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The adoption of VOIP technology by mobile network operators in South Africa.

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The Adoption of VOIP Technology by Mobile Network Operators in South Africa

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A research report submitted to the Faculty of Commerce, Law and Management, University of the Witwatersrand, in partial fulfilment of the requirements for the degree of Master of Business Administration

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ABSTRACT

Voice Over Internet Protocol (VOIP) is an example of convergence, bringing together telephony and Internet technologies. Convergence, brought about by rapid technological change and market liberalisation, is contributing to the evolution of the telecommunications sector by blending previously separate technologies to create new products and thus revolutionising markets and disrupting established business models.

This research explores the adoption of VOIP technology by Mobile Network Operators in South Africa and considers whether the service introduction is a response to changes in the technological, market and regulatory landscape. The study also looks at the implementation of IP based services and the implication that these business developments have on the telecommunication sector.

Semi-structured interviews were used to gain views and opinions from twenty four managers and senior executives at the leading mobile network operators, VOIP operators, technology vendors and consultants involved in the data and voice sectors.

The key findings were that mobile network operators are uncertain about the financial viability of VOIP technology and the potential benefits that it provides. The new business units face challenges in implementing a disruptive technology due to a lack of support and synergies with their parent organisations. The implication of these findings is that value chains in the sector will be reconfigured as various market players configure themselves to address the needs of end customers.

The study also concludes that the established operators are likely to have more difficulty in achieving success in delivering IP services to business customers while new market entrants are likely to outperform in exploiting a disruptive technology such a VOIP and will better address the needs of business customers.

DECLARATION

I, Laurent Pieton, declare that this research report is my own work except as indicated in the references and acknowledgements. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.

Laurent Pieton

Signed at ……

On the …….. day of …… 2013

DEDICATION

In memory of my father Jean-Claude and to my mother, Caroline for her love, constant support and encouragement.

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- My supervisor, Professor Gillian Marcelle, for her time, patience, encouragement, and valuable insight;
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1 INTRODUCTION

1.1 Introduction

The purpose of this study is to investigate how the South African mobile network operators have responded to the changing telecommunications environment and the opportunities presented to them by IP technologies through the process of convergence.

The research seeks to identify the forces, both internal to the mobile network operator's organisation, as well as external, which influence the adoption of Voice Over Internet Protocol (VOIP) technology as a means of successfully providing services to business customers. It then proceeds to analyse the manner in which they have managed the implementation of such a technology and the challenges that it poses. The implication of such a strategy for the mobile network operators and other market participants is then considered.

The literature proposes various models, which lend themselves to the understanding of the evolution of the telecommunications environment and the role of various stakeholders in the convergence process. Research findings are analysed within the context of these models to make sense of the actions of the market participants as they tackle a disruptive technology such as VOIP.

1.2 Context of the study

VOIP has evolved considerably over the last number of years offering many benefits over traditional analogue telecommunications services. These benefits give rise to new business opportunities for telephony operators (Ciancetta, Colombo, Lavagnolo, Grillo, & CSELT, 1999) as well as offering new services and benefits to their customers (Vrdoljak, Vrdoljak, & Skugor, 2000). A key benefit to consumers is that VOIP offers significant cost savings on telephone calls (Cohen & Southwood, 2004). However, despite the apparent benefits that IP enabled voice technology offers both operators and consumers, there seem to remain resistance to its widespread adoption.

Ciancetta et al. (1999) indicate that due to liberalized market conditions telecommunications operators in Europe have realised that converged service offerings can create interesting opportunities in both commercial and operational aspects of their businesses. That is to say, traditional fixed line operators are given freedom to provide a range of offerings, which include mobility, and similarly mobile network operators are being allowed to offer fixed line services. They attribute the following key drivers for this trend, which include: liberalized regulatory policies, technological innovation and increased competition between operators.

Regulatory policies in South Africa have resulted in excessive price increases which have not been a reflection of the global trend towards reductions in the cost of telecommunications (Gillwald, 2005). The South Africa Foundation (2005) supports this claim by providing evidence that South African telecommunications prices ranked amongst the highest of the fifteen countries sampled. It also states that as telecommunications are inputs into virtually all productive activities, high telecoms costs have a negative influence on the country's economic growth.

