEs in Jeddah.

Manufacturing industry organisational culture profile

Manufacturing SMEs in Jeddah are dominated by the clan culture. On the other hand, the research findings indicate that, these SMEs in Saudi Arabia are dominated by the market culture very little. Moreover, some of the SMEs are showing tendency towards adhocracy culture in comparison with the hierarchy and market culture. Adhocratic organisations are considered to be creative and dynamic workplaces. The leaders are therefore innovators who are prepared to take risk takers and view success as gaining unique and new products or services (Cameron and Quinn, 1999). However, clan culture is a friendly workplace and the leaders are there for mentoring, facilitating and nurturing. SMEs who are dominated by these two types of cultures could be good environment to adopt latest technologies like WiMax. WiMax could be a powerful tool in order to gain the competitive advantage by these SMEs.

Other services industries organisational culture profile

Clan culture is dominating Saudi SMEs in Jeddah related to other services. Research finding indicates that, other services are very little dominated by the hierarchy culture. Similar to the manufacturing SMEs as mentioned earlier, the other services SMEs are mostly dominated by the clan and adhocracy culture. These two cultures could encourage SMEs in this field to adopt new technologies like WiMax for improving their way of doing business.

Transportation industry organisational culture profile

Research findings indicate that, transportation SMEs of Saudi Arabia are influenced by the market culture and they are least influenced by the clan culture. SMEs which are dominated by the market culture are concerned with the external issues with the need for stability and control. Their strategy was focused on measuring customer preferences thereby improving productivity while enhancing competitiveness, involving customers and suppliers (Cameron and Quinn, 1999). Adopting new technologies such as WiMax could be helpful for achieving their strategic objectives. SMEs which are involved in transportation could use WiMax for monitoring their competitors and connecting with customers as well as suppliers.

Wholesale and retail industry organisational culture profile

Wholesale and retail sector of the Saudi Arabia in Jeddah are mainly dominated by the clan culture. From the research findings, it was seen that some of the SMEs are also dominated by the market culture. In comparison to the clan, market culture is externally focused with the need for stability and control. Leaders of the market culture are hard drivers, competitors and producers. However, in the clan culture leaders are family mentoring where the organisation is held together by tradition or loyalty (Cameron and Quinn, 1999). The commitment with the clan culture is very high. New technology like WiMax could be helpful for these SMEs to be well connected with their customers and suppliers. Also, such a technology could help SMEs those are involved in wholesale and retail trading to distribute their goods and products by taking orders through Internet. WiMax could be a good tool to inform their consumers with their latest products and services.

Discussion on organisational culture profiles of all SMEs trade sectors

From the research findings it is indicated that, all trade types of Saudi SMEs in Jeddah are mainly influenced by the clan culture. Moreover, they are also influenced by the adhocracy and market culture according to their trading type. Unlike the rules and procedures of adhocracy or the competitive profit centres of market culture, typical characteristic features of clan culture are coordinative, involve teamwork, cooperative and fewer management levels. SMEs in clan culture are

characterised as a friendly workplace, with shared values, goals, unity beliefs and participation. Rather than looking for stability this type of culture focuses on internal issues, flexible values and carefulness (Cameron and Quinn, 1999). SMEs are naturally small in size and their workplace is like a family. These could be the reasons for the SMEs in Jeddah to be dominated by the clan culture. Clan culture is internally focused as mentioned earlier and that could be helpful for adopting new technology like WiMax. Leaders of clan culture are concerned about their employees. They work as team with employees and they do the best for their employees to facilitate the way of working. That could be a reason to encourage leaders to adopt new technology in order to keep them up to date with the latest information about the business. Moreover, adopting a new technology such as WiMax could improve the employees' skills and organisation performance.

- **Organisational culture profile of SMEs according to their Internet connection type**

In this section the researcher will discuss the dominant organisational culture type for Saudi SMEs in Jeddah based on their Internet connection types. From the research findings it was found that, there are mainly four types of Internet connection including DSL, WiMax, Wi-Fi and VSAT are adopted by the Saudi SMEs in Jeddah. The research findings indicate that, types of all Internet connection profile are dominated by the clan culture. According to Cameron and Quinn (1999) organisation with clan culture are concentrated on internal maintenance with flexibility, sensitivity for customers and concern for people. The research findings also showed that, the SMEs who are adopters or non-adopters of WiMax technology are dominated by the clan culture mentioned in chapter 4. This indicates that Saudi SMEs in Jeddah are willing to adopt latest technologies such as WiMax. In the following sections the researcher would discuss the four types of Internet connections individually.

WiMax technology adopters organisational culture profile

Saudi SMEs who are adopting WiMax technology in Jeddah are significantly influenced by the clan culture. They are influenced by the market culture by the least. SMEs those are dominated by the clan culture, focus on the internal issues, flexible values and carefulness rather than looking for stability (Cameron and Quinn, 1999). Using WiMax in clan culture could be helpful because it focuses on people's capability to enhance interpersonal communications and support through networked systems such as electronic mail, group support systems, and group decision support (Cooper and Quinn, 1993; Davison and Jordan, 1996). However, since this could work against the human-touch aspect, any technology would have to be user friendly.

As mentioned earlier in chapter 2, that WiMax technology has numerous advantages are driving force behind opting for WiMax broadband technology such as: improved performance and robustness, end-to-end Internet protocol-based networking, secure mobility, and broadband speed for voice, data and

video (Ahson and Ilyas, 2007; Vaughan-Nichols, 2004). However, the research shows that only 1.6% SMEs have adopted WiMax which very low ratio comparing with the DSL.

Wi-Fi technology adopters organisational culture profile

SMEs with Wi-Fi Internet connection in Jeddah are clearly dominated by the clan culture. In the clan culture, maintenances are focused internally with concern of people, sensitivity of customers and also with flexibility of working environment are the main characteristics of this culture. Wi-Fi is considered to be a viable and practicable broadband technology for wireless local area networking applications in both business and home environments (Houliston and Sarkar, 2005; Pentland et al., 2002). Broatch (2003) highlights that, within the flat hi-tech landscape of the last few years, Wi-Fi stands out as one technology that still attracts a great deal of interest. Literature in recent years has established that Wi-Fi has revolutionised wireless networking in such a way that it is now widely adopted by business and domestic users. However, there are several limitations attached to Wi-Fi such as: weak security is one of the main challenges in Wi-Fi technology. Wi-Fi network requires some expertise that wired network engineers are not likely to possess, inconsistent performance, and business value. Taking into consideration the limitations of Wi-Fi, WiMax technology came with the promises to overcome these limitations. WiMax enables broadband access anywhere, anytime and on virtually any device contrasting to Wi-Fi. That could be a reason that SMEs who adopting Wi-Fi are more likely to adopt WiMax to overcome these limitations.

DSL technology adopters organisational culture profile

SMEs with DSL Internet connection in Saudi Arabia are dominated by the clan culture and the second dominator is the adhocracy culture. Even though with the DSL connections have limitations such as pricing, distance sensitivity and reliability, the research shows that 65.1% from the Saudi SMEs who have Internet are DSL adopters. All these issues might have negative implications on the Internet adoption by SMEs. It also could be a reason that, most of SMEs are not aware of new technologies in the Saudi market such as WiMax.

VSAT technology adopters organisational culture profile

From the research findings it was found that, SMEs with VSAT Internet connection in Jeddah are significantly dominated by the clan culture. SMEs in the clan culture work as team, leaders are concerned about people and working place is friendly in comparison to the others (Cameron and Quinn, 1999). VSAT connection is expensive comparing with other Internet connections such as WiMax. That could be a reason to encourage SMEs to adopt a new technology like WiMax that

provides them with higher mobile cost-effective environment with a wider coverage, high capacity and non-line-of-sight operations (WiMax Forum, 2005).

Discussion on organisational culture profile of all types of Internet connections adopters

The research findings indicate that the majority of organisational cultures of Saudi SMEs are clearly dominated by clan culture with the highest average in comparison to the other types of cultures. Unlike the rules and procedures of hierarchies or the competitive profit centres of market culture, typical characteristic features of clan culture are cooperative, coordinative, involve teamwork, and fewer management levels. SMEs in clan culture are characterised as a friendly workplace, with shared values, beliefs, goals, unity and participation. This type of culture concentrated on internal issues, flexible values and carefulness instead of considering stability (Cameron and Quinn, 1999). Using WiMax in clan cultures could be helpful because it focuses on people's capability to enhance interpersonal communications and support through networked systems such as electronic mail, group support systems, and group decision support (Cooper and Quinn, 1993; Davison and Jordan, 1996).

The literature demonstrated the link between an organisation's culture, its performance, and its leaders. Schein (1992) argued that leaders of the organisations are responsible for enforcing and creating the organisational culture. Even though, the DSL and VSAT adopters show some tendency toward adhocracy, the research findings show similarities between the impact of the adhocracy, market and hierarchy in term of DSL, VSAT, and Wi-Fi adoption.

Despite the clan culture, adhocratic organisations are considered to be creative workplaces where people take risks; leaders are known as entrepreneurial and innovative (Cameron and Quinn, 1999). In turn, Saudi SMEs leaders are more likely willing to adopt the latest technologies such as WiMax. However, the research shows that WiMax has not been used widely by SMEs in Saudi Arabia. The lack of awareness of Saudi SMEs could be a reason for not adopting WiMax.

Although the literature revealed a relationship between technology adoption and hierarchy culture that is positive (Cooper and Quinn, 1993), the findings from Saudi SMEs show the opposite. The hierarchy culture is not sufficient to ensure WiMax adoption as it is not the predominant culture of WiMax adopters. Furthermore, the findings of the research agree with the fact that hierarchy culture is not a dominating culture for Saudi SMEs. Cameron and Quinn (1999) also agree that private sectors such as SMEs strongly do not fit in the hierarchy culture quadrant, which was confirmed by the research findings. Hierarchy SMEs are not yet convinced and do not yet accept technology. They could resist the adoption of any type of computerised technology, and this negatively affected

the adoption of WiMax. In addition, it negatively influences the norms, values, and beliefs shared by the majority of employees in the organisation.

According to Cameron and Quinn most of the organisations progressively take to different cultures, starting from clan culture, they move to adhocracy culture, next to market culture and finally to the hierarchy culture after they have been established for some time (1999). The research shows that, period of establishment of the Saudi SMEs do not have impact on the type of organisational culture as majority of them are dominated by the clan culture.

Despite the fact that there might be some differences between the organisational cultures types of Saudi SMEs with different types of Internet connection, no measurable differences were found between them. The four types of Internet connection are dominated mostly by the same type of organisational culture. Consequently, the findings state that there are no huge dissimilarities between the organisational cultures of Saudi SMEs in term of the Internet access type.

Even though all SMEs with different types of Internet connections are dominated by clan culture, the limitation of existing Internet services could encourage SMEs to look for other types of Internet connection that overcome these problems. Consequently, SMEs who have already adopted other Internet connections such as DSL could be a very good candidate for WiMax adoption.

The following section will discuss the different views from vendors, government and SMEs regarding the organisational culture impact on the adoption of new technology such as WiMax.

Discussion on others views related to organisational culture

Research findings from different perspectives (vendors, SMEs, government) confirmed that, organisational culture profile has an impact on the adoption of new technology such as WiMax as discussed earlier. Moreover, they are also dominated by the adhocracy and market culture slightly. Unlike the rules and procedures of adhocracy or the competitive profit centres of market culture, typical characteristics of clan culture are coordinative, involve teamwork, cooperative and fewer management levels. SMEs in clan culture are characterised as a friendly workplace, with shared values, goals, unity beliefs and participation. Rather than looking for stability this type of culture focuses on internal issues, flexible values and carefulness (Cameron and Quinn, 1999).

Saudi WiMax vendors and government representatives believe that, the adoption of WiMax by SMEs could be driven by the type of their organisational culture and type of their business. WiMax adoption depends on the SMEs needs for the technology. Therefore, norms, beliefs and attitudes of the people in the SMEs could have impact on the adoption of WiMax. People in SMEs are few and they are less complex than bigger organisations and that helps in taking quick decision for adopting new

technologies such as WiMax. However, they need to be educated and ready to adopt the new technology as well.

Majority of the Saudi SMEs are mainly controlled by the clan culture as discussed earlier. SMEs in clan culture have the characteristic feature of a friendly workplace, with shared values, beliefs, goals, unity and participation (Cameron and Quinn, 1999). Moreover, the research findings indicate that, Saudi SMEs who participated in this research have a friendly working place and they work as one family. These characteristics of the clan culture could be a good environment to encourage SMEs to adopt WiMax. They think that, clan organisational culture motivates the employees and make them come up with new ideas.

Management or owner of any organisation is considered to be an important factor for new technology adoption (Nejati and Amran, 2009). SMEs have also, emphasised the role of the management or owners on the adoption of new technology such as WiMax. SMEs think that, the owner/manager of SMEs play a big role in the adoption of any technology for business development.

Cameron and Quinn have measured (1999) the impact of leadership style by using the organisational cultural assessment instrument (OCAI). They have classified the organisational culture profile to four types including clan, adhocracy; market and hierarchy culture as mentioned in chapter 2. Each culture profile has their specific characteristics such as leadership styles and management. The research findings addressed that the working environment of SMEs might affect the decision of ICTs adoption. SMEs think that, WiMax adoption is affected by the beliefs and attitudes of the people within the organisation. According to them, adoption of new technology depends on the personality of the individual and varies from person to person. The knowledge and exchanging experience between staff members themselves and managers/owners could affect the adoption of new technology as highlighted by the Saudi SMEs. Also, advanced and modern attitudes help in the development of the way of doing business. SMEs think that, people from different cultural backgrounds within the organisation could bring new ideas to improve the business.

SMEs in Saudi Arabia are mainly dominated by the clan culture as discussed earlier. Leaders of this type of culture are mentoring, facilitating and nurturing their employees; while leaders of hierarchy are coordinating, organising and efficiently oriented (Cameron and Quinn, 1999). Research findings indicate that, as one family, staffs of SMEs share ideas and views with their managers/owners. SMEs managers/owners are only mentoring their employees and helping them to be more productive as found from the research. The research finding is supported by theory mentioned by Cameron and Quinn (1999), Saudi SMEs managers/owners have same characteristics of the clan culture leadership

style. This flexibility in decision making of the Saudi SMEs could be helpful to speed up the adoption of new technology such as WiMax within the organisation.

For adoption of WiMax SMEs think that, the organisational culture have a positive impact on the adoption if people in the organisation share different views with each other. According to SMEs, family or clan organisational culture could have impact on the business performance. Moreover, SMEs think if they are dominated by the hierarchy culture, the adoption of a new technology could be affected negatively as the owner would take the decision individually. Consequently, it could be concluded that, clan culture has a positive impact on WiMax technology adoption by Saudi SMEs.

The following sections will discuss the other dimensions such as vendors' strategies that might have an impact on the adoption of WiMax by Saudi SMEs.

6.2.2 WiMax Vendors' View on Key Dimensions of Competition

The World Wide Web has started its journey only two decades ago but its connectivity is transforming daily in countless ways. Reliable and faster connection can make various activities like education and business easier. Earlier networks allowed people to communicate as they moved about town, but fourth-generation WiMax technology now makes it possible to deal with nearly any online task while on-the-go. Fast and easy wireless Internet connection can provide better facility for shopping and checking any update. Improved convenience is virtually helping every area of life. Convenience of WiMax technology is related to the wireless connection and from the vendor's agenda it was backward compatibility with wireless network effects (Enderle, 2007).

For making the research effective the researcher will discuss various factors related to WiMax technology adoption from vendors' commercialisations strategies. This research therefore examines how the disruptive nature of WiMax technology influences the vendors' view on key dimensions of competition. The ease of use dimension, measured in terms of convenience, customisation and cost of use.

The analysis of the WiMax vendors' view highlighted important aspects of the diffusion process of WiMax technology and the key players' commercialisations strategies (Saudi WiMax vendors) with the introduction of the disruptive innovation theory perspective. Discussion will be based on the diffusion process of WiMax technology as disruptive innovation and the key dimensions for competition of the disruptive theory by Christensen (1997, 2006). These dimensions include convenience of WiMax cost of use of the service and customisation of WiMax. The discussion related to the SMEs' expectations from vendors' strategies will be demonstrated in this section as well.

The diffusion process of WiMax technology as a disruptive innovation

WiMax technology although started as an innovation with the potential to be disruptive and a replacement for the widely diffused fixed wire line Internet connection, the empirical findings showed an interesting deviation from this path. In particular, the WiMax technology market analysis in Saudi Arabia shows the vendors' tendency to treat WiMax technology as a sustaining innovation. WiMax vendors in Saudi Arabia believe that, WiMax has more features than other Internet connections such as DSL. Literature indicates that WiMax has numerous advantages that are also the driving force behind opting for WiMax broadband technology including improved performance and robustness, end-to-end Internet protocol-based networking, secure mobility, and broadband speed (Ahson and Ilyas, 2007; Vaughan-Nichols, 2004). WiMax came with the promise of providing low cost service and good quality (WiMax forum, 2005). Therefore, in the beginning the researcher treated WiMax technology as disruptive innovation. According to Christensen et al. (2004), the disruptive innovation is cheap, simple, small and convenient to use and therefore create new markets or reshape existing markets with the offer of a new value proposition.

A new value proposition is therefore introduced into the new market created or the reshaped existing market by the disruptive innovations (Christensen et al., 2004). Kohlbacher and Hang (2010) classified the innovative disruptive strategies as low-end and new market disruptive innovations. Research findings indicate that, in Saudi Arabia WiMax technology is provided by only three vendors among them one is new entrant and rest of them are existing vendors. The research findings also show that, WiMax is simple and convenient to use for customers. Moreover, vendors indicated in the interview session that, the quality of WiMax service is better than the fixed-wire line Internet connections offerings for the mainstream customers who were limited only to fair quality of Internet services in Saudi Arabia. Vendors also indicate that, WiMax technology has resolved the existing problems such as distance sensitivity or speed limitation in other Internet connections like DSL. Saudi WiMax vendors think WiMax is quicker to rollout and diffusion is faster than other wire line technologies.

However, the price of the service that is offered by Saudi WiMax vendors is almost similar to other Internet connections in the country. This is not a characteristic feature of low-end disruptive innovation or new market as mentioned earlier. Furthermore, the findings show that, the WiMax vendors are interested to invest on more improvement of service quality according to consumers' expectations. Therefore, the quality of WiMax technology would be improved in long run to reach the mass market including SMEs. As WiMax is not following the disruptive innovation characteristics in terms of price, so it is not in the line of theoretical prediction that have been mentioned by Christensen et al. (2004).

Key dimensions for competition in the WiMax technology market

The key dimensions for competition of the disruptive theory as mentioned earlier will be discussed in this section. These dimensions include convenience of WiMax cost of use of the service and customisation of WiMax.

Convenience of WiMax technology

For technological development in any particular business area some particular strategies are followed. In most of the cases small and medium size enterprises are affected by new technological strategies especially by communication tools like WiMax. Moreover, the forecasting of diffusion of disruptive technology is not straightforward due to the uncertainty surrounding the specific characteristics and maturity levels of the existing markets (Linton, 2002). Research findings indicate that, various vendors' strategies could be helpful for organisations to help the diffusion of new technology such as WiMax. As highly accentuated by several researchers – 'Wireless' is the future of broadband technology (Ganapati and Schoepp, 2008; Jindal et al., 2005). It certainly offers several advantages over the wired connections for Internet access such as greater mobility and flexibility, so that wireless devices can be used in the field for various purposes (Ganapati and Schoepp, 2008). It has also been found from the research that, Saudi WiMax vendors think WiMax is quicker to rollout and diffusion is faster than other wire line technologies. There is an agreement between all WiMax service providers to work on comprehensive WiMax coverage for all regions that can help the WiMax diffusion in Saudi Arabia. Vendors therefore strategise by optimising their resources with the view of using leading technologies and becoming the telecommunication service provider of choice.

Vaughan-Nichols (2004) also opines that WiMax offers a standardised technology. The open approach used by WiMax technology allows for economies of scale as manufacturers are able to use one common standard to build large quantities of products. As with any business, the service providers of broadband and more specifically of WiMax technology would want to sell as much of their product as possible for generating much revenue. However, it has not been explored in this investigation so far. There are a number of obstacles that the vendors would have to face in their attempt to sell WiMax to SMEs in the Kingdom of Saudi Arabia. WiMax vendors believe that, government policies and organisational culture could affect the adoption of new technology. Government of Saudi Arabia follows technology neutral regulations which could help a lot in new technology adoption such as WiMax. On the other hand, WiMax vendors in the Saudi Arabia think that, government is very slow in issuing licenses. The restriction and bureaucracy of the Saudi government policies might limit the deployment of WiMax service in the kingdom comparing to other countries. Additionally, for SMEs the price of WiMax service is important for adoption.

The WiMax vendors also acknowledged that the compatibility of WiMax with existing hardware and software is important to enhance convenience. Customer satisfaction is almost dependent on the technological compatibility. According to Murillo and Lozano, depending on the implementation of the updated technologies, hardware and software could be changed and it can lead to extra budget for any organisation (2006). Literature highlights that plethora of proponents are advocating the use of WiMax to overcome the limitation of Wi-Fi technology – yet another wireless broadband technology which is based on evolving standards designed for effective point-to-multipoint wireless networking (Ganapati and Schoepp, 2008; Abichar et al., 2005; Vaughan-Nichols, 2004). WiMax is based on the IEEE 802.16 standard that enables wireless broadband access anywhere, anytime and virtually on any device. All Saudi WiMax vendors addressed during the interviews that, using the existing hardware and software and spending almost same money as DSL, WiMax technology could be adopted by SMEs. Based on this compatibility, it is considered that, WiMax adoption is flexible enough. Therefore, from the vendors perspectives compatibility is not an obstacle for the SMEs' WiMax adoption decision.

Research findings indicate that, WiMax technology is provided by three vendors in Saudi Arabia. Vendors also think that, WiMax is increasing market competition which could lead to better service. For vendors WiMax is being adopted because of its flexibility and accessibility anywhere anytime. Moreover research findings indicate that, WiMax is hassle free and easy to use. It does not need cables or landlines and is a fully Wireless technology. This technology is faster than the DSL and reliable and works on any computer. Its Quality of service is better than DSL and flexible packages suite everyone's needs. WiMax vendors in Saudi Arabia are trying to provide faster and reliable services among various types of customers including SMEs. Vendors believe that, providing WiMax service with affordable prices could encourage SMEs to adopt WiMax.

Research findings also indicate that, all the Saudi vendors are providing the necessary information that their clients need to know about WiMax before purchasing the service. Moreover, if the signal is poor in the customer area, vendors provide them a special device to strengthen the signal. Additionally, SMEs can come to the vendor's technical department if they have any problem with the devices like modem and vendors fix it for clients free of charge.

Cost of WiMax technology

In the technological issue price is considered as an important factor (Vijay and Subhash, 1993). Lu et al., (2008) argues that despite WiMax's benefits and objectives as aforesaid and the outstanding technical features, the success of the WiMax network however much depends on meeting the needs of the variety of existing and potential services with cost-effective solutions. From the research findings

WiMax vendors addressed that, comparing the quality of the service, WiMax is better than DSL. They also believe that, depending on the pricing policies of vendors, services could be varied. Vendors acknowledged that, price of the WiMax service is one of the most important challenges for expanding the WiMax business over the Kingdom of Saudi Arabia. Vendors are also imposing prices on their services considering competitors. All the vendors are comparing their prices with competitors in order to keep the WiMax prices affordable to consumers. They are trying to reduce the prices of their products to attract the largest possible number of customers including SMEs. All the Saudi WiMax vendors are aware of their competitors and their pricing policies.

WiMax vendors believe that, lower pricing policies could be helpful for organisations to attract more customers especially SMEs. During the interviews Saudi WiMax vendors addressed that; every Internet service provider should have effective pricing policies considering their competitors and current demand. Research findings indicate that, promotional offers or lower prices bundles could catch the attention of the new customers such as SMEs. Moreover, WiMax vendors think that, they can attract more SMEs by having special offers that suit their needs and matches their low budget. However, good quality service with affordable cost for SMEs is the main challenge for them.

The sustenance of company's growth in the existing or established marketplace which will also ensure market growth and innovation requires sustaining innovative technologies. Sustaining innovation focuses on the improvement of the performance of current product or service (Christensen 1997; Christensen and Raynor, 2003). In contrast to this, disruptive innovations occur when new technologies that are made available have lower performance initially but may be attractive to certain market because of some features that are not valued by the established marketplace.

However, WiMax vendors highlighted that, they were not focusing on WiMax on the last few years because their service was not ready and good enough to present to their users. They had a problem in WiMax coverage in the beginning. Moreover, they have not had any advertisements for WiMax because they did not want to provide poor service to their customers unless they can cover the areas with the WiMax signals particularly Jeddah and Riyadh. Saudi WiMax vendors' strategies are not in the line of theoretical prediction that has been mentioned by Christensen et al. (2004).

Research findings indicate that, nowadays, most of the Internet vendors in Saudi Arabia are providing updated facilities including 4th Generation Wireless Internet connection. Vendors who are established for long time focusing on the WiMax or their main business is to provide WiMax services could be more matured to deal with issues that might affect the adoption of this new technology.

WiMax providers may face with initial difficulty in persuading SMEs in KSA to adopt their innovative technology (Schooler and Fischer, 2004). The fact that the technology is indeed innovative

and new may make it more appealing. Furthermore, once they become more established in KSA, it is more likely that they will experience longevity, as a costly commitment to their installation will have been made and companies will be unwilling to spend more money (Christensen et al., 2004).

From the research it was found that, in the Saudi Arabia vendors of the WiMax are also trying to keep their existing customers by providing various services. The vendors maintain the quality of service differentiation with affordable pricing. Various extra facilities are provided by various WiMax vendors. They try to please the clients from the beginning. Consequently, vendors offer their clients good service quality to gain their satisfaction and keep them as valued customers. Vendors of KSA are offering unlimited WiMax services with good quality. It could also be included that, for the new clients, they have very good offers in comparison to DSL. Moreover, sometimes vendors provide special offers for SMEs as well for their core values.

Customisation of WiMax technology

Customisation of WiMax service is mostly concerned with meeting consumers' technological and infrastructural needs to effectively access the services (Nielsen and Thomsen, 2009).

Easy use or simplicity can help any organisation to be favourable among all types of customers and in the technological sector it could have significant impact (Tse and Soufani, 2003). The research findings indicate that, WiMax customers do not need any training programs and anyone with a simple idea of using computer would be able to use it. This simplicity of use can help WiMax to be expanded easily among large number of customers including SMEs.

There are various policies to implement new technologies over another (Murillo and Lozano, 2006). Various strategies could be helpful for the service providers for the diffusion of WiMax as mentioned in the literature review chapter. Most of the companies aim to become one of the largest telecommunication service providers by optimizing their resources and introducing world leading technologies. These organisations are committed to serving the community by revolutionising the telecommunication standards in the Kingdom of Saudi Arabia. WiMax vendors are also committed for providing world class services to their customers.

New technological invention in new areas could affect any SMEs business and sometimes it could be an important player for the development of those particular types of businesses. For Saudi Arabia SMEs such as creative industries are affected positively by the WiMax. Disruption innovation can change the business policies and business strategies also and it could happen depending on the types of firms and their services (Aftab, 2001). Technology is making any business easier and making good communications among organisations, customers and suppliers. WiMax can serve well in point of

sales solution requirements. Vendors of WiMax indicated that, any company including SMEs needs Internet, fax and telephone and all of these are included in their offers to SMEs. From vendors' perspectives WiMax could help SMEs to trade via Internet faster and easier to commercially deploy. Vendors also believe that, WiMax could also help SMEs to link their branches together. Moreover, it can save time, money and effort.

Vendors' commercialisation strategies for WiMax technology

Established Saudi firms seem to find the sustaining innovation approach natural (Walsh et al., 2002). Saudi WiMax vendors treated WiMax technology as a sustaining innovation which enhances the introduction of a new wireless Internet access with new features and bundles. The wireless technologies such as WiMax turn out to be critical in the modern society. As highly accentuated by several researchers – 'Wireless' is the future of broadband technology (Ganapati and Schoepp, 2008; Jindal et al., 2005). It certainly offers several advantages over the wired connections for Internet access such as greater mobility and flexibility, so that wireless devices can be used in the field for various purposes (Ganapati and Schoepp, 2008). It could satisfy consumers by focussing on their needs for more improved and advanced services in the ICTs market (Constantiou et al., 2009). The market of WiMax technology in Saudi Arabia has been dynamically affected by the variety of strategic approaches adopted to exploit the market and the advanced technologies in use.

From the above discussion it could be concluded that, affordable WiMax technology price could be a factor to encourage SMEs to adopt it. The vendors are making some efforts in order to attract new customers. Yet, SMEs have not been especially targeted from these vendors. Promotional offers or lower prices bundles could catch the attention of the new customers such as SMEs but the vendors could make more efforts to attract them. Vendors need to pay more attention to SMEs by having special offers that suit their needs and go with their low budgets.

As WiMax is compatible with any PC it does not need any training programs for the consumers. It could help SMEs to adopt WiMax easily even with limited computer skills. Vendors who are established for long time focusing on the WiMax or their main business is to provide WiMax services; could be more matured to deal with issues that might affect the adoption of this new technology. Moreover, vendors should be more aware of their consumer's expectations and demands.

WiMax provides reliable service for customers including SMEs. Moreover, customers in Saudi Arabia have more than one vendor for WiMax. So, that will increase market competition and may lead to better service and not monopoly. Furthermore, DSL is distance sensitive while the issue with WiMax is better managed through proper planning. Considering these issues it could be mentioned that adoption of WiMax in the Saudi Arabia could be flexible. While the market is still relatively new,

different vendors can certainly take advantage of this opportunity. This could play an important part in vendors' marketing strategies. Indeed, effective marketing is hugely important for the success of WiMax providers.

SMEs views on WiMax technology vendors' strategies in KSA

Convenience of WiMax technology is related to the wireless connection and from the vendor's agenda it was backward compatibility with wireless network effects (Enderle, 2007). According to the Saudi SMEs the research findings indicate that, in comparison to other Internet connections such as DSL in Saudi Arabia, WiMax service is considered to be better due to cost, speed of Internet, reliability, low risk of malfunction, customer satisfaction, less time consuming and good communication.

Various vendors' strategies could be helpful for organisations to help the diffusion of new technology such as WiMax. As highly accentuated by several researchers – 'Wireless' is the future of broadband technology (Ganapati and Schoepp, 2008; Jindal et al., 2005). It certainly offers several advantages over the wired connections for Internet access such as greater mobility and flexibility, so that wireless devices can be used in the field for various purposes (Ganapati and Schoepp, 2008).

The research findings show that, WiMax in Saudi Arabia seems to be good enough in terms of flexibility, advantages of WiMax over other services and compatibility. It was also found that, SMEs who are involved in creative industry need high speed Internet to upload and download information from the server. Therefore, creative industries SMEs are more likely to adopt high speed Internet connection like WiMax rather than other industries.

It was found from the research that, SMEs in KSA are not still fully involved in the WiMax technology. The lack of computer literacy/IT background could be a reason hindering the adoption of new technology such as WiMax (Al-Gahtani, 2004). The research findings show that the Internet service in Saudi Arabia has some problems. Among the problems disruptions in service, speed of the service; lack of maintenance and customer service quality are the most important. The lack of Internet knowledge and awareness of new Internet services also create barriers for adopting the new technologies like WiMax.

Quality of the Internet service is very important for any business. In the small and medium enterprises quality of service is used effectively and so it is considered as an important factor (Perrini *et al.*, 2007). Research findings indicate that, the quality of WiMax service has been highlighted by all the WiMax vendors' and SMEs who participated in this research.

The result shows that, quality of WiMax is very important for the vendors to be able to compete with the other Internet services. It demonstrates that WiMax provides good quality communication service

over other Internet connections in Saudi Arabia. This good quality service could attract a large number of Internet users including SMEs.

The importance of the quality of WiMax has also been confirmed by all SMEs. SMEs consider the quality of WiMax technology to be a significant factor that could have an impact on their adoption of this technology. The research results indicate that Saudi WiMax technology is good quality comparing with other existing Internet connections. It also indicates that, using WiMax by SMEs has improved their work performance. For SMEs involved in creative industries which need high speed Internet connection adopting a good Internet connection is very important. Furthermore, the WiMax quality and good speed of this technology helped SMEs who are involved in creative industries to download and upload the media files that they need for their business without any hassle. By using WiMax this creative business is able to communicate with both their suppliers and customers online. For them WiMax is reliable, flexible, cheaper, easier to use and better quality than other Internet connections that they have used in the past. Similarly, SMEs who are involved in other types of business could also be benefited by adopting WiMax in their business.

Consequently, quality of WiMax technology seemed to be a very critical issue for SMEs to adopt it. Both WiMax adopters and non-adopters of Saudi SMEs emphasised on the importance of the quality of Internet connection. The good quality of the Internet connection service could encourage Saudi SMEs to adopt WiMax technology. From the research findings it could be concluded that, the quality of the Saudi WiMax is good enough which could encourage SMEs to adopt it.

Research findings indicate that, SMEs who are non-adopters of WiMax technology could adopt it in the future in order to satisfy their clients. Also, business demand could enforce them to adopt a good quality Internet connection that can help them to expand their business. The research findings highlighted that Saudi SMEs could adopt WiMax technology if they get to know about the benefits of using this technology before purchasing the service.

Convenience and *pricing* of WiMax are related to the adoption of new technology (Greenwood and Levin, 2008). The research findings also highlighted the importance of these two factors on the WiMax adoption by Saudi SMEs. Most of the WiMax non-adopters Saudi SMEs representatives believe that, the cost of Internet service is an important factor that can encourage or hinder the adoption of this new technology.

WiMax technology provides higher mobile environment, (1) cost-effective (e.g. WiMax is based on an open, international standard and mass adoption of such standard, and the use of low-cost, mass-produced chipsets, will drive costs down dramatically), (2) wider coverage, (3) non-line-of-sight operations, and (4) high capacity (WiMax Forum, 2005). The research findings indicate that, Saudi

WiMax comes with a reasonable price with good speed and quality in comparison other Internet connections.

Both WiMax adopter and non-adopter SMEs believe that, the service providers should make some efforts to target them. They believe that, WiMax technology vendors should have some economical bundles that are designed to suit SMEs budgets. From the research findings it could be told that, these economical packages that are designed particularly for the SMEs would increase the rate of WiMax adoption by them.

As mentioned earlier in the vendor's section, *customisation* of WiMax services is mostly related to the potential to meet consumers' needs in terms of technology awareness and infrastructure needed to access the services. This dimension will be discussed based on the simplicity of the service and consumer awareness.

The simplicity of the WiMax technology has been learnt from the SMEs who are already using the service. The research findings indicate that, WiMax is very easy to use in terms of simplicity. Additionally, it is not difficult to set up and install WiMax equipment in SMEs. It also found from the research that, WiMax technology does not require any additional training programme.

According to Beckinsale and Levy (2004), SMEs' decision to adopt Internet or not lies on the perceived benefit and relative advantage they might get. Sandler and Bogg (2001) demonstrate that, the use of Internet could put SMEs on a platform where they are able to compete with larger companies. More SMEs could decide to adopt if they were aware of this. The research findings indicate that, there are various respondents involved in the awareness of WiMax to SMEs and vendor is one of the important respondents. All of the SMEs who participated in the research interviews have mentioned that there is a lack of awareness regarding WiMax technology. Also, most of SMEs have mentioned that Internet service providers do not pay specific attention to them. Moreover, SMEs believe that, the Saudi WiMax vendors have a significant role in the diffusion of this technology. They think that, the vendors' commercialisation strategies should be considered particularly targeting the SMEs.