In order to curb this trend Gillwald (2005) proposes that the focus on regulatory policy should be structured in such a way as to, amongst others: induce investment in network rollout, encouragement of service innovation and improvement of customer choice and service quality. In addition they feel that policy must enable fair competition that will drive down the costs to make services more widely affordable.

It would appear that such proposals are progressively taking place in the South African Telecommunications space. Evidence for this is shown by the following media releases. In 2005 VANS operators were granted the right to provide voice service by means of VOIP technology (Snyman, 2007) thus posing a threat to Telkom's fixed line services. A significant event in 2008 was the regulatory ruling allowing VANS operators to be able to self-provide infrastructure under the new licensing framework, essentially giving them the same rights as the incumbent operators (MyBroadband, 2008).

Developments with the mobile network operators also have significant impacts on the local telecommunications landscape. Legislative changes in 2005 made it possible for mobile network operators to self provide facilities, freeing them from their dependence on Telkom (ITWeb, 2009). Vodacom has subsequently established its Vodacom Business

division which focuses on data solutions offered over fixed line infrastructure to business customers (Vodacom, 2008) and, MTN has acquired Verizon Business, which is an established data services provider (MTN, 2009). These two companies now have the ability to provide innovative solutions to South African businesses.

The changes in liberalisation of the regulatory policies and increased competition raise questions around the ability of the respective operators in South Africa to leverage technology such as IP enabled voice services to offer innovative new solutions that will bring down the cost of telecommunications for South African consumers.

1.3 Significance of the study

The study fills a gap in the available theory relating to the adoption of IP enabled communications services by the mobile network operators in South African and their ability to satisfactorily serve the needs of South African business market. A body of knowledge exists in the European context but is limited in respect to the South African context.

The study will provide guidance to mobile network operators locally and in developing countries, who are undergoing changes in the form of market liberalisation and increased competition and who are considering diversifying their offerings by introducing new technologies as a means of new product and market development. It will identify the strategic motivations for mobile network operators to consider IP enabled communications services as well as identify the communications needs of business. This will ensure that the services that are taken to market do in fact address the needs of their intended target market.

1.4 Delimitations of the study

This study will consider only the current incumbent mobile network operators namely; Vodacom, MTN and the scope of operations will be limited to those within South Africa.

The research will not consider the activities of Cell or the mobile division of Telkom, 8ta, as at the time of undertaking the research these operators did not have clearly

established business units targeting the business sector with services based on IP technology.

The research will, as far as possible, steer clear of the technical aspects of IP enabled communications but due to the fact that technology is a major contributor to this trend technical information will be included where necessary.

1.5 Definition of terms

Table 1: Table of Definitions

TERM	DEFINITION	REFERENCE
3G	3G wireless networks support peak data rates of 144 Kbps at mobile user speeds, 384 Kbps at pedestrian user speeds and 2 Mbps in fixed locations (peak speeds), although some initial deployments were configured to support only 64 Kbps. The International Telecommunication Union (ITU) coordinates 3G standards through its International mobile Telecommunications-2000 (IMT-2000) project and incorporates the key standards bodies, Third-Generation Partnership Project (3GPP) and 3GPP2.	(Gartner)
ADSL	Asymmetric Digital Subscriber Line. A technology used to provide broadband internet connections over standard phone lines.	(South African Foundation, 2005; TIA)
ARPU	Average revenue per user. A measure used by telephone and media companies for the income they receive from each customer. It is a key indicator of the source of revenue and margin growth. Growth in ARPU is likely to be more profitable than increasing the number of customers; the increases in costs are likely to	(Reuters)