The first time the WiMax non-adopters SMEs heard about the technology was from the researcher. SMEs believe that, for creating awareness the WiMax vendors should work on advertisement targeting their requirements. Research findings highlighted that vendors should make some efforts to ensure awareness of WiMax to SMEs. Both SMEs adopter and non-adopters of WiMax think that the reason behind the lack of awareness of WiMax technology is vendor's strategies. It was found from the research that, WiMax vendors are not interested in SMEs because they have a good number of subscribers from other sectors.

From the research findings, it could be concluded that, WiMax is easy to use and does not need any additional equipment and training program to be able to use the service. Consequently, SMEs could be encouraged because of the simplicity and ease-of-use of the WiMax technology. The research findings show that, computer literacy is not a barrier for adoption of WiMax by Saudi SMEs.

Moreover, the research findings highlighted that, the rate of WiMax adoption by SMEs would be increased if WiMax providers ensure awareness to SMEs. By putting some efforts in advertising in TV, newspapers or sending some representatives from WiMax vendors to SMEs might make Saudi SMEs aware of the new technologies that have been established in the country. That also, could encourage them to adopt the technology. WiMax service providers should think to have some special offers for SMEs that suits their budget and needs.

6.2.3 Government Intervention

The initiation in 1998 of e-government national projects by the Kingdom of Saudi Arabia (KSA), a wealthy developing country in the Middle Eastern region has been very successful in electronic service delivery in the country (UN, 2008; Sahraoui et al., 2006; Abanumy et al., 2005). The focus has however been on big cities like Riyadh, Mecca, Jeddah and Madinah.

In this section the researcher will discuss the impact of Saudi government policies on WiMax adoption by SMEs based on the institutional theory by King et al. (1994) that has been used in the framework of the research. These dimensions are knowledge building, knowledge deployment, subsidy, mobilisation, innovation directive and standard setting dimensions. Each of these dimensions will be discussed individually in the following sections. The discussion related to the SMEs expectations from government intervention will be demonstrated in this section as well.

Knowledge building

For providing the base of scientific and technical knowledge for any exploitation of innovations or production, knowledge building is undertaken. The form of sponsored research to universities or research institutions is typically taken by the knowledge building. It normally happens in the form of the supply side influences (King et al., 1994).

Most of the developed countries, like the UK, have their updated technological policies and these policies are imposed by the government of those countries as mentioned in chapter 2. Technological policies are also found in the Kingdom of Saudi Arabia.

Most of the Western European countries are investing for technological infrastructure development (Nielsen and Thomsen, 2009) and as a developing country the investment of KSA is lower compared

to other developed countries. The Saudi government has set up the Communication and Information Technology Commission (CITC) as a regulatory body for the telecommunication and information technology industries entire the country.

Saudi Government is seeking to extend the Internet infrastructure development by establishing new policies, plans and strategies in the entire country (CITC, 2011). Moreover, the Government of Saudi Arabia is fully aware of the importance of the access of ICT service for all segments of the Saudi society. Therefore, in 2006, the Saudi government has established The Universal Access and Universal Service Policy (USF) to ensure ICT services among 100% of the population at a defined it quality on an individual or household basis. The USF shall focus on funding new services and/or networks to provide universal access or universal service to geographic areas that are in the commercially unprofitable and the undeserved zone. These funds are provided pursuant to either: (i) a roll-out obligation included as a license condition for one or more service providers or, (ii) a designation of one or more service providers by the commission as a “Universal Service Provider” under the telecommunication Bylaw (CITC, 2012).

From the research findings it can be seen that, there are some strategies, plans and also funds for developing Internet infrastructure in Saudi Arabia including rural areas. Saudi government has two main strategies to widespread availability of the Internet connection. Firstly, the government has implemented universal service fund which depends on taking 1% revenue from all the Internet operators. This collected revenue is used to create network in rural areas that are not businesswise feasible. The Saudi Government has 200 million dollars budget for Internet service providers who are going to extend their services in the rural areas. Secondly, Saudi Government is trying to increase the rate of broadband adoption within the country. However, the government does not have strategies for widespread wireless broadband connection such as WiMax in Saudi Arabia.

Saudi government has recognised the importance of technology knowledge building and has begun to provide fund for scientific and technical studies. The Kingdom of Saudi Arabia is witnessing remarkable growth and development in information and communication technology sector. Therefore, the Saudi Government has taken some effective actions to promote an enabling environment for information and communication technologies within the country. In response to this directive, the Saudi government has invented a comprehensive ICT plan for the Kingdom. The National Communications and Information Technology Plan (NCITP) have been prepared by the Saudi government through direct participation of academic, private sector and governmental agencies. ICT plan consists of a long term vision for twenty five years which is segmented into two sections. In the first section the vision is predicted for twenty and in the second section it is predicted for five years for ICT in the Kingdom of Saudi Arabia (MCIT, 2011).

The Saudi Government recently announced a budget in the information and communication technologies sector that would hit SR50 billion by the year 2015 (Reid, 2011). Moreover, CITC sector in Saudi Arabia is following the National ICT plan which holds a number of initiatives. Under the umbrella of national ICT plan, there are a number of initiatives in the same pipeline. These initiatives include various studies on Internet research, general studies in the development of ICTs marketing in SA and studies related to technical and scientific development. Moreover, the Saudi government is providing research facilities in the health and education sector. The government is also ensuring the research for the centre of statistics and ministry of family and planning. Saudi government also shares research with various Internet service providers to help them to be aware of their consumer's demands.

The Saudi government possesses some institutions including King Abdul Aziz City for Science and Technology (KACST), Dhahran Techno-Valley (DTV), Riyadh Technology Incubation Centre (RTIC) and the Saudi Arabian Business Innovation Research Program (SBIR) (MCIT, 2011).

KACST is located in Riyadh has funds to support research on science in general and IT in particular. Other institution DTV is established by King Fahd University of Petroleum and Minerals (KFUPM) to attract researchers and development centres of local and international companies to promote new businesses. The main aim of the SBIR program is to encourage the foundation and growth of technology based companies. Moreover, they are providing solutions to government needs and encouraging competition between firms. The program supports the development of Saudi through funding for initiative research and technology development (KACST, 2012).

Because of government encouragement, the adoption of wireless broadband connection is increasing in Saudi Arabia. 51% of all broadband connections in Saudi Arabia are wireless broadband (Maravedis, 2010). Despite this high rate of wireless Internet connections adoption, WiMax is still in lower rate. Though some strategies and plans are made for extending Internet infrastructure as mentioned earlier, the WiMax technology is still not adopted much by Saudi citizens including SMEs. Therefore, Saudi Government should pay more attention to the wireless Internet connections such as WiMax to enhance economic competition and improve the quality of life. Adoption of WiMax can help SMEs to improve their business activities which can help the development of Saudi economy.

Knowledge deployment

Dissemination of new knowledge is stimulated by knowledge deployment. General provision of education to people or through the official system such as universities, schools is the most obvious form of knowledge deployment. Temporary training is also included in the knowledge deployment (King et al., 1994). In various countries such as South Korea and the UK the government policies are playing a big role in adopting technologies (Oni, 2008). According to Oni (2008) strategies such as the development of broadband market, promoted efficient and innovative supply arrangement and encourage effective use of broadband services will help to promote investment in new technologies such as WiMax. Under the knowledge deployment dimension the researcher will discuss various plan initiatives for assisting the government for fulfilling its goal.

Recently, the Saudi government has recognised the importance of technology knowledge deployment and has begun to provide funding for education on ICTs. It is implemented by various government departments such as the ministry of Information Technology (MCIT) and the Economy and Planning Minister for the Kingdom (MCIT, 2011).

In order to minimize computer illiteracy in Saudi Arabia, MCIT has launched e-training caravans. This program is targeting the low-income people in the rural areas and students at the beginning and intermediate level in the general education. The e-training caravan provides effective training to the targeted people to learn the basic skills of using computer and Internet (MCIT, 2012).

Moreover, the MCIT has initiated the Dissemination of Digital Culture and Knowledge Lectures (DDCKL). This initiative promotes the importance of implementation of information technology to types of community members with focusing on young generation. This project is targeting school, college and university students including visitors of local festivals, sports clubs visitors, exhibitions and variety of conferences and symposia. DDCKL has several training programs for the targeted segments. It is introducing the importance and applications of telecommunications and information technology in the society. It is also increasing the awareness of the positive and negative aspects of the use of communication and information technology to the targeted groups. Moreover, DDCKL is providing information about Internet user's security/privacy; computer crimes issues and the concerned regulations and legislation (MCIT, 2012).

The Economy and Planning Minister for the Kingdom of the Saudi Arabia recently announced a budget in the information and communication technologies sector that would hit SR50 billion by the year 2015. The ministry of the Economy and Planning highlighted the rising ICT investment in applications and services which may likely get to SR 37 billion in 2013, creating further growth opportunities (Reid, 2011).

The research findings indicate that, there are several initiatives carried out by the Saudi CITC for SMEs. Government of KSA has ICT sector headed by deputy government for IT who have a programme of a specific retailer to SMEs for more adoption of Internet. The government has a national plan for telecom IT that encouraging adoption and usage of the Internet in business. They do some awareness for SMEs by doing studies or iteration about what the usage of the Internet in general and broadband specifically. They are not looking whether the broadband is WiMax or any other technologies. The CITC is technology neutral, so they are not pushing for any specific technology.

Even though all the initiatives that mentioned earlier, the researcher has not found any ICTs training program which is targeting SMEs. The Saudi government has recognised the importance of SMEs and their requirements including training, finance and business services. Moreover, this country has the largest number of SME support programs for both public and private sectors (SUSRIS.com, 2011). However, from the research it could be told that, there is a lack of ICTs knowledge deployment to SMEs. None of these programs are targeting SMEs and their ICTs needs.

Since Saudi government has not effectively addressed SMEs' needs for ICTs, a new approach must therefore be designed for tackling the business services, finance and training issues especially for SMEs.

Subsidy

Subsidy is related to support innovators for helping them in minimising the risks or costs related to information technology adoption (King et al., 1994). The subsidy dimension of the Saudi government will be discussed considering the funding for any research projects related to technology adoption and some issues related to awareness and promotions of new technology.

Most of the government of the developed countries have specific funding for research works and this funding could be helpful for adoption of new technology (Nielsen and Thomsen, 2009). Moreover, service providers could be funded for promotional activities in order to extend ICTs activities to a large number of populations (Pedersen, 2009). Additionally, many governments in European Union and SE Asia have initiated policies to enhance the ICTs adoption by SMEs such as the UK and Singapore (Kendall et al., 2001; Lunati, 2000). In such countries, policy guidelines and websites have been developed to provide SMEs with the relevant information about the opportunities from the Internet (Lunati, 2000). They also provide SMEs with necessary funds and training programmes to help them to improve their businesses.

Research findings indicate that, there are some organisations like Dhahran Techno Valley in KSA for doing research on technology. Some funds are also provided by the government for running the

technological research. The Saudi government is indirectly helping others through their research but not helping directly by effective initiatives to SMEs.

Currently, numbers of funds in values have been allocated to develop research bodies. Such as Dhahran Techno-Valley (DTV) a business cluster located in Dhahran, Saudi Arabia, which was recently set-up by the King Fahd University of Petroleum and Minerals (KFUPM) with the aim of attracting research and development centres from both local and international companies to facilitate new businesses. The aim is to make it a leading nucleus research and technology development centre backed up with comprehensive business support. There is also a project called SBIR which is a government portal for Small Business Innovation Research (SBIR) Information. Such projects could be encouraging for SMEs indirectly to adopt Internet connection to their business (MCIT, 2012).

In Saudi Arabia, Internet subscription including DSL, wireless broadband such as WiMax and other fixed lines have been increased around 2.13 million at the end of 2011 (MCIT, 2012). With the response of the public demand for wireless and fixed broadband connections, a market-led approach is favoured by the Saudi government (MCIT, 2012). Therefore, various subsidies have been initiated by the Saudi public/private sectors such as USF. As mentioned earlier, the USF is funding new services and/or networks that provided by innovators to deliver universal access or universal service to geographic areas that are in the commercially unprofitable and the undeserved zone. These funds are provided for pursuant to either: (i) a roll-out obligation included as a license condition for one or more service providers or, (ii) a designation of one or more service providers by the commission as a “Universal Service Provider” under the telecommunication Bylaw (CITC, 2012).

The SME sector is being given increasing importance and financial support in Saudi Arabia. Through training and guidance to help SMEs contribute to the development of the economy, many subsidies have been provided by the Saudi government as well as the private sectors (Tago, 2012). For example, in financing SMEs, the Saudi Credit and Savings bank are playing important roles. They have invested SR4 billion for supporting 21,000 SMEs. For Saudis, these banking sectors are also providing job opportunities. Moreover, a program has been launched by the Ministry of Finance for Saudi SMEs in order to support them financially has been extended to around SR5 billion. The Saudi Industrial Development Fund (SIDF) is also helping in financing SMEs (Tago, 2012).

However, there is no a particular funds to support SMEs to become more competitive by adopting reliable Internet connections such as WiMax. Even though, all the subsidies that have been taken by the Saudi public and private sectors to support SMEs, there is no particular effective action for the ICTs deployment to them. The research findings indicate that, there is no policies have been implemented by the Saudi government in related to Internet diffusion to SMEs. Moreover, from the

research findings it is found that, government policies towards ICTs diffusion to Saudi SMEs could be a major factor to encourage them to adopt suitable Internet connections such as WiMax.

Mobilisation

Mobilisation is responsible for encouraging decentralisation and it encourages those organisations to take innovation in a positive way. Awareness and promotional campaigns are the main institutional tools for mobilisation (King et al., 1994).

Level of broadband adoption could be varied depending on the countries. According to the information technology and innovation foundation (ITIF) report only 38.1% of the Saudi populations are using Internet (ITU, 2010). Consequently, it could be mentioned that a number of factors are responsible for slow adoption of broadband technology in the Saudi SMEs including lack of awareness.

The Saudi Government uses a variety of promotional policies to boost Internet use among the Saudi citizens. These promotional policies included Internet literacy and IT literacy programs that targeting particular segments of Saudi population. These segments include the low-income people in the rural areas and students at the beginning and intermediate level in the general education. For example, the Saudi MCIT has launched e-training caravans. It provides the effective training to the targeted people to learn the basic skills of using computer and Internet (MCIT, 2012).

Moreover, the Saudi government has initiated another project called DDCKL that targets school, college and university students including visitors of local festivals, sports clubs visitors, exhibitions and variety of conferences and symposia. The main goal of this project is to promote the importance of implementation of information technology to a variety of community members with focusing on young generation (MCIT, 2012).

Furthermore, the government of Saudi Arabia has recognised the importance of media role in wide-spreading the technological awareness amongst populations. This program is targeting technical information pages editors of the local newspapers to encourage them to publish articles for increasing the public awareness of ICT. It is also encouraging editors in selected journals particularly in ICTs. The main goals of this program are to highlight how information and communication technology influence life in the contemporary societies. Moreover, it is identifying the need for media coverage on the influences of communication and information technology in the media sectors. It also enhances public awareness and skills on information and communication technology. This program also converses the mechanisms for obtaining the targets of the media contribution in the society awareness (MCIT, 2012).

It was found from the research that, some initiatives taken by the Saudi Arabia are not effective at present. The research also indicates that, Saudi SMEs are not aware of the latest technology such as WiMax that has been launched in the country. Both larger population and to small businesses awareness can be increased by educational and informational campaigns (Poon and Swatman, 1999). However, these campaigns should also have the objectives of informing SMEs of the existing of government subsidies and other forms of intervention as they are not aware of them. Saudi government should create more programs aiming to increase awareness of Internet technologies such as WiMax to SMEs.

Standard setting

As a form of regulation the main aim of the standard setting is to indicate the constraining options of decentralised actors and organisations involved in the larger social or institutional objectives. It can have the force of law or can be by voluntary completely (King et al., 1994). For making any effective infrastructure most of the European countries and Korea are reviewing their current technologies for implementing new technologies (Hauser, 2003). For standard setting current infrastructure and pricing policies are important and these two issues will be discussed under this dimension.

In the Saudi Arabia CITC is the regulator of the information and communications technology sector. In order to provide the basis for regulatory framework of the CITC sector, the Telecommunications Act and its Bylaws have been enacted in 2001-2002. These include a wide range of objectives involving the provision of affordable but advanced communications services; the creation of an environment that encourages fair competition; utilising frequencies efficiently, effective and continuous technological development and transfer, and realising clarity of processes and transparency of procedures. This is done with a view of establishing equality and non-discrimination principles as well as providing protection for the public and users/investors' interest (CITC, 2011).

CITC has many important responsibilities related to ICTs regulations in Saudi Arabia. For example, CITC is responsible for the licensing and pricing of ICTs vendors and services aimed at protecting users' right, in terms of setting service quality standards and managing frequency spectrum. For setting service quality standards, CITC has established regulatory standards to ensure a minimum quality of service proved by ICT services providers. Moreover, the CITC is ensuring the international standard of safety radiation levels by conducting periodic field measurements of radiofrequency (RF) radiation levels (field measurement programs) in collaboration with academic and research institutions in the Saudi Arabia. The measurements are meant to verify the performance of wireless operators and service providers in meeting CITC guidelines for limiting exposure from wireless base

stations. Moreover, CITC has developed the National Frequency Plan (NFP) to allocate the radio frequency spectrum bands (CITC, 2011).

Pricing is one of the most important factors for adopting any new technology. Technological adoption could be faster if prices are kept affordable. If good pricing policies are implemented then adoption of new technology could be adopted easily (Passerini et al., 2004).

From the research it was found that, the price of Internet connection is comparatively higher in the Saudi Arabia. Only educational institutions get special rates from Internet providers but not the SMEs. Saudi government cannot force Internet service providers to keep the price affordable to SMEs. The government does not have price policies to support ICTs adoption by SMEs. They only have policies for education institutions. For SMEs most of the vendors do not provide any discount, but they try to achieve that by competitors. To keep the price affordable for consumers in general, it depends on the highest operator in stock in the market like STC provider. Saudi government CITC is responsible to put a price cap so that Internet service providers cannot charge above the price cap. They have policies just to keep the price not too high for the consumers but they are not targeting SMEs.

As mentioned earlier CITC is the responsible body for managing tariffs of information technology services. The duty of CITC is to provide high quality and affordable ICT services in all parts of the Kingdom by monitoring the permanent and temporary telecom service tariff offers to ensure affordable ICTs services prices that based on CITC regulations and are fair for all users (CITC, 2011).

From this discussion it is indicated that, the Saudi government is reviewing their current technologies for implementing new one. However, no policies have been implemented by the Saudi government in related to pricing of Internet services for SMEs. Moreover, increasing the number of the Internet service providers in Saudi Arabia will make the prices of Internet more affordable to the populations including SMEs.

Innovation directive

Innovation directive commands the initiation of innovations that can specifically facilitate production by engaging in some activities. Innovative and effective direction could be helpful for the adoption of new technology (King et al., 1994). Under the innovation directive mainly the e-government initiatives and its role in new technologies adoption such as WiMax will be discussed in this section.

Some effective initiatives can make any new technology adoption easier and most countries of the world are taking some initiatives for adoption of new technology (MacInnes et al., 2005). The Kingdom of Saudi Arabia is not far behind. Various e-government initiatives have been taken by several sectors in Saudi Arabia.

Saudi government has prompted a different initiatives to encourage the adoption and diffusion of ICTs in general and e-government in particular. In 2005, the Ministry of Communications and Information Technology (MCIT) setup the e-Government Program in alliance with the Ministry of Finance and the Communication and Information Technology Commission (CITC). One of these initiatives that are keened to motivate the sustained growth of e-services for Saudi citizens is 'Yasser' project (www.yesser.gov.sa).

The e-government program 'Yasser' is a part of the different project initiatives by the Saudi government to achieve sustained growth and development of e-services in all aspects of Saudi life. The main objective of 'Yasser' is to raise the productivity and efficiency of the public sector. Moreover, it is responsible for providing better and easier services for individual and business customers. It is also responsible for providing the updated required information to the public. The executive plan for the e-government program is published in the website in both English and Arabic languages (MCIT, 2012).

The benefits of e-government to developing countries such as KSA with a large population and land size are much. With an area of 2,240,000 square kilometres in the Southern-Eastern region of Asia (MEP, 2008), it would be difficult cover in any business transaction, but E-government helps in the coverage of the wide area, removes the limitations of traditional services and enhances easier, faster non-physical contact between users. Finally, the use of the Internet also brought down the cost of government in providing services (Huang and Bwoma, 2003; Reffat, 2003).

Some additional important initiatives to develop the information technology sector have been implemented by the CITC. CITC plays a vital role in developing IT sector in the Kingdom of Saudi Arabia by implementing nationally adopted policies, plans and programs; stimulating and encouraging investment in the IT industry; and closely working with relevant authorities to promote the use of e-commerce. CITC works with the public and private organisations in order to implement the IT strategies. These IT strategies are implemented through launching some e-commerce initiatives, conducting studies and holding conferences, seminars and workshops (CITC, 2011).

However, the research findings indicate that, the Saudi e-government program has a slow progression. Moreover, an effective e-government program could be a reason to enforce the population including SMEs to adopt reliable Internet services such as WiMax. The role of the e-government in the adoption of Internet connections by SMEs has been emphasised by the Saudi government representatives. The Saudi government should streamline procedures to facilitate web service to SMEs such as licensing. These procedures could force SMEs to adopt new technologies to help them to do their e-government activities effectively.

From the research findings it can be concluded that, the findings have mostly supported King et al. (1994) framework of institutional intervention in supply-push perspective.

SMEs views on government policies in KSA

From the research findings it can be concluded that, the data have mostly supported King et al. (1994) framework of institutional intervention in demand-pull perspective. The research findings have shown that, SMEs wish government intervention, both in terms of influence and regulation to foster adoption and diffusion of WiMax in SMEs. Such interventions concentrate on different areas: knowledge deployment and mobilisation, innovation directive and subsidies. The SMEs interviewed have not referred to knowledge building and standards. These might be explained by the fact that, the SMEs interviewed are not IT or policy experts, but they only know those aspects of WiMax that directly concerns their business.

Knowledge deployment should aim at increasing knowledge of ICTs including WiMax (e.g. through targeted training programs), but also specially at increasing knowledge of ICTs knowledge among the population in general and SMEs employees in particular. It seems therefore that, being knowledgeable in ICTs is very important to successfully enter the information society.

Moreover, *mobilisation* should aim at awareness creation of technology, related benefits and ways of use (Poon and Swatman, 1999). The research findings have also shown that, even when intervention initiatives exist, SMEs might not be aware of them. Therefore, mobilisation initiatives should also aim at informing the SMEs of the latest ICTs technologies and other ICTs institution support programs and initiatives.

It has been found from the research findings that, the Saudi government has taken some steps for the knowledge deployment and mobilisation of ICTs. In order to minimize computer illiteracy in Saudi Arabia, MCIT has launched some initiatives such as e-training caravans and the Dissemination of Digital Culture and Knowledge Lectures. Furthermore, the government of Saudi Arabia has recognised the importance of media role in wide-spreading the technological awareness amongst populations. In response to this issue the government has established “*The foundations of media processors to the issues of communication and information technology*” (MCIT, 2012).

Moreover, SMEs believe that, the major players that have role in WiMax diffusion to them are government, service providers and private institutions. Most of the SMEs strongly believe that, the roles of government and large private institution are very important in ICTs diffusion to SMEs as well. They think if ICTs training programs and latest technologies awareness could be provided by the Saudi public and private sectors then, it could be helpful for SMEs to adopt a new technology such as

WiMax. In Saudi Arabia, there is a social service provided by the National Bank but it is not for all SMEs. They are only providing training sessions for the best hundred SMEs projects in KSA. SMEs think that, these courses are good for them to develop their projects and they hope the Saudi government could provide fund for such training courses.

Even though the government of Saudi Arabia has recognised the importance of media role in wide-spreading the technological awareness amongst populations, Saudi SMEs are not included in their plan. It has been found from the research findings that, most of the SMEs do not know about any new technologies that have been established in the country. Saudi SMEs highlighted that, there is no advertisement of these new technologies via mass media such as TV, radio and newspapers.

Innovative and effective direction could be helpful for the adoption of new technology (Berger et al., 2003). Some effective initiatives can make any new technology adoption easier and almost countries of the world are taking some initiatives for adoption of new technology (MacInnes et al. 2005). The Kingdom of Saudi Arabia is not far from it. Various e-government initiatives have been taken by several sectors in Saudi Arabia. The e-government program 'Yesser' is a part of the different project initiatives by the Saudi government for sustained growth and development in all aspects of Saudi life.

However, the research finding indicates that, the Saudi e-government program has a slow progression. SMEs also indicated that, e-government program in Saudi Arabia is not effective. They think that, activating the e-government applications could force them to adopt latest technology such as WiMax to cope with the e-government transactions. For them, having a good Internet connection such as WiMax is very important to efficiently surf the e-government websites.

Moreover, it is believed by the SMEs that, the efficient e-government programme is considered as an important turning point in the community in all Saudi society. However, the SMEs believe that, Saudi society has a fast reaction on frequent changes of policies that might hinder them from using e-government portal in future.

Subsidies have emerged important as influence and regulation mechanisms. The most important desired form of *subsidy* is indirect subsidies aiming at improving e-government, as SMEs believe that, e-government is fundamental to their adoption of ICTs including WiMax. Direct subsidies such as financial support and ICTs pilot programs are also considered as important and desirable.

Funding could be helpful for new technology adoption (Buch, 2003). Most of the government of the developed countries have specific funding for research works and this funding could be helpful for adoption of new technology (Nielsen and Thomsen, 2009). Research findings indicate that, there are some organisations like Dhahran Techno- Valley in KSA for doing research on technology. Some

funding is also provided by the government for running technological research. The Saudi government is indirectly helping others through their research but not helping directly by effective initiatives such as ICTs diffusion to SMEs.

However, the research findings indicate that SMEs are not getting any funds regarding ICTs adoption. SMEs in Saudi Arabia only get loans for establishing their business but there is no obligation to have ICTs facility in their business. Some private sectors along with Saudi public sectors are providing loans to establish SMEs business such as Bab-Rizq Jameel.

Moreover, the Centennial Fund which is an independent, non-profit organisation by Royal Decree from King Abdullah aims to support young generation to start their small businesses. However, it does not provide any loans for ICTs adoption by SMEs. In addition, this private institution “Centennial Fund” gives SMEs free short training courses like public relations, marketing and accounting to improve the personal skills with no focus on ICTs.

SMEs have mentioned that, there are some obstacles in getting funds in Saudi Arabia. Moreover, SMEs mentioned that, in Saudi Arabia, there is a social service provided by the National Bank but it is not for all SMEs. They are only providing free training sessions for the best hundred SME projects in KSA. They think that, such a program is good for ICTs development to SMEs.

It could be concluded from this section that, the role of e-government and e-enabled technology and communication via e-mail are very important to encourage SMEs to adopt new technology such as WiMax. SMEs believe that, indirect subsidies in the form of government procurement of ICTs and e-services are very essential to the adoption and diffusion of WiMax among SMEs. This is also confirmed by Andersen et al. (2003) study that indicates that, one of the governance initiatives responsible for the uptake of ICTs such as electronic commerce in Denmark has been electronic government.

The research findings have also shown that, even when intervention initiatives exist, SMEs might not be aware of them. Therefore, mobilisation initiatives should also aim at informing the SMEs of the latest ICTs technologies and other ICTs institution support programs and initiatives. Providing adequate support for small and medium enterprises by private or governmental entities and update them of the modern technology that can help them to improve their business. It was found from the research findings that SMEs do not need only financial support and loans but they need training courses to take advantages of these financial loans to achieve a success in their business. SMEs mentioned that they need more support from the government to help them to adopt Internet and latest technologies to improve their business.

6.3 Discussion on Further Issues that Arose from this Research

The researcher has found some new issues that might have an impact on the adoption of WiMax by Saudi SMEs. First, the importance of Internet especially WiMax technology is discussed in this section. Moreover, issues such as taxation, experience exchange, herd culture/bandwagon, customer right protection and customer service that uncovered by this research are discussed as well regarding their impact on WiMax adoption by SMEs in the following sections.

- **Importance of Internet especially WiMax technology for SMEs in KSA**

Looney (2004) reported that, SMEs in KSA may play roles such as: (a) sales of products; and (b) subcontractors or representatives of larger multinational enterprises. In this wise SMAs have been able to create large number of jobs at relatively low costs. For example, the ICT job market is doing well in Saudi Arabia, and in turn many positions in SMEs have been filled by Saudi people (Waegeniere, 2003). Currently, SMEs make up 90% of all businesses in Saudi, but however their contribution to the country's GDP with only 33% and the total employment with 25% remain low (SUSRIS.com, 2011). In contrast, despite these successes, Sajini (2004) also reported that access to technology is a significant problem for many SMEs in KSA (digital divide). Facilitating required improved access to technological networks at international standard may be very expensive and unaffordable for many SMEs. In the context of WiMax adoption in SMEs, Smura (2005) presented a model for techno-economic analysis of WiMax networks. He applied this model to analyse a 3.5 GHz WiMax-based network deployment, so as to provide fixed broadband services for SMEs. Similarly, according to a report from In-Stat/MDR, the Fixed Wireless Broadband (FWB) market would grow from \$558.7 million in 2003 to more than \$1.2 billion by the end of 2007 (Scholar and Fischer, 2004). One of the primary reasons for such an increase is the introduction of standardized WiMax technology (Angelov and Rao, 2006). A research conducted by the Yankee Group (research firm), also reported that just 21% of homes and 51% of businesses in the United States had broadband access in 2003. Among the businesses, almost 90% of large enterprises and only 35% of SMEs have broadband access. This clearly identifies the SMEs as a future opportunity for WiMax (Angelov and Rao, 2006).

As well as having the ability to advance individual small and medium sized enterprises, the adoption of broadband and specifically WiMax can also benefit the wider economy (Olajubu et al., 2009). The principles behind this notion apply to all areas of business in any country and regarding every industry. That is, the more successful companies are the more money they produce and this in turn boosts their industry on a national level. Businesses which are developing and making more sales and profits are generating more economic flow which has a knock on effect for the economy of the nation

to which they belong. Therefore, it is in the interest of a country's economy for that country to produce as many successful businesses as possible. As has been previously noted, SMEs account for around 90 % of the Kingdom of Saudi Arabia's total enterprises, 25 % of its total employment and only 33 % to the country's GDP (SUSRIS.com, 2011). It therefore goes without saying that the success of SMEs is of paramount importance for the wider success of the country's economy.

Research findings indicate that, all of the Saudi WiMax vendors and government representatives who participated in this research strongly recommended the WiMax technology for many reasons. WiMax vendors believe that, the wireless broadband which offered by WiMax technology has more features than other Internet connections in Saudi Arabia. According to WiMax vendors, WiMax technology is easier to use than DSL and more flexible. Saudi WiMax overcomes the problems of the other Internet connections such as DSL considering the poor infrastructure. Also, WiMax comes with affordable price that suits the majority of business budgets including SMEs. They believe that WiMax is a quicker rollout than other Internet connections. So, its diffusion is faster than other wire line technologies.

Moreover, CITC government representatives were neutral in their opinion about types of Internet connections. They have not recommended any particular Internet connection over one another such as WiMax. The government representatives believe that, the demand of new technology could be driven by awareness, SMEs understanding of the importance of this new technology for their business. There supply issues for the Internet vendors including speed of the Internet service, connectivity and consumer requirement awareness. The market demand also has an impact on the Internet diffusion.

Furthermore, they strongly believe that using Internet is an essential part of SMEs for improving their business. They also think that would enable the e-commerce activities in future. They think that SMEs should employ the Internet connections such as WiMax for achieving their target and improving the way of their business. A good Internet connection such as WiMax could encourage SMEs for e-commerce implementation in future.

The research findings from the vendors and government perspectives indicate that, there are lot of people involved in the WiMax diffusion to SMEs. All the WiMax vendors believe that, they are the main responsible factor for WiMax diffusion to SMEs. Moreover, some of them believe that, CITC as a government sector has a role in the ICTs deployment in Saudi Arabia. As CITC is responsible for licensing of new technologies, it could also play an important role in spreading citizen awareness about new technologies. Social culture and negative or positive reputation of the WiMax service could play a role in the WiMax diffusion. Another factor could encourage SMEs to adopt WiMax is advertisement via various social media such as TV, newspaper, radio, websites, Facebook and twitter.

Moreover, the government perspectives indicate that, there are lot of people involved in the Internet including WiMax diffusion to SMEs. For example, CITC itself, Chamber of Commerce, service providers, suppliers, private sectors, private partnership and Ministry of Commerce are responsible for Internet deployment. Moreover, the educational institutions have roles to raise the awareness of ICTs to the Saudi population. Furthermore, the ministry of telecommunication has a responsibility for facilitating the availability of new services over the country.

Most of the WiMax vendors think that, the existing Saudi government policies support the WiMax diffusion. However, some of the WiMax vendors think that, the current Saudi government policies are not effective enough to support the WiMax diffusion to SMEs.

Furthermore, Saudi WiMax vendors believe that, the adoption of WiMax technology by SMEs could be driven by the type of their organisational culture and type of their business. It depends on the SMEs needs for the technology. Therefore, norms, beliefs and attitudes of the people in the SMEs could have impact on the adoption of Internet technologies. WiMax technology vendors in Saudi Arabia think that, SMEs are less complex than large organisations and that helps in taking quick decision for adopting new technologies such as WiMax. However, education could be a factor that hinders them from adopting Internet technologies such as WiMax.

- **Taxation**

Innovation and technology adoption are widely viewed as the primary sources of productivity. In this respect adoption of new technology is considered as an important issue until technology is employed by potential users (Ederington and McCalman, 2006). So, government role especially taxation system has a dynamic impact on the adoption of new technologies. Moreover, a research conducted by Goolsbee (2006) showed that, the dynamic costs of taxes can help ICT companies to enter new markets. From these discussions it could be concluded that, government taxation policies have great impact for adoption of new innovations such as WiMax by Saudi SMEs.

The influence of technology can be seen everywhere affecting work pattern, business transactions, social interactions, linking even the design of the tax system in most developing countries. If any new technology could be implemented over the whole country then, it could be familiar to all easily and availability can help to adopt new technology (Passerini and Patten, 2005).

The research findings indicate that, it might be a relation between tax and adoption of Internet in Saudi Arabia. The taxation system in Saudi Arabia is different from other countries. Tax is not imposed individually unless there is no commercial products are included in their business. This Tax on commercial products is termed as Zakat under the religion obligation (DZIT, 2012).

Research findings also address that, applying efficient taxation system in Saudi Arabia could be helpful for Internet adoption by SMEs. Government could encourage different types of organisations including SMEs to adopt Internet by giving them more financial options. For example, they can exempt their tax for adopting ICTs. This government incentive could help SMEs in Saudi Arabia and around the world for adopting ICTs applications.

- **Experience exchange**

SMEs should collaborate and ally in order to surpass the barriers of the new economic and structural era. Due to their limited size SMEs should seek cooperation with other SMEs and related partner institutions (Karaev et al., 2007). The sharing of experience plays an important role to the creation of a useful database for practicing and exchanging experiences between SMEs and other organisations. That can help to adopt new innovations such as WiMax technology.

According to Huggins (1996) learning process of any organisation is an important issue which is formed from the cooperation. SMEs depend on their innovation capability for their survival in the marketplace (Charitoudi et al., 2011).

The research finding indicate that, exchanging experiences with the leading private institutions and other SMEs that are using the ICTs facilities could help SMEs to improve their business to be able to cope with the change. SMEs believe that, there is a gap between themselves and the large companies in Saudi Arabia. Large companies in Saudi Arabia do not cooperate with SMEs in terms of exchanging ICTs experience. Large companies and government institutions should make some efforts to encourage sharing knowledge between SMEs themselves and large organisations.