	be less than those incurred by raising the number of customers. ARPU growth is a measure of a company's success in selling additional services to individual customers.	
Bandwidth	This is the measure of the maximum capacity of a data link in the network.	(Ofcom)
CLCR	As a derivative of LCR, it is the routing of calls from fixed-line to cellular via like- networks, ensuring that the voice call are made "on-the-network" or commonly referred to as on-net, being much cheaper than "off-the-net" or commonly referred to as off-net	(Snyman, 2007)
Core Network	The backbone of a communications network, which carries different services such as voice or data.	(Ofcom)
ECA	Electronic Communications Act (2005) To promote convergence in the broadcasting, broadcasting signal distribution and telecommunications sectors and to provide the legal framework for convergence of these sectors; to make new provision for the regulation of electronic communications services, electronic communications network services and broadcasting services; to provide for the granting of new licenses and new social obligations; to provide for the control of the radio frequency spectrum; to provide for the continued existence of the Universal Service Agency and the Universal Service Fund; and to provide for matters incidental thereto	(Government Gazette: Republic of South Africa, 2006)
ECNS	Electronic communications network service A service whereby a person makes available an electronic communications network, whether by sale, lease or	(Government Gazette: Republic of South Africa,

	otherwise	2006)
FMC	Fixed mobile Convergence. Device and infrastructure technology trend that enables the transparent use of voice and data applications across fixed and mobile access points.	(Gartner)
GSM	Global System for mobile Communications. Digital cellular phone system standard that originated in Europe	(Simpson, King, Reali, Zimmerman, & Jones, 2008)
ICASA	The Independent Communications Authority of South Africa. The South African telecommunications and broadcasting regulator.	(South African Foundation, 2005)
IP	Internet Protocol. A standard protocol designed for use in interconnected systems of packet-switched computer communication networks.	(TIA)
ISP	Internet Service Provider	(South African Foundation, 2005)
ITU-T WTSA	International Telecommunications Union, Telecommunication Standardization Sector (ITU-T) World Telecommunication Standardization Assembly (WTSA)	(International Telecommunications Union)
LAN	Local Access Network**.** A data communications system that (a) lies within a limited spatial area, (b) has a specific user group, (c) has a specific topology, and (d) is not a public switched telecommunications network, but may be connected to one.	(TIA)

LCR	Least Cost Routing. LCR is simply speaking the process of identification and implementation of the most cost-effective way to reduce telephone (voice) call charges. These calls, including all types of traffic, are routed along the path of least cost	(Snyman, 2007)
Leased Line	A private telephone circuit permanently connecting two points, normally provided on a lease by a local PSTN	(South African Foundation, 2005)
Local Loop Unbundling	When communication providers can gain access to the network by placing their own equipment at the exchange. The communication providers then gain control of the line from the local exchange to the customer and the backhaul runs from the local exchange to their core network	(Ofcom)
MNO	A mobile-network operator (MNO) is a company that owns and operates one or more mobile networks	(Gartner)
Open Source	Open source describes software that comes with permission to use, copy and distribute, either as is or with modifications, and that may be offered either free or with a charge. The source code must be made available.	(Gartner)
PABX	Private Automatic Branch Exchange	(South African Foundation, 2005)
PSTN	Public Switched Telephone Network	(South African Foundation, 2005)
SIM card	Subscriber identity module card. Programmable smart	(Simpson et al.,

	card in a mobile device that gives access to a network	2008)
SMME	A small enterprise defined in section 1 of the National Small 10 Enterprise Act, 1996 (Act No. 102 of 1996)	(Government Gazette: Republic of South Africa, 2006)
SS7	Signaling System No. 7. A common-channel signaling system defined by the CCITT in the 1988 Blue Book, in Recommendations Q.771 through Q.774. *Note:* SS7 is a prerequisite for implementation of an Integrated Services Digital Network (ISDN).	(TIA)
TCP/IP	Transmission Control Protocol/Internet Protocol. Two interrelated protocols that are part of the Internet protocol suite.	(TIA)
TDM	Time-Division Multiplexing. Digital multiplexing in which two or more apparently simultaneous channels are derived from a given frequency spectrum, *i.e.* Bit stream, by interleaving pulses representing bits from different channels.	(TIA)
VANS	Value Added Network Services	(South African Foundation, 2005)
VoIP	Voice over Internet Protocol. The term describes the transmission of IP packetized voice traffic over a communications infrastructure (for example, LAN and WAN). Confusingly, VoIP is not the same as Internet telephony or IP telephony, although the terms are commonly and erroneously interchanged.	(Simpson et al., 2008)