From the research it was found that, exchanging experience activities such as conferences, seminars and meetings could assemble both large companies and SMEs to share their knowledge of business and experience of ICTs usage. SMEs could be benefited from these activities by having peer to peer exchange of experience between SMEs managers themselves and large companies' representatives. It could also create a connection between SMEs and large companies that most of time difficult to reach. It could also generate potential business facilities including ICTs experiences.

- **Social cultural issues: Herd culture/Bandwagon**

The potential of new technologies can change business models and the level and characteristics of demand. Competitive positions of any organisation with others could be affected because of the new technology and their changes. According to Christensen (1999), the mark of the beginning of the end, for established companies could be introduced by the invention of new technology. The introduction of new technology could also appear as new industries with corresponding wave of new entrants (Anderson and Tushman, 1990). Research findings indicate that, WiMax as a new technology has an impact on the way of Saudi SMEs business. For example, WiMax technology has helped SMEs who are involved in creative industries to deal with their business efficiently as discussed earlier.

Loch and Huberman (1999) claimed that diffusion concerns the spread of new technology in a market or user community. The technology diffusion literature opines that information diffusion as a key force in new technology deployment. According to Fourt and Woodlock, the technology deployment is described as a function of gathering interpersonal communication and media communication (1960). Moreover, interpersonal communication is defined as “word of mouth” (Bass, 1969; Mansfield, 1961), “epidemic communication” (Geroski, 2000) or “bandwagons” (Abrahamson and Rosenkopf, 1993).

Some researchers such as Abrahamson and Rosenkopf (1993) and Fiol and O’Connor (2003) have introduced the construct of bandwagon into technology diffusion. Bandwagon refers to a positive feedback loop and it is being increased by the number of adopters. Stronger bandwagon could be created by a stronger bandwagon and it could lead the number of adopters (Abrahamson and Rosenkopf, 1993). Some researchers such as Westphal et al., 1997; Abrahamson and Rosenkopf, 1993; Tolbert and Zucker, 1983; Strang and Macy (2001) and Meyer and Rowan (1977) claimed that, new technologies could be adopted by organisations because of the bandwagon and mass media communication. New technologies are mainly adopted based on the careful assessment of the selected technology’s efficiency and expected returns (Westphal et al., 1997; Abrahamson and Rosenkopf, 1993; Tolbert and Zucker, 1983; Strang and Macy, 2001; Meyer and Rowan, 1977). To explain technological diffusion for different organisations bandwagon theories are being used by many researchers (Gurbaxani, 1990; Kumar and Kumar, 1992; Rogers, 2003 for a comprehensive review).

The research findings also indicate that, bandwagon could have an impact on WiMax diffusion among Saudi SMEs. SMEs who participated in this research think that people in Saudi Arabia including SMEs get affected by each other’s opinion about any new technologies. Positive or negative impression about any kind of technology makes the people in the Saudi society think twice before purchasing it. Additionally, the herd culture and how people in Saudi Arabia perceive new

technologies might affect the adoption of WiMax by SMEs within the country. The other important factor that can play a possible role of the WiMax diffusion is the company's existing customers. Most of the Saudi SMEs believe that, there is a 'herd culture' in the Saudi Arabia. People copy each other without thinking about the advantages and disadvantages of the technology.

- **Consumer right protection**

Consumer protection means to protect consumers from different types of unfair trading practices. The main target of consumer protection is to avoid and exploit various business malpractices. To organise consumers; provide market information; for providing physical safety; avoiding monopoly business style; preventing from malpractices; avoiding pollution; to prevent misleading advertisement and informing consumers about their basic needs consumer right protection is important for any country (Haider, 2010).

A research conducted by Alshehri and Drew (2010) indicates that, security and privacy of information is a serious technical challenge for Saudi Arabia. It was also found from the research that, transfer of personal data (such as date of birth, name, credit card details and ID number), and sharing information with public agencies online or electronically using websites is not safe. People of Saudi Arabia are afraid and sceptical of the safety and security of their private information on e-services websites. People are afraid that there is not enough protection for their personal data stored electronically which can be seen and used by an unauthorised user, or may even be attacked by viruses.

In the Saudi Arabia CITC is the regulator of the information and communications technology sector. CITC are responsible for many regulations of ICTs including provision of affordable but advanced communications services; the creation of an environment that encourages fair competition; utilising frequencies efficiently, effective technological transfer and ensuring process clarity and transparency. In addition ensuring the principles of equality and non-discrimination in guaranteeing the interests of users and investors (CITC, 2011) CITC plays an important role.

However, the research findings indicate that, still there is a lack of consumer right protection in Saudi Arabia. SMEs who participated in this research strongly believe that, the Communications and Information Technology Commission (CITC) sector in the government does not apply their regulations effectively. SMEs in Saudi Arabia are not relying on new technologies because of insufficient government regulations in consumer protection. SMEs in Jeddah do not feel secure without having strict government roles that can protect them from vendors' aggressiveness. SMEs think that, the government should pay attention to this critical issue. They also think that, the government should have a special sector for monitoring the service providers.

SMEs also believe that, the existing government regulation for consumer protection is not effective. SMEs think that, the Saudi government is not applying the data protection regulation appropriately. SMEs think that, having an effective regulation regarding consumer right would encourage them to adopt new technologies such as WiMax without fear.

From the research it could be concluded that, governments need to provide a secure access point and consumer protection right to buy citizen's trust. In brief, consumer protection right in Internet service systems seems to be a significant challenge for the government and Internet vendors to deal with consumers in Saudi Arabia. It is indicated that, an effort should be made to address the impediments brought about by combined technical and cultural issues which might yield positive results. In practice, the increase in public awareness and sensitisation may be central to public acceptance of the innovation which may generate public trust on the security of the networked systems.

- **Customer service**

Customer service is the overall description of a desired relationship between a supplier and a customer. Customer satisfaction is the outcome of perceived value received by customer in a transaction or relationship, in relation to perceived service quality from the firm. This is compared to the value expected from transactions or relationships with competing related industries (Blanchard and Galloway, 2004).

In addition to that customer satisfaction should revolve around the customers and firms may have to enhance their services and go beyond meeting customer satisfaction (Scott, 2000). Customer service and satisfaction may therefore be defined by the service providers, thus customer service becomes an avenue of providing customer satisfaction. This implies that superior customer satisfaction may be built and enhanced with a good customer relationship (Azaddin, 2004).

Research findings also highlighted the importance of the customer service in the technology adoption by SMEs. WiMax vendors in Saudi Arabia are aware of importance of quality customer service. All the WiMax vendors are providing both online/offline services to their consumers in order to satisfy their consumers and to gain customer loyalty. Some of the services delivered by Saudi WiMax vendors are reviewing account details, checking bills, requesting new services, raising complaints, reporting faults and 24/7 customer helpline.

Customer satisfaction therefore in the opinion of Xeuming and Christian (2007), is an important influence in earning good customer relationship. It is also important and useful in understanding customer loyalty and their buying behaviour (Nadiri and Hussain, 2005). Therefore attracting new customers requires customer satisfaction which ultimately results to customer loyalty.

Customer loyalty refers to trust earned by a company as it provides and develops products or services that meet the expectation of their customers (Zymanski et al., 2001). Customer service is therefore a key issue in business transactions for building customer relationship. Quality customer service therefore may ensure customer loyalty.

However, it was found from the research that, Internet service in Saudi Arabia has some problems. Among these problems the lack of maintenance and customer service quality are the most important. For SMEs customer service and technical support are very important issues. They think that, in order to retain WiMax customer, service providers should make some efforts to build trust between them and their customers by providing honest and good customer service. It was found from the research that, SMEs are not only interested in the technology they are being offered but all extra services that they can get from the vendors. SMEs when adopting a technology, they expect effective customer service from the service providers and look for efficient help and support. Having such a good quality customer service could encourage them to be loyal with the particular service provider. A good quality service could encourage SMEs to go new service providers and adopt their available Internet services such as WiMax.

6.4 Enhancement of the Research Framework

The initial framework presented in chapter 2 (figure 2.7) considered three main dimensions that might have impact on the WiMax adoption by SMEs in the context of KSA. The dimensions that have been identified are the organisational culture profile, vendors' strategies and government policies. The dominant organisational culture type that has an impact on the WiMax adoption has been identified during the first phase of data analysis. In the second phase of data analysis, the government's views have been determined concerning the institutional theory attributes including knowledge building, knowledge deployment, mobilisation, subsidy, standard settings and innovation directive. The Saudi WiMax vendors' views have identified according to the disruptive theory dimensions concerning the convenience of WiMax, customisation and cost of use. The SMEs' managers/owners views have been addressed based on the combination of the institutional theory and disruptive theory attributes.

The dominant organisational culture type of Saudi SMEs in Jeddah is clan culture as found from the both phases of the research results. Moreover, from the research findings, it was found that the combination of Clan and Adhocracy culture in Saudi SMEs are more likely to adopt latest technologies such as WiMax. Saudi SMEs are also slightly dominated by the Market culture.

Additionally, the organisational culture characteristics of SMEs that have an impact on the WiMax adoption are identified. Age, size of SMEs, equity capital of SMEs, availability of Internet accessibility and trading type might have an effect on WiMax adoption by Saudi SMEs.

The views of the WiMax vendors, Saudi government's agencies and SMEs manager/owners were sought in relation to the attributes as mentioned earlier. The attributes that might have an impact on WiMax adoption by SMEs are identified according to SMEs expectations from vendors' strategies and government policies.

Based on disruptive theory, as mentioned earlier, convenience, cost and customisation of WiMax have been investigated. In terms of convenience of WiMax, flexibility and compatibility of WiMax service are the most important issues that have been emphasised by SMEs and WiMax vendors. The cost of WiMax has been emphasised by the Saudi SMEs, WiMax vendors and Saudi government. Low pricing policies, economy bundles, awareness of competitors and promotional offers could encourage the adoption of WiMax. Awareness of new Internet services and simplicity of WiMax are emphasised by vendors, SMEs and government under the attributes of customisation.

Additionally, based on the dimension of the institutional theory that has been mentioned earlier, government intervention and SMEs expectations have been investigated. Knowledge deployment, mobilisation, innovation directive and subsidy have been emphasised by SMEs as the important dimensions that might have an impact on WiMax adoption.

Moreover, the analysis resulted in uncovering some other issues which affect SMEs adoption of WiMax namely taxation, experience exchange, herd culture/ bandwagon, consumer right protection and customer service. In order to go deeper into how these issues affect the adoption of WiMax by SMEs, an updated framework is proposed in **figure 6.2**. This is done to provide a deeper understanding of the diffusion process.

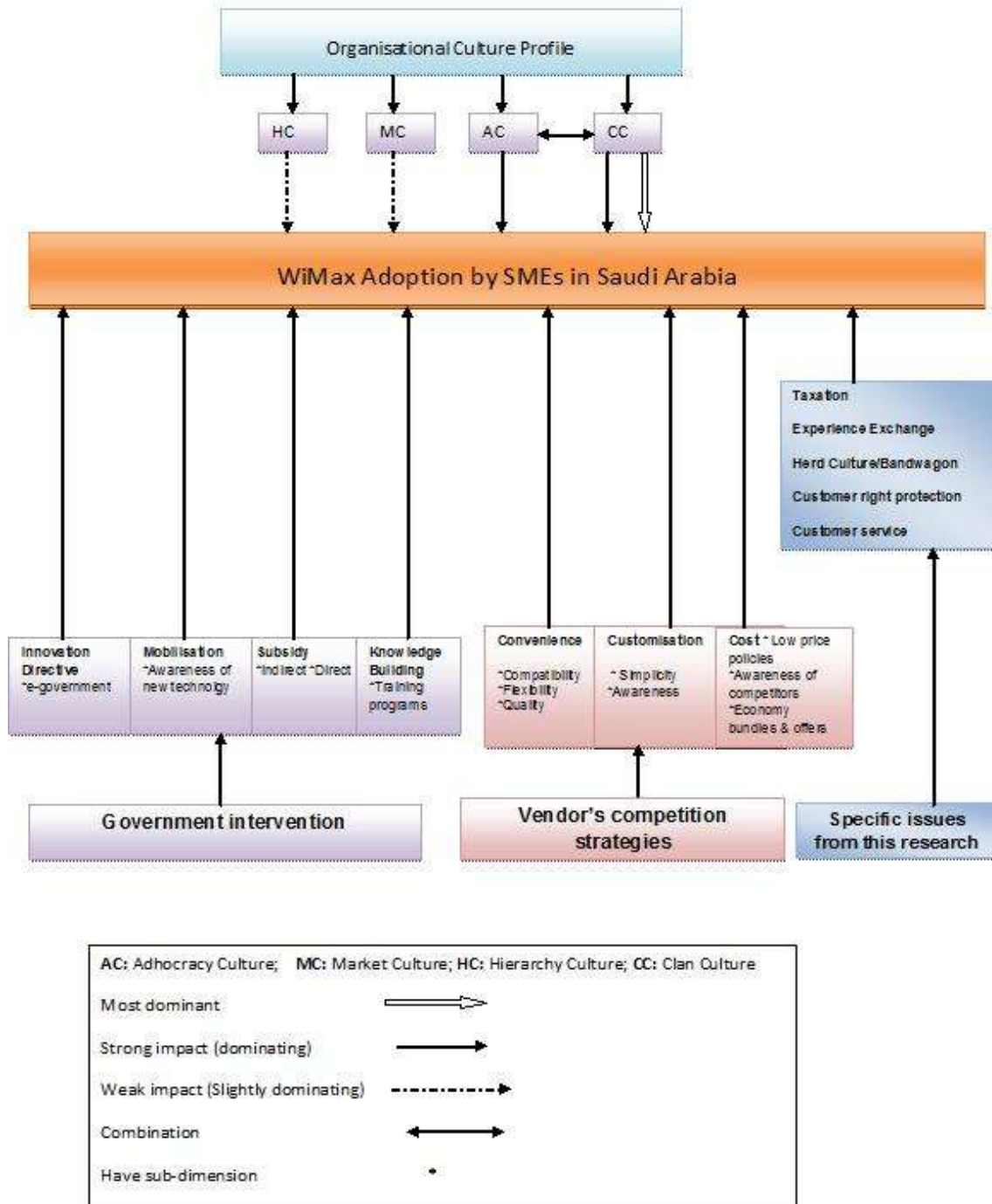
The framework of the research is initially intended to be used by SMEs, WiMax vendors, government agencies and academic researchers. The research framework provides valuable guidelines to SMEs, policy makers, technology vendors in diffusing and accelerating Internet technologies adoption and utilisation among SMEs in the private sector. However, other agents such as large organisations, consultants and business makers could use this framework as well.

1. The enhanced framework as a decision-making tool may be used to support organisations, and allow researchers understand technologies adoption by SMEs. The concepts of the proposed model can possibly be used for the analysis of other Internet technologies adoption.

2. SMEs can identify their organisational culture profile which would lead to better understanding to their organisational characteristics. Identifying the organisational culture profile for SMEs provides as a starter, a validated image of overall culture to enable effective change in the firm. It therefore facilitates both the assessment and change strategy within the organisation. Moreover, SMEs could use the framework to understand the government policies that have an impact on their business. They could also use it to understand the vendors' strategies which keep them updated with latest technologies introduced by technologies vendors in the Saudi market.
3. Saudi government agencies or any other government that is similar to it could use the research framework in many ways. The government could use the model to recognise the effects of their policies on the diffusion of technologies to SMEs. For government bodies or others whose task it is to support SMEs and promote Internet adoption in SMEs, the framework could be used to assist SMEs in identifying and adopting Internet technologies in the business process which would improve the competitiveness of organisations in the new digital economy. The implication is that it requires finding appropriate ways of identifying and transmitting required knowledge to the decision makers of the firms concerned. The growth and development of WiMax as Internet technology could involve the reviewing of government policies and incentives aimed at promoting the adoption of technology in the manufacturing and service sectors. In fact, the research framework could help explore and enhance the potential benefits of the ICT implementation effort by the Saudi government and provide an understanding of the issues influencing the adoption and implementation of Internet technologies such as WiMax. This will lead to more acceptable Internet technologies to enhance SMEs' capabilities and better choices for ICT.
4. For technology consultants and new technology vendors, the research framework has identified the organisational culture profile of SMEs that are more likely to make them adopt new technologies such as WiMax. Vendors and mediating institutions could focus more on establishing role models, to understand the specific problems of SMEs, understand organisational characteristics, and proactively promote successful diffusion in these organisations and, more importantly, target those segments whose characteristics indicate that they are likely to become WiMax technology adopters. Consequently, understanding issues affecting organisations' adoption of new technologies will enhance the effective design of strategies by technology consultants for the widespread adoption of Internet technologies such as WiMax. Technology consultants could use the research framework to help SMEs to

evaluate the resources needed for new technology adoption, offer ways to help SMEs to understand the prerequisites for launching their online presence.

Figure 6.2 Enhanced framework



6.5 Conclusion

Various issues have been discussed in this section, based on the research findings and existing literature considering WiMax adoption by SMEs. All these discussions are from the WiMax vendors, Saudi government representatives and SMEs in Jeddah. Research findings indicate that, for overcoming the existing problems of other Internet connections in Saudi Arabia, WiMax technology has come with effective features.

Discussion of both phases of the research indicates that, Saudi SMEs in Jeddah are mainly dominated by Clan culture. Moreover, from the research findings, it was found that the combination of clan and adhocracy cultures in Saudi SMEs is making them more likely to adopt latest technologies such as WiMax. Saudi SMEs are also slightly dominated by the Market culture.

Additionally, the organisational culture characteristics of SMEs that have an impact on the WiMax adoption are identified. Age, size of SMEs, equity capital of SMEs, availability of Internet accessibility and trading type might have an effect on WiMax adoption by Saudi SMEs.

Although WiMax technology began as an innovation with the potential to be disruptive and the possibility of replacing the widely diffused fixed wire line Internet connection, the research findings revealed an interesting deviation. In particular, the WiMax technology market analysis in Saudi Arabia highlighted the vendors' tendency to treat WiMax technology as sustaining innovation.

Discussion of disruptive theory dimensions including convenience, cost and customisation of WiMax have been also presented in this chapter. In terms of convenience of WiMax, flexibility compatibility of WiMax service and the quality of service are the most important issues that have been emphasised by SMEs and WiMax vendors. The cost of WiMax has been emphasised by the Saudi SMEs, WiMax vendors and Saudi government. Low pricing policies, economy bundles, awareness of competitors and promotional offers could encourage the adoption of WiMax. Awareness of new Internet services and simplicity of WiMax are emphasised by vendors, SMEs and government under the attributes of customisation. Research date also indicated that, WiMax technology has resolved the existing problems such as distance sensitivity or speed limitation in other Internet connections like DSL. Saudi WiMax vendors claimed that WiMax is quicker to rollout and diffusion is faster than other wire line technologies.

However, the price of the service offered by Saudi WiMax vendors is almost similar to other Internet connections in the country. This is not a characteristic of low-end disruptive innovation or new market as mentioned earlier. Furthermore, the findings show that, the WiMax vendors are interested to invest on more improvement of service quality according to consumers' expectations. Therefore, the quality

of WiMax technology would be improved in the long run to reach the mass market including SMEs. As WiMax is not following the disruptive innovation characteristics in terms of price, so it is not in the line of theoretical prediction that have been mentioned by Christensen et al. (2004).

Additionally, based on the dimension of the institutional theory, the government intervention and SMEs expectations have been discussed. Knowledge deployment, mobilisation, innovation directive and subsidy have been emphasised by SMEs as the important dimensions that might have impact on WiMax adoption.

Finally, the importance of the specific issues that have been uncovered by this research such as taxation, experience exchange, herd culture/Bandwagon, consumer right protection and customer service are discussed related to the adoption of WiMax by SMEs. WiMax adoption of Saudi SMEs is emphasised by Saudi government, WiMax vendors and SMEs in Jeddah. The next chapter presents the conclusions, contributions and further research for this work.



**CHAPTER 7: CONCLUSIONS & FURTHER
RESEARCH DIRECTIONS**

7.1 Introduction

The purpose of this chapter is to conclude the research presented in this thesis, and to provide its achievements and contributions. Also, this chapter will propose areas of further work. The chapter begins with a summary of the thesis and drawn conclusions derived from both the literature and empirical research reported in this thesis. The contribution and the research novelty of the thesis are claimed. Thereafter, the limitations in various phases of the research undertaken are then identified. Finally, this last chapter concludes with the identification and discussions of further research directions. The structure of this chapter is shown in figure 7.1.

Figure 7.1 Structure of the Chapter 7



7.2 Overview of the Research and Findings

This thesis started with an overview of the motivation for this research and its objectives in Chapter 1. **Chapter 1** began the research with an introduction and detailed explanations of the limitations of previous research and motivations for this one. This research identified the importance placed on WiMax technology and its use for exploring the benefits of using the Internet for SMEs. It is highly accentuated by several researchers ‘Wireless’ as WiMax is the future of broadband technology. WiMax certainly offers several advantages over the wired connections for Internet access such as greater mobility and flexibility, so that wireless devices can be used in the field for various purposes. Although WiMax technology overcomes the limitations of other Internet connections in Saudi Arabia, it has not been widely adopted by SMEs. It has been identified from the literature that, adoption of

new technology by SMEs could be influenced by a number of factors such as cost, user benefits, government policies; stakeholders' interests; geographic and demographic factors. WiMax technology studies focus on technology developments, deployments, benefits of use, challenges, and evaluation. It also focuses on adoption issues in healthcare and education, while there is little emphasis on the adoption of WiMax by SMEs and specifically in the context of KSA. However, there is limited research that has considered organisational cultural profile, vendors' commercialisation strategies and government interventions impact on the adoption of WiMax especially by SMEs in KSA. Therefore, the organisational culture assessment instrument has been chosen in this research to determine the dominant organisational culture type that has impact on the adoption of WiMax by SMEs. Moreover, the research identified the key dimensions in the Institutional theory and the theory of disruptive innovation to investigate WiMax vendors' commercialisation strategies and government intervention in relation to WiMax adoption by SMEs in context of KSA. Chapter 1 then states the aim of the research which is to investigate the impact of *organisational cultural profile, vendors' commercialisation strategies and government intervention on WiMax adoption by SMEs in the context of KSA*. Chapter 1 also presented an introduction to the literature review and methodology of the research. The research potential contribution to theory and practice are also highlighted in the first chapter.

Chapter 2 provided the background literature to this research. SMEs characteristics and the effect of their characteristics on the adoption of information technology were discussed. The chapter provided insights on SMEs and the adoption of technologies such as the Internet. In addition, previous research that examined SMEs and their use of information systems, the Internet, broadband and WiMax were also discussed. Moreover, the evolution of wireless broadband networks, such as Wi-Fi, was discussed along with the benefits and limitations of Wi-Fi. Wireless broadband adoption: A case of Wireless fidelity and various applications and advantages of WiMax technology are also included in the literature review. The gap in the normative literature with regards to WiMax adoption by Saudi SMEs has been identified in this chapter. This chapter also offered a detailed overview of the existing literature and in the research areas where this research is based, namely organisational cultural, vendors' commercialisation strategies and government intervention. The roles and interests of institutions involved in the diffusion of WiMax to SMEs in Saudi Arabia have been examined as well. The chapter has also considered various theories that have been used for the study of information technology use by SME such as TAM by Davis (1989) and Innovation Diffusion Theory by Rogers (2003). These theories are typically applied when considering individual adoption, whereas this research study focuses on the adoption of WiMax by SMEs in the context of KSA within *organisational cultural context, vendors' commercialisation strategies and government intervention*. Therefore, this research has been done with particular emphasis on the *organisational culture*

assessment instrument by Cameron and Quinn (1999), *disruptive innovation* according to Christensen's theory (1997, 2006) and *institutional theory* by King et al. (1994). The Organisational Culture Assessment Instrument (OCAI), developed by Cameron and Quinn (1999), is considered to be suitable for the purpose of this research. The OCAI is based on a theoretical model, the "Competing Values Framework" by Quinn and Rohrbaugh (1981) and Quinn and Cameron (1983). Christensen's theory (1997, 2006) offers different perspectives of innovation diffusion, focussing on strategies and behaviour of customers to existing technologies in the market. Particularly, Christensen examines the market player's commercialisation strategies of the innovation, based on their established position, in relation to the existing market segments. Moreover, King et al. (1994) study of government intervention in the diffusion of information technology, examined the forces of demand-pull and supply-push using the institutional theory. In order to move beyond the limitations of current innovation diffusion approaches the organisational culture assessment instrument, disruptive innovation and institutional theories dimensions have been applied in this research in the investigation of WiMax adoption by Saudi SMEs. Chapter 2 concluded by proposing a framework that synthesized all the dimensions, including organisational cultural profile, vendors' commercialisation strategies and government intervention.

Chapter 3 addressed the research methods used in this research to examine the adoption of WiMax by Saudi SMEs in order to answer the research questions. This chapter also discussed the research processes from different perspectives and their application to information technology context. The uniqueness of this study has been represented in its theoretical framework that has been translated into empirical questions. These questions were used in the survey questionnaire and interview. Both positivism and post positivism philosophies were used for the effectiveness of this research. This chapter has highlighted the research philosophy with particular focus on positivism and post positivism as well as deductive and inductive approaches, applicability of these philosophies to information systems in general and adoption of WiMax by SMEs in particular. The third chapter has also demonstrated the notion of quantitative and qualitative methods and the difference between them as well as their uses in information systems research. The justifications for the selection the particular methodological stand were presented together with the reasons for selecting both quantitative and qualitative methods for this research. Moreover, this chapter has illustrated the sampling strategy including population of the study and unit of analysis, sampling techniques in quantitative and qualitative research. The study instruments including the data collection procedure and conducting semi-structured interviews with SMEs owners/managers, government representatives, and WiMax vendors were also pointed out in this chapter. Additionally, the researcher has mentioned the data analysis strategy of survey data and semi-structured interviews. Validity of the quantitative data and

trustworthiness of qualitative data; the ethical issues such as informed consent, anonymity, privacy and confidentiality were also indicated in this chapter.

Chapter 4 presented the analysis of the results of the quantitative data of the first phase of this research. The view of 63 SMEs in city of Jeddah in Saudi Arabia has been analysed in this chapter. Descriptive statistics which include the frequencies and percentages have been analysed by the Statistical Package for the Social Sciences (SPSS). Chi square distribution was used as well in order to justify the validity of the collected data. Data of organisational culture were analysed using the Organisational Culture Assessment Instrument (OCAI) by Cameron and Quinn (1999). Data related to SMEs profile such as the decision making, Internet access, Internet connection type, trade type, numbers of staff and equity capital have been analysed. Furthermore, organisational culture profiles considering the trade type and Internet connection of SMEs are also analysed. The dominant organisational culture of Saudi SMEs in Jeddah that might have an impact on the WiMax adoption was identified in this chapter. It was found from the findings that, the dominant organisational culture type of Saudi SMEs in Jeddah is the clan culture. Moreover, Saudi SMEs who are dominated by a combination of adhocracy and clan cultures are more likely to adopt latest technologies such as WiMax.

Chapter 5 analysed the results of the semi-structured qualitative interviews conducted in the second phase of the research. The proposed framework in chapter 2 has been used in order to gather views of the participants involved in this research. The thematic data analysis process were used in this chapter to analyse the views of the only three WiMax vendors, five government representatives and five SMEs who participated in this research. The WiMax vendors' views were investigated based on the disruptive theory dimensions concerning the convenience, cost and customisation of WiMax. The government agencies views were analysed as well based on the institutional theory attributes which are knowledge building, knowledge deployment, subsidy, mobilisation, innovation directive and standard setting. The SMEs' managers/owners expectations were analysed based on the disruptive and institutional theory attributes that have been proposed in the framework of this research. Additional issues from chapter 4 such as the impact of organisational culture and importance of WiMax for SMEs have been investigated in this chapter as well. The main themes and sub-themes which are related to answer the research questions have been identified in this chapter based on disruptive innovation and institutional theories dimensions. Moreover, in this chapter the research has used constant comparative approach which has helped the researcher to compare SMEs perspective with both vendors and government perspectives. The analysis also led to the identification of umbrella issues which were not previously included in the framework but were important in explaining SMEs reasons for adoption or non-adoption of WiMax. They included taxation, experience exchange, Herd culture/Bandwagon, consumer right protection and customer service.

In **Chapter 6**, various issues have been discussed based on the research findings and existing literature considering WiMax adoption by SMEs. Discussions considering the research dimensions including organisational culture, WiMax vendors' commercialisation strategies, Saudi government policies towards ICTs adoption and SMEs perspectives have also been discussed in this chapter. Discussion of the both phases of the research indicates that, Saudi SMEs in Jeddah are mainly dominated by clan culture. Moreover, from the research findings, it was found that the combination of clan and adhocracy culture in Saudi SMEs could lead to adopt latest Internet technologies such as WiMax. Saudi SMEs are also slightly dominated by the Market culture. Additionally, the organisational culture characteristics of SMEs that have an impact on the WiMax adoption were identified as clan and adhocracy culture. Discussion on the key dimensions of competition of disruptive theory including convenience, cost and customisation of WiMax has been presented in this chapter. In terms of convenience of WiMax, flexibility and compatibility of WiMax service are the most important issues that have been emphasised by SMEs and WiMax vendors. The cost of WiMax has been emphasised by the Saudi SMEs, WiMax vendors and Saudi government. Low pricing policies, economy bundles and promotional offers could encourage the adoption of WiMax. Awareness of new Internet services and simplicity of WiMax are emphasised by vendors, SMEs and government under the customisation attribute. Research data also indicated that, WiMax technology has resolved the existing problems such as distance sensitivity or speed limitation in other Internet connections like DSL. Saudi WiMax vendors claimed that WiMax is quicker to rollout and diffusion is faster than other wire line technologies. However, the price of the service that offered by Saudi WiMax vendors is almost similar to other Internet connections in the country. This is not a characteristic of low-end disruptive innovation. Furthermore, the findings show that, the WiMax vendors are interested to invest on more improvement of service quality according to consumers' expectations. Therefore, the quality of WiMax technology would be improved in long run to reach the mass market including SMEs. As WiMax is not following the disruptive innovation characteristics in terms of price, so it is not in the line of theoretical prediction that have been mentioned by Christensen et al. (2004). Although WiMax technology began as an innovation with potential to be disruptive and possibly replace the widely diffused fixed wire line Internet connection, the research findings interestingly showed a marked deviation. In particular, the WiMax technology market analysis in Saudi Arabia also showed the tendency of the vendor to treat WiMax technology as sustaining innovation. Additionally, based on the dimension of the institutional theory, the government intervention and SMEs expectations have been discussed. Knowledge deployment, mobilisation, innovation directive and subsidy have been emphasised by SMEs as important dimensions that might have an impact on WiMax adoption. Although the government provided funds for ICTs diffusion in Saudi Arabia, the level of awareness displayed by SMEs is persistently low. This may be because SMEs are unique as are their needs. So, they need to be targeted as individual businesses with individual

needs as opposed to ‘one size fits all’ solution. Finally, the importance of the new issues that have been uncovered by the research such as taxation, experience exchange, Herd culture/Bandwagon, consumer right protection and customer service have been discussed in relation to the adoption of WiMax by SMEs. The conceptual framework was therefore adjusted to reflect these findings. The framework can therefore be used as a frame of reference when SMEs are taking their decisions for adopting new technologies. In doing so, the researcher has achieved the aim of this thesis as identified in chapter 1.

7.3 Research Contributions and Implications

This research set out to meet number of objectives as described in chapter 1, which have been accomplished as follows.

- *To critically review the WiMax literature and understand the area with a particular focus on SMEs in the context of KSA.*

Literature review examining existing research on Broadband and the Internet which showed that there is no focus on wireless broadband such as WiMax has been investigated. WiMax technology studies focus on technology developments, deployments, benefits of use, challenges, and evaluation. It also focuses on adoption issues in healthcare and education, while there is little emphasis on the adoption of WiMax by SMEs and specifically in the context of KSA. The factors that have an impact on WiMax adoption by SMEs and the relevant theories that are often used to study the adoption of new technology by SMEs have been analysed and assessed. The research issues including organisational culture, vendors’ commercialisation strategies and government policies roles regarding WiMax adoption by SMEs in KSA have been identified.

- *To investigate the organisational cultural profile in relation to WiMax adoption by SMEs*

To better understand the concept of organisational culture, several studies were explored in order to measure and map organisational culture. The Organisational Culture Assessment Instrument (OCAI), developed by Cameron and Quinn (1999), which is based on the Competing Values Framework (CVF) by Quinn and Rohrbaugh (1981), is considered to be suitable for the purpose of this research to determine the dominant organisational culture that might have an impact on the WiMax adoption by SMEs in Saudi Arabia. The organisational culture dimensions that form four types of dominant organisational culture types: hierarchy, clan, adhocracy and market have been identified to measure the organisational culture profile of SMEs in Saudi Arabia. These

four culture types are used to identify the organisational culture profile based on the core values, assumptions, interpretations, and approaches that exemplify organisations.

- *To investigate the vendors' commercialisation strategies and the government policies that might have an impact on WiMax adoption by SMEs.*

The roles and interests of institutions involved in the diffusion of new technology to SMEs in Saudi Arabia have been studied. Literature examining the vendors' commercialisation strategies and government intervention in new technology adoption by SMEs has been also examined. Christensen's theory (1997, 2006) disruptive innovation and institutional theory by King et al. (1994) have been identified to determine the Saudi WiMax vendors' commercialisation strategies and Saudi government's intervention in WiMax adoption by SMEs. The key dimensions and strategies of disruptive innovation have been examined. The ease of use dimension which is related to the low-end disruption strategy of disruptive innovation has been identified to investigate the WiMax technology adoption by SMEs in terms of convenience, customisation and cost of use. The examination of government intervention and the related influence of demand-pull and supply-push forces regarding WiMax adoption by SMEs in Saudi Arabia required the investigation of the six main actions of institutional theory. These are knowledge building, knowledge deployment, subsidy, mobilisation, standard setting and innovation directive.

- *To propose a conceptual model for WiMax adoption in SMEs and apply it in specific geographical context of KSA.*

To address those voids in the literature three factors were identified including organisational culture profile, vendors' commercialisation strategies and the government intervention. Therefore, the research model was developed based on prior theoretical background discussion, as reported in Chapter 2. By adopting the Organisational Culture Assessment Instrument (OCAI) by Cameron and Quinn (1999), together with the theoretical disruptive innovation by Christensen (1997, 2006) and institutional theories by King et al. (1994), the WiMax adoption in SMEs is conceptualised in terms of the identified factors and their sub-factors. In the first phase of the research the OCAI was employed and the organisational culture types of 63 Saudi SMEs have been identified in Jeddah in Saudi Arabia. In the second phase of the research, the views of three WiMax vendors, five government representatives and five SMEs who participated in this research have been analysed. The analysis also led to the identification of umbrella issues which were not previously included in the framework but were important in explaining SMEs reasons for adoption or non-adoption of WiMax. They included taxation, experience exchange, Herd culture/Bandwagon, consumer right protection and customer service. The conceptual framework was therefore

adjusted to reflect these findings. The conceptual framework as a decision-making tool may be used to support organisations, and to allow researchers understand SMEs' adoption of WiMax. The concepts of the proposed model can be possibly used for the adoption of other new technologies. **Table 7.1** presents the objectives of this thesis along with the evidence how they were met.

Table 7.1 Objectives of the Research and their achievement in chapters

Objectives of the Research	Chapters
To critically review the WiMax literature and understand the area with a particular focus on SMEs in the context of KSA.	2
To investigate the organisational cultural profile in relation to WiMax adoption by SMEs	2,4
To investigate the vendors' commercialisation strategies and the government policies that might have an impact on WiMax adoption by SMEs	2,5
To propose a conceptual model for WiMax adoption in SMEs and apply it in specific geographical context of KSA	2,6

The accomplishment of the above objectives has been made possible after the synthesis of the identified factors with the identified adoption factors (i.e. theoretical background), developing a novel conceptual model for the examination of issues related to the adoption of WiMax technology by SMEs in Saudi Arabia. This was demonstrated by their applications in the adoption of new technologies aiming to overcome limitations in the literature of innovations adoption and address open issues in the practice of new technologies adoption. Thus, this research has contributed to both theory and practice. The different components of this thesis therefore forms the individual elements of the contributions made: from the contextual information provided in Chapters 1, 2 to the research methodology reported in Chapter 3, through the empirical analysis of quantitative and qualitative data reported in Chapters 4 and 5, and finally, in the development of conceptual model presented in Chapter 6.

This research presents one of the initial efforts towards gaining an understanding of the adoption and diffusion of WiMax technology in SMEs in general, and in Saudi Arabia in particular. Also, this study is one of the very few empirical investigations that address the issue of adoption and diffusion of WiMax from the organisational culture, vendors' commercialisation strategies and government intervention views, which is beyond the individual view of adoption of WiMax. This study fills a gap in innovation research in developing economies and attempts to quantify in an area where research on WiMax technology adoption by Arabian firms is very limited.

In chapter 1, this research highlighted the point that while some countries have low broadband adoption rates, other countries have experienced phenomenally high rates. As a result, researchers in countries like KSA have investigated factors that contributed to the high success rates in countries such as Korea and Hong Kong. Although there is still a lot more that can be done to improve the adoption and use of the technology by the SMEs KSA, other researchers may adopt the use of the framework to study WiMax adoption by SMEs in other countries.

Some of the problems that have been identified in chapter 2 that can act as barriers to the diffusion of new technologies to SMEs have also proved important in this study. Factors such as the organisational culture, vendors' commercialisation strategies and government intervention and their sub-factors were identified in existing literature and also confirmed in this research. Moreover, cost of obtaining new technology, quality of service, flexibility of the technology, compatibility of the technology, simplicity of the technology, awareness, lack of adequate understanding of the new technology knowledge deployment, mobilisation, innovation directive and subsidy are examples of the barriers to the adoption of new technologies by SMEs that were also identified in existing literature as sub-factors of the previous factors and also confirmed in this research. The importance of the new issues that have been uncovered by the research such as taxation, experience exchange, Herd culture/Bandwagon, consumer right protection and customer service related to the adoption of WiMax by SMEs were also identified in existing literature and also confirmed in this research. As a result of the importance placed on these issues, as can be observed in the analysis from chapters 4 and 5, they were included in the framework and further analysed in chapter 6.

An important issue of any research contribution is how the results of a particular study can be generalised and proved useful in other research contexts. In other words, it is important for any researchers in the future to be able to use the conclusions of a particular research to study a similar subject in a different geographical, political or social setting. For this research, it is interesting to examine the relevance of its conclusions to other innovations, rather than WiMax technology or other geographical areas. This research has developed a theoretical framework that can guide future studies in the same research area. More specifically, the framework that has been developed in this research

can be applied by researchers considering studies in similar fields such as the diffusion of other new technologies and other studies involving SMEs. Additionally, the results of this research can prove useful for researchers studying the adoption of new technologies outside Saudi Arabia. The experience of countries where WiMax technology has been introduced earlier can guide SMEs in less technologically advanced countries in their adoption strategy formulation.

In addition to this research being beneficial to other researchers, it would also be beneficial to SMEs manager/owners, vendors and government that have been identified as pertinent to the WiMax diffusion process to SMEs. In the next sections the contribution of this thesis will be presented in terms of theoretical, methodological and practical contributions.

7.3.1 Contribution to Theory

The most important contribution of this thesis is the development of a comprehensive validated novel framework for Internet technologies adoption in SMEs such as WiMax technology (see Figure 6.1). The research framework makes a contribution at two levels. Firstly, at the conceptual level, it incorporates aspects identified in previous studies as influencing the adoption of technologies by SMEs. The researcher extends and analyses this work by classifying them into three categories, namely: (1) SMEs organisational culture profile, (2) government policies, and (3) vendors strategies. The factors representing each category were later examined through empirical data. In addition, based on the theoretical background analysis, a number of research questions were presented which helped the researcher to identify the parameters that can be used to explain the different factors focused on when taking decisions for WiMax technology adoption by SMEs. The identified parameters were then incorporated in the proposed research framework, and these results in the development of a framework for the adoption of WiMax technology in SMEs. Secondly, at the theoretical level, the empirical data was interpreted and analysed through theoretical diffusion and resource-based theories, resulting in the identification of new issues which were also incorporated in the proposed research framework. The proposed framework supports better understanding in the research area and better decision-making.

This research identified the limitations of previous studies in the field of wireless broadband such as WiMax and technologies adoption. One of the limitations that were highlighted was impact of the organisational culture, vendors' commercialisation strategies and government intervention on WiMax adoption by SMEs in KSA. Rather than using these factors individually, these factors have been identified together to study the WiMax technology adoption by SMEs from different aspects. Therefore, some dimensions from organisational culture framework, disruptive innovation and institutional theories have been used as theoretical base to investigate these factors. The organisational culture framework has not been previously used with disruptive innovation and the institutional

theories frameworks. Previous research has tended towards criticizing one approach and embracing the other. However, by synthesizing these theories, weaknesses in one are complemented by strengths in the other and vice versa. The research has therefore made contributions to the organisational culture disruptive innovation and institutional frameworks and provides an opportunity for further research in the area.

The ease of use dimension which is related to the low-end disruption strategy of disruptive innovation has been identified to investigate the WiMax technology adoption by SMEs in terms of convenience, customisation and cost of use. To also examine government intervention and the effects of the demand–pull and supply–push forces regarding WiMax adoption by SMEs in Saudi Arabia, Therefore, the research model was developed based on prior theoretical background discussion, as reported in Chapter 2 by adopting the Organisational Culture Assessment Instrument (OCAI) by Cameron and Quinn (1999), with the theoretical disruptive innovation by Christensen (1997, 2006) and institutional theories by King et al. (1994).

In the case of *organisational culture framework* this research offered the introduction of the organisational culture in the study of adoptions of information technology innovations. Through the four types of organisational culture (hierarchy, clan, adhocracy and market), the clan and adhocracy cultures have been identified in this research as the most common organisational culture profile that have an impact on the WiMax technology adoption by SMEs in Jeddah. The organisational culture concept has not been explicitly used in the literature of adoption of Internet technologies by SMEs especially in KSA and this research provided a review of its implicit use and identified issues related to the organisational culture and its impact on the adoption of Internet technology such as WiMax.

This research also adopted the key dimensions for competition of the *disruptive innovation theory* namely the ease of use dimension which has been measured in terms of convenience, customisation and cost of use in relation to WiMax technology adoption by SMEs in KSA. The ease of use dimension is related to the low-end disruption strategy (Christensen et al., 2004; Schmidt and Druehl, 2008). This dimension has been used to study the WiMax technology vendors' commercialisation strategies in relation to its adoption by SMEs in Saudi Arabia. This research presented an effort to develop a more comprehensive analysis of the competition dimensions proposed by Christensen et al. (2004) in the case of low-end disruption, by using these dimensions along with the *institutional* theory dimensions and organisational culture framework to study the WiMax technology adoption by SMEs in context of KSA. Although WiMax technology started as an innovation that has the potential to be disruptive, the WiMax technology market analysis in Saudi Arabia highlighted the vendors' tendency to treat WiMax technology as a sustaining innovation. According to Christensen et al., (2004), the disruptive innovation is cheap, simple, small and convenient to use. A new value proposition is

introduced by disruptive innovations in its creation of new markets or reshaping of existing markets (Christensen et al., 2004). As WiMax is not following the disruptive innovation characteristics in terms of price, so it is not in the line of theoretical prediction that have been mentioned by Christensen et al. (2004). As WiMax is not following the disruptive innovation characteristics in terms of price, so it is not in the line of theoretical prediction that have been mentioned by Christensen et al. (2004).

Furthermore, this research used the *institutional theory* (King et al, 1994) framework to examine the demand–pull and supply–push forces in Saudi government intervention for WiMax technology diffusion to SMEs. Looking at the existing trends in the study of WiMax technology adoption and policy making, the recognition of institutional intervention and their roles in the diffusion process provided the starting point for further developments in these research areas. The institutional intervention concept has not been explicitly used in the literature of adoption of Internet technologies by SMEs especially in KSA and this research provided a review of its implicit use and identified issues related to government intervention and its role on the adoption of new technology such as WiMax by SMEs. Through the six main actions of institutional theory that have been investigated in this research (knowledge building, knowledge deployment, subsidy, mobilisation, standard setting and innovation directive), the Knowledge deployment, mobilisation, innovation directive and subsidy have been emphasised by SMEs as the most important government interventions that might have an impact on WiMax adoption by them.

Finally, further important issues have been uncovered by the research such as taxation, experience exchange, herd culture/bandwagon, consumer right protection and customer service that also explained adoption behaviour emerged from the analysis thus contributing to the perceived attributes in disruptive innovation and institutional theories in relation to the adoption of WiMax technology by SMEs. These additional issues *perceived future prospect* has been considered as an influence on adoption of WiMax technology by SMEs. The findings of this research can be useful to guide analysts and researchers in determining critical aspects of the complex issues involved in technologies adoption, and lead to suggestions for further valid research. **Table 7.2** below summarises the contribution of this research to WiMax technology, organisational culture, disruptive innovation and the institutional theories.

Table 7.2 **Research Contribution (theoretical)**

Research area	Existing research	Contribution of this research
Adoption of WiMax technology	<ul style="list-style-type: none"> • Focused on WiMax technology developments, deployments, benefits of use, challenges, evaluation, adoption issues in healthcare and education 	Examination of the adoption of WiMax by SMEs in context of KSA
Organisational culture framework	<ul style="list-style-type: none"> • Focused on measuring and mapping organisational culture and MIS adoption in large organisations • Not used with Disruptive Innovation and Institutional theories 	Measuring the organisational culture of Saudi SMEs and its impact on the WiMax technology adoption
Disruptive Innovation theory	<ul style="list-style-type: none"> • Focused on VoIP, Wi-Fi, IP telephony • Not used with Organisational culture framework and Institutional theories 	Examination of the WiMax vendors' commercialisation strategies in relation to SMEs in the context of Saudi Arabia
Institutional theory	<ul style="list-style-type: none"> • Focused on e-commerce, e-government, assessing government policies towards IT innovation diffusion in countries such as UK, Italy, Latin America • Not used with Organisational culture framework and Disruptive Innovation theories 	Investigation of the Saudi government policies towards ICTs adoption and WiMax technology in relation to SMEs
Organisational culture framework, Disruptive Innovation and Institutional theory	None	The synthesis of three theories for the examination of WiMax by SMEs in Saudi Arabia

7.3.2 Research Implications for Practice

This research has contributed to policy and practice by providing a rich insight into the SMEs' experience of wireless broadband adoption especially WiMax technology. Adoption of new technology such as WiMax could be helpful for SMEs to change the traditional way of doing business. The adoption of such a technology could be affected by many factors as discussed in chapter 2. Theoretically grounded in organisational culture, vendors' commercialisation strategies, government policies framework, this thesis represents an early attempt to examine these factors. Findings of this research have a number of important implications that may assist SMEs managers/owners, technology consultants and new technology vendors, and government and policy makers to facilitate WiMax technology adoption by SMEs. These implications are discussed below.

7.3.2.1 Implications for SMEs managers/owners

This research has helped the SMEs to identify their organisational culture profile which would lead to better understanding to their organisational characteristics. Identifying the organisational culture profile for SMEs provides a validated and quantified image of overall culture to enhance effective change in an organisation. It therefore facilitates both assessment and change strategy within the organisation.

Empirical findings from this study demonstrate the importance of management roles in developing countries such as Saudi Arabia on adoption of new technology by SMEs. In fact, without the commitment and the support of SMEs managers/owners, WiMax technology will not be adopted. SMEs' managers/owners support is imperative for enhancing the extent of WiMax adoption. SMEs managers/owners should direct their significant influence on organisational members to see the promise and importance of adopting WiMax technology.

Undoubtedly, if SMEs managers/owners are motivated to innovate and/or have favourable attitudes toward the innovation, there is likely be a positive attitude to adopt the technology, and resources will be allocated for its acquisition and alteration. In fact, SMEs managers/owners can demonstrate their support belief and participation via various types of support mechanisms, such as working groups, training activities and programmes. They should acknowledge the need to exploiting the full potential of WiMax technology which will require them to go beyond initial financial investment. Findings from the research also suggest that IT readiness influences WiMax adoption in a firm. Both financial and organisational resources have great importance in the adoption of this technology. This suggests that SMEs with a level of technological resources may be more likely to adopt WiMax technology.

Moreover, studying the government roles in WiMax diffusion to SMEs can result in the SMEs in particular, becoming aware of certain government policies and how they affect them. In addition, in order to ensure that their businesses are enhanced, the SMEs need to become more aware of their own needs and take some time out to learn about the technologies that would fulfil those needs. These would lead to their ability to identify and maximise whatever benefits the technology they adopt have to offer to their businesses.

7.3.2.2 Implications for technology consultants and new technology vendors

This research points to important practical implications for technology consultants and new technology vendors. Firstly, the research has identified the organisational culture profile of SMEs that are more likely to adopt new technologies such as WiMax. SMEs who are dominated by clan and adhocracy cultures are more likely to adopt new technologies such as WiMax. Vendors and mediating institutions could focus more on establishing role models, to understand the specific problems of SMEs, understand organisational characteristics, and proactively promote successful diffusion and, more importantly, target those segments whose characteristics indicate that they are likely to become WiMax technology adopters. Consequently, technology consultants will be enabled to design effective strategies enhancing the widespread adoption of Internet technologies such as WiMax, based on the knowledge of the factors influencing the adoption of new technologies. Secondly, the lack of knowledge of the potential benefits of adoption in the short and long term, by decision makers, sometimes delay the take-up of new IS innovations. Generally, lack of awareness of the potential benefits of WiMax technology can hinder its adoption by SMEs. The study found that lack of awareness was an important factor influencing the adoption of new technologies such as WiMax. Non-adopters of WiMax technology were found to be unaware of the existent or benefits of this technology. Therefore, it is essential for technology consultants and vendors to educate SMEs about the potential benefits of using ICTs applications and adopting new technology including WiMax. That could be achieved by developing a training strategy that actively communicates the benefits of using the ICTs technologies through promotional seminars, workshops, presentations and on-site visits. This would protect firms against any adverse developments, and will provide a supportive business environment. It is believed that training sessions offered by vendors should have a crucial role in the learning process and should be concerned with building an image of the strategic benefits of ICTs.

Finally, technology consultants can help SMEs to evaluate the resources needed for new technology adoption, offer ways to help SMEs to understand the prerequisites for launching their online presence and also offer some incentives dedicated to potential ICTs applications adopters, such as developing an interactive website. Furthermore, technology consultants and vendors can increase the WiMax rate of adoption among SMEs by offering trial periods before full adoption of the technology. This would

create awareness and demonstrate what WiMax technology can do for an organisation and how it can be different than other Internet connections. Vendors should also take care of the service quality provided to SMEs as they stated this issue as an important factor to adopt WiMax technology.

7.3.2.3 Implications for government and policy makers

The research shows the regulatory environment as an important issue influencing SMEs' adoption of Internet technologies such as WiMax. Internet technologies adoption requires the existence of appropriate government policies and regulations. Such policies include promotion of computer use among SMEs, endorsement of low taxes and tariffs on computer imports and consumer rights protection. Indeed, government support is a critical factor in fostering Internet technologies and has an important role in overcoming these concerns and challenges.

The government could also benefit from this research by recognising the effects of some of their policies on the diffusion of technologies to SMEs. In the literature review, it was stated that the Saudi government is seeking to extend the Internet infrastructure development by establishing new policies, plans, strategies and funds in the entire country including rural areas. The government of Saudi Arabia has recognised the importance of media role in wide-spreading the technological awareness amongst populations. However, further research in chapter 5 revealed that SMEs are not getting any funds regarding ICTs adoption and they do not know about any new technologies that have been established in the country. This suggests that SMEs could benefit from the awareness programs supported by funding from the government. There is also a need for the government to acknowledge that SMEs are unique as are their needs and make provision to address each SME according to their needs as opposed to lumping them together and providing the same initiatives for all of them.

For government bodies or others whose task it is to support SMEs and promote Internet adoption in SMEs, one implication would be to assist SMEs in identifying and adopting Internet technologies in the business process which would improve the competitiveness of organisations in the new digital economy. It is thus implied that getting the required knowledge after its identification to decision makers would have to be done systematically. The growth and development of WiMax as Internet technology could thus require a review of government policies and incentives with a view of enhancing technology adoption in the manufacturing and service sectors.

As mentioned earlier, the Saudi government has resolved to transform the country into a digital society by ensuring that business processes are enhanced electronically with various policy measures. In fact, the research model will help enhancing the potential benefits of ICT implementation effort of the Saudi government by providing an understanding of the influence issues in the adoption and implementation of Internet technologies such as WiMax. This will lead to more acceptable Internet

technologies to enhance SMEs' capabilities and better choices for ICT. It is to be noted that, the Saudi private sector plays a critical role in creating employment opportunities and the government aims to increase Saudi employment in the private sector. However, women in Saudi Arabia mainly work in public sector jobs which do not involve mixing with men. In fact, the social and cultural barriers against female interaction with men seem to stop any effort to increase female participation rates in Saudi Arabia. By encouraging and supporting SMEs to adopt Internet technologies like WiMax could lead to adopt other technologies such as e-commerce. Women could establish their own business easily from home or work in jobs such as customer support over the Internet and online marketing.

Taking all the above into account, it can be argued that the contributions of this research are important for SMEs, technology consultants, vendors and policy makers. Therefore, this research is viewed as being relevant to the current era of rapid diffusion and adoption of Internet technologies such as WiMax. Finally, the above discussion on contributions and implications of this research has led to provide valuable guidelines to SMEs, policy makers, technology vendors in diffusing and accelerating Internet technologies adoption and utilisation among SMEs in the private sector.

7.4 Limitations of the Research Approach

In this research, effort has been made to develop a comprehensive research framework, employ reliable and valid measures of study variables, and analyse the data using robust and powerful techniques. Furthermore, a research design has been chosen that maximizes the generalisation of research findings. However, as with any study of this nature, it is wise to recognise and understand all of the limitations of the work. The areas of these limitations will be discussed in turn.

First, this study only examines WiMax technology adoption at a specific time. It is however argued that members' attitudes and behaviours are developed over time in a socialisation process, which relates to experiences in diffusion of innovation where member's attitudes are also developed over time (Zmud, 1982; Ouchi, 1979). Therefore, there is no way to avoid including time when diffusion is studied and a longitudinal study would be preferable. However, such research project requires much financial investment and human effort. This was deemed impossible for this research study.

The second concern might arise from the use of a single respondent where the study utilises a key decision maker who provides relevant information as the representative of the decision-making unit in SME. It is assumed that these managers/owners are involved with the strategic activities of the organisations, have had a particular experience they can elaborate upon, and are credible sources of information about an organisation's functions, activities and operating environment. Multiple

respondents from each SME are more favourable for such research. However, access would have been difficult, and probably would have resulted in a smaller usable sample size from SMEs.

Third, inadequate literature was one of the important limitations in the secondary source of data. As the studies about Internet technologies adoption by SMEs in Saudi Arabia are limited. Resources such as primary data collection from various respondents including government representatives, WiMax vendors and SMEs of this research were time consuming and not an easy task. Furthermore, data collection from SMEs was difficult for the researcher because they were not interested to share information due to their registration issues. The reliability, validity and comprehensiveness of the theory might have been improved if more empirical data had been available.

Finally, the study was limited to the city of Jeddah (the most cosmopolitan city in the western region of Saudi Arabia). In fact, more research is needed to validate the results obtained so far for WiMax technology adoption determinants, to increase generalisation of results making it applicable in the various contexts of regions, countries, and cultures; and to make meaning of the role of cross-national differences on organisational adoption including adoption by consumer.

7.5 Areas for Further Research

Findings from this research and its limitations have paved the way for future research directions and investigations. Several future research recommendations and suggestions are thus presented. Firstly, this research is aimed to investigate WiMax technology adoption by SMEs, it would be interesting to use the research model to examine other types of technologies such as VoIP and IP telephony. Also, the framework could be used to study the adoption of Internet technologies by non-profit organisations such as religious organisations, government agencies and academic institutions in order to identify potentially important factors that may facilitate the adoption of WiMax technology in educational institutions and other non-business settings. Unfortunately, the area of non-business ecommerce has not attracted any serious empirically based research in the Middle East.

Secondly, it would be useful to conduct a follow up study to find out the financial, operation and relationship benefits of adopting WiMax to enrich understanding of how WiMax technology contributes to SMEs performance improvement.

Thirdly, findings reported in this study should be interpreted with caution due to the sample size. Future tests and refinements of the proposed model using a larger sample will be extremely useful in advancing knowledge of the determinants of WiMax adoption in developing countries. Particularly, comparative, case study research targeted at rural, remote areas with comparisons made to the

advanced regions in other developing countries would be desirable. Other researchers may identify whether the findings of this study are valid for different types of innovation and should see how factors change as the type of innovation changes.

Finally, as discussed above (in Section 7.4), although a longitudinal research design is relatively costly and time consuming, it is suggested that future research can adopt a longitudinal process method to explore the adoption behaviour over time and to determine the causal links more explicitly. For instance, if time allowed, the researcher would ask permission from the participating SMEs to follow up the survey on the same respondents after the adoption of new innovation aiming to assess how their organisational culture profile change in the future. This further research would compare in more detail the factors that motivate SMEs in the pre-adoption stage, the initial adoption stage and the post-adoption stage of the new technology use. This would certainly be a significant contribution to the future of innovation adoption and information systems (IS) literature. The research therefore identifies the need to recognise and gain access to the right people who will be able to embrace the new innovation and avoid the underuse of the technology. Literature on technology acceptance model (TAM) also reveals that there is a tradition of individual acceptance models in information systems where some individuals accept innovations readily and easily while others do not. However, research on individual acceptance of innovation in organisational environments is few requiring much to be learnt about the organisational dynamics with respect to innovation acceptance (Gopalakrishnan and Damanpour, 1992). The need to have knowledge of personal characteristics, organisational and social processes in organisational adoption decision therefore calls for future research. Moreover, longitudinal studies may provide richer insights into the determinants of innovation acceptance in organisations.

In conclusion, Internet technologies represent a major opportunity for SMEs in less developed countries that are able to use it effectively. Internet technologies adoption by SMEs remains a complex, elusive, yet extremely vital phenomenon.

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APPENDICES

APPENDIX A

This appendix contains the ethical approval that served as authorised basis for conducting the survey and interviews during the first and second phase of this research.

School of Information Systems, Computing and Mathematics
David Gilbert, Head of School, Professor of Computing
Jasna Kuljis, Head of Information Systems and Computing, Professor of Computing
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Date: 01 December 2011

STATEMENT OF ETHICS APPROVAL

Proposer: Inam Abdulqader Abousaber

Title: WiMax adoption by SMEs in Saudi Arabia

The school's research ethics committee has considered the proposal recently submitted by you. Acting under delegated authority, the committee is satisfied that there is no objection on ethical grounds to the proposed study. Approval is given on the understanding that you will adhere to the terms agreed with participants and to inform the committee of any change of plans in relations to the information provided in the application form.

Yours sincerely,



Professor Zidong Wang
Chair of the Research Ethics Committee
SISCM

APPENDIX B

This appendix contains the questionnaire questions that served as basis for the survey carried out during the first phase of this research.



Organisational Culture and the Adoption of WiMax by SMEs In Saudi Arabia Questionnaire

A survey conducted by
Miss. Inam A Abousaber

School of Information Systems, Computing and Mathematics, Brunel University

To Whom It May Concern:

I am a full-time Ph.D. student at the Department of Information Systems and Computing, Brunel University, UK.

The purpose of this survey is to collect information on your experience with using WiMax to determine the impact of the Saudi's organisational culture on the adoption of these technology in SMEs. The final results of this study will be available to all those interested who participated in the study upon request.

This questionnaire is aimed for senior management and decision makers who are using/not using or think they will be using WiMax in their organisations. Your assistance in completing the attached questionnaire would be greatly appreciated. Please remember that it is important to complete the survey according to the instructions provided for each part.

This is a confidential, anonymous survey. Detailed results of the survey will be confidential to the researcher only. No names will be entered to the study database. No individual feedback will be given to any party. Responses will be assigned a sequential number and only the aggregated results will be reported.

Completion of the questionnaire will take about <15 min.>. Please return the completed questionnaire as soon as possible to email (Inam.Abousaber@brunel.ac.uk) or by postal address shown below, whichever is convenient to you.

Your reply to this questionnaire is very essential to my study.

Thank you for your assistance in this project.

Yours sincerely,

Inam Abousaber

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**Organisational Culture and the Adoption of WiMax by SMEs
In Saudi Arabia Questionnaire**

A survey conducted by
Miss. Inam A. Abousaber
School of Information Systems, Computing and Mathematics, Brunel University

General Instructions

There are 2 main parts to the questionnaire:

- I. General demographic and organisation questions.
- II. Organisational culture questions.

- Please, **answer all questions as appropriate** according to the instructions provided.
- Please don't think hard about answer just put the first answer that comes to your mind.
- Try to complete the questionnaire in one setting.
- Read the instructions at the start of each part carefully.
- Always mark only **one** answer per question.
- If you feel any question does not apply to you or for any reason you don't want to answer it, just go to the next question.
- We would like to have your written comments (if any) or explanations on any issue, whether or not this is covered in the questionnaire. Please use the **comments sheet** for this purpose.
- If you have any doubts or have a question or you require any assistance concerning the questionnaire, please do not hesitate to contact: Miss. Inam A. Abousaber, Department of information systems, Brunel university, Uxbridge UB8 2DF, + 44 (1895) 27 4000, E-mail: Inam.Abousaber@brunel.ac.uk. For convenience you may also use our Fax. + 44 (1895) 251686
- If you would like to participate please read and sign below. Thank you.

I have read the information sheet and the consent form. I agree to participate in the study and give my consent freely. I understand that the study will be out as described in the information statement, a copy of which I have retained. I realise that whether or not I decided to participate is my decision. I also realise that I can withdraw from the study at any time and that I do not have to give any reasons for withdrawing. I have all questions answered to my satisfaction.

Signatures:

.....
Participant

.....
Date

Part I- Personal and Organisational Information

This part is general information about yourself and the organisation that you work for.

Personal:

A1- What is your gender?

Male

Female

A2- What is your age?

1	2	3	4	5
Up to 24	25-34	35-44	45-54	55+

A3- What is your educational level?

1	2	3	4	5
Secondary school	High school	Diploma	First degree	Post graduate

A4- Did you have any training in Information Technology (IT) or related area of IT?

Yes, please specify:

No

A5- Have you had any education abroad (outside your native country)?

Yes

No

Organisation:

B1- Are you the main decision maker in the organisation?

Yes

No

B2 - Do you have internet access for your business?

Yes

No

B3- If yes, what kind of connection do you usually have

1. DSL

2. WiMax

3. VSAT

4. I do not know

5. Other specify:

B4- What is the main area of your business?

.....

B5- What is the total number of staff at your organisation (Approximate)?

B5- What is the total number of staff at your organisation (Approximate)?

1	2	3	4	5
1-4	5-9	10-49	50-99	100+

B6- How much is the equity capital for your business?

1	2	3	4	5
Up to R.999,000	1000,000-1999,000	2000,000-2999,000	3000,000-4999,000	5000,000+

Part II - The Organisational Culture

In this section we are going to characterise your organisation's culture. This part consists of 6 questions that you are asked to rate your organisation. Each question has four alternatives. Divide 100 points among the four alternatives depending on the extent to which each alternative fit to your own organisation. Give a higher number of points to the alternative that is most fit to your organisation. (For example, in question 1, if you think alternative A is very similar to your organisation, alternative B and C are somewhat similar, and alternative D is hardly similar at all, you might give 50 points to A, 25 points to B and 20 points C, and give 5 points to D. Be sure that your total equals 100 for each question).

Note that the response column labelled "Score". These responses mean that you are rating your *organisation as it is currently*.

B1. Dominant Characteristics		Score
A	The organization is a very personal place. It is like an extended family. People seem to share a lot of themselves.	
B	The organization is a very dynamic entrepreneurial place. People are willing to stick their necks out and take risks.	
C	The organization is very results oriented. A major concern is with getting the job done. People are very competitive and achievement oriented.	
D	The organization is a very controlled and structured place. Formal procedures generally govern what people do.	
Total		100
B2. Organizational Leadership		Score
A	The leadership in the organization is generally considered to exemplify mentoring, facilitating, or nurturing.	
B	The leadership in the organization is generally considered to exemplify entrepreneurship, innovating, or risk taking.	
C	The leadership in the organization is generally considered to exemplify a no-nonsense, aggressive, results-oriented focus.	
D	The leadership in the organization is generally considered to exemplify coordinating, organizing, or smooth-running efficiency.	
Total		100
B3. Management of Employees		Score
A	The management style in the organization is characterized by team work, consensus, and participation.	
B	The management style in the organization is characterized by individual risk-taking, innovation, freedom, and uniqueness.	
C	The management style in the organization is characterized by hard-driving competitiveness, high demands, and achievement.	
D	The management style in the organization is characterized by security of employment, conformity, predictability, and stability in relationships.	
Total		100

APPENDIX C

This appendix contains the semi-structured list of subjects-questions that served as basis for the interviews carried out during the second phase of this research.

Vendors interviews questions

General questions:

Duration:

Name of organisation:

Major sector:

What is your position in the organisation? For how long it has been held?

Your level of education:

Age category:

Research questions:

- **Questions focused on benefits of WiMax technology to SMEs, WiMax technology diffusion, organisational culture and the firm's strategy on targeting SMEs, positioning and offerings of the service.**
1. Would you recommend WiMax for all SMEs?
 2. On what basis do you recommend WiMax for them?
 3. Who would you say is responsible for diffusion of WiMax to SMEs?
 4. Any suggestion on who else can provide insight on these issues?

5. Do you think existing government policies support the WiMax development or diffusion? Explain.
6. What policies are in place to ensure awareness? (What plans that you have to ensure awareness of WiMax to SMEs?)
7. What plans or strategies that you have as a service provider for widespread availability of WiMax? Do you think that would help in its diffusion?
8. Is your policy considering type of technology over another? Why.
9. Do you have any programs to support SMEs to encourage them to adopt new Internet technologies such as WiMax?
10. Do you think that norms, beliefs, and attitudes of the people in the SMEs would make the adoption of WiMax easier? If so, how?

• **Questions that explored vendors' views of the three dimensions of competition**

11. A user may consider the value of using DSL or any other connections what do you think?
12. In what way/s is WiMax better than DSL or other connections?
13. In what ways would it affect/improve SMEs business?
14. How compatible is WiMax with existing hardware & software that your consumers already have including SMEs?
15. Providers' willingness to offer a new service is not always based on as the usefulness of the technology. What do you think?
16. Do the consumers need a special training to be able to use the WiMax?
17. Are you aware of the consumers' requirements? For example some of the SMEs have limited technical skills?
18. To do so what do you do as a WiMax provider to help them?
19. Do you offer the required devices such as a modem, chip to the consumers including SMEs?
20. What do you think about the quality of WiMax that you provide for the SMEs?
21. How receptive are SMEs towards WiMax?
22. How easily would it blend into SMEs existing practices? How easy is it to use?
23. WiMax came with a promise of low price and high speed especially for those who suffer from bad Internet infrastructure and high price for broadband in their country. For how extent is that true in Saudi Arabia?
24. In terms of prices, how much WiMax costs?
25. Is it cheaper than the other services such as DSL?
26. Are you aware of the consumers' need of low price?
27. What policies that you have to keep the price affordable to all SMEs?

28. Do you have any economic packages or bundles for WiMax to SMEs? Explain.
29. Are you aware of the other competitors that providing the same service such as WiMax?
30. What policies that you have to keep your existing customers or to attract a new ones?
31. Can you give me an estimation of the number of SMEs who have purchased WiMax from your company? Anything to add?

Government interviews questions

Duration:

Government representative:

General questions:

What is your position in the organisation? For how long has it been held?

Your level of education:

Age category:

Research questions:

1. Would you recommend internet for all SMEs?
2. On what basis do you recommend internet?
3. What policies are in place to ensure awareness (What planes that Saudi Government has to ensure awareness of WiMax to people? Such as broadband campaign, media newspaper to encourage the WiMax or internet amongst the consumers and businesses)?
4. What plans or strategies that you have as a government for widespread availability of Internet? Such as the availability of the internet to local community centres such as libraries, universities, hospitals? Any planes? Do you think that would help in WiMax diffusion?)
5. To what extent that the government invests in education, training programs or support research on ICTs. (Provide funding for education on ICTs)?
6. Do you have any programs to support SMEs or other sectors to encourage them to adopt new technologies such WiMax?
7. What about the e- government initiatives (ex. online information from schools, electronic payments for services), do you have any plans towards that matter? Do you think that would encourage SMEs to have internet?
8. In term of prices, are there any policies to keep internet affordable. Explain.
9. Is the government policy considering type of technology over another? Why.

10. What bodies are responsible for internet diffusion to SMEs?
11. Any suggestion on who else can provide insight on these issues?
 - Anything to add.

SMEs interviews questions

WiMax adopters:

1. What is the nature and size of your business?
2. How long has your organisation been using WiMax?
3. How does using WiMax help your business?
4. Why did you choose WiMax?
5. How did you hear about WiMax?
6. How do you find WiMax broadband better than other connections (advantages), in what ways has it improved your business?
7. Did you find WiMax compatible with your current software and hardware?
8. Was it difficult to setup and install the WiMax' equipment in your organisation? Explain.
9. Did you have to get trained to use the technology?
10. How easily did using WiMax broadband blend into your existing practices?
11. What do you think about the price of the service? Is affordable? Explain.
12. Do you think that the price is fair enough for the quality of the service?
13. Would you be happy to purchase a product with less (but good enough) performance if you could get it at a lower price?
14. Do you believe that the owner or the person who is in charge of the organisation play a role in the adoption of new technology in your organisation? Explain.
15. Who that you think are the major players that have a role in WiMax diffusion? Why?
16. Do you think that the vendors have ensured awareness of WiMax to SMEs?
17. Do you get any funds from any institution for the internet?
18. In your opinion how can the vendors keep you as a valued customer?
19. How can they attract new consumers?

20. Can you describe the environment or the organisational culture of your organisation as you see it? And how do you think it affected the adoption of new technology such as WiMax?
21. If you were to give advice to a manager from another organisation in a different business sector with the same organisational culture, who was thinking of adopting WiMax, what advice would you give him/her about the adoption of such a technology?
22. Do you think that norms, beliefs, and attitudes of the people in the organisation made the adoption of WiMax easier? If so, how?
23. I would like to ask if you have anything to add or any last comments?

Non- adopters:

1. What is the nature and size of your business?
2. Why you didn't adopt WiMax?
3. What are the major issues that holding you from adopting WiMax?
4. Would you be happy to purchase a product with less (but good enough) performance if you could get it at a lower price?
5. Who are the major players that have a role in WiMax diffusion? Why?
6. Do you think that the vendors have ensured awareness of WiMax to SMEs?
7. What is the most important thing that might make you change your internet connection to a new technology such as WiMax?
8. Do you get any funds from any institution to adopt internet to improve your business?
9. Do you believe that the owner of the organisation plays a role in the adoption of new technology in your organisation? Explain.
10. Can you describe the environment or the organisational culture of your organisation as you see it? And how do you think it might affect the adoption of new technology?
11. Do you think that norms, beliefs, and attitudes of the people in the organisation would make the adoption of WiMax easier? If so, how?