Wi-Fi	Short range wireless technologies that allow an over-the-air connection between a wireless device and a base station, or between two wireless devices. Wi-Fi has a range of over 30 meters indoors, and around a kilometer outside	(Ofcom)

1.6 Assumptions

The research assumes that:

- Industry respondents will have sufficient expertise in IP communications to be able to provide a complete list of motivational factors
- Industry respondents will provide an accurate depiction of motivational factors without restriction due to competitive concerns
- Mobile network operators have taken steps with regard to developing IP capabilities within their organisations and that IP communications to business customers will be amongst their product offerings.

1.7 Conclusion

This chapter has described the purpose of the research and provided an outline of the main theme to be investigated as they relate to the adoption of VOIP technology by the mobile network operators in South Africa.

A brief overview of the South African Telecommunications market has been provided to contextualise the research, as well as justification as to the significance of the study. As the operations of mobile network operators in South Africa is vast the study has been limited to those mobile network operators who, at the time that the research was initiated, had made public the establishment of a dedicated business unit focusing on serving business customers with IP services.

A full glossary of terms used in the research has been provided for ease of reference.

The subsequent chapters of this document include a literature review, research methodology, report on findings, analysis of findings and conclusion.

The literature review, which proceeds, introduces the reader to the technical terms and concepts of VOIP and convergence in the telecommunications sector. A framework is presented which assists in analysing the changing telecommunications industry. Opportunities for the mobile network operators are presented, followed by an exploration of technological change and innovation in the telecommunications sector. The literature review concludes with an overview of the current South African Telecommunications environment as it relates to the liberalisation of VOIP technologies and its adoption by market participants.

Chapter 2 details the literature by defining VOIP technology and explores the opportunities brought about through convergence of technologies. A model for understanding the evolution in the telecommunications sector is presented. The concept of innovation and managing innovation within a changing environment are then discussed including the implications for organisations adopting disruptive technologies. The chapter ends with a review of the South African telecommunications sector and the recent changes brought about through liberalisation.

Chapter 3 describes the research methodology with justification for the qualitative research approach adopted for this report. The research population is described with a full table of respondents presented.

Chapter 4 presents the research findings following the format of the research questions posed in the literature review. These relate to the changing telecommunications landscape and the actions taken by the mobile network operators in the face of such change. The implementation of VOIP within these organisations is then reviewed specifically highlighting the challenges that are faced in managing such an implementation. Lastly the implications of such a strategy by the mobile network operators on the South African telecommunication sector are presented.

Chapter 5 presents the analysis of the findings in relation to key themes presented in the literature review. In order to better make sense of the findings the analysis is structured against the four stages of the innovation process as well as considering internal and external forces that affect the process of innovating new product offerings with a disruptive technology.

Chapter 6 concludes the report, providing key findings from the research in terms of the research questions posed. Recommendations are provided as well as areas for future research.

2 LITERATURE REVIEW

2.1 Introduction

This chapter outlines the literature used to derive the propositions against which the research will investigate. It sets out to introduce the concept of VOIP and the benefits that the technology offers both operators and their customers.

Convergence of technologies on to a common platform is then introduced and the opportunities that it presents are indicated. Similarly, implications and relevant considerations in making a change to VOIP are explored, which sets out a framework for determining the impact that introducing VOIP will have to an operator. These factors are then examined in more detail.

An overview of the current local telecoms market is provided in order to contextualise the theory and indicates the strategic and competitive considerations that will need to be addressed when introducing VOIP solutions.

2.2 Voice Over Internet Protocol

The term voice over internet protocol (VOIP) is a generic term referring a technical standard that enables the transmission of voice traffic in whole or in part, over one or more networks, which uses the Internet Protocol (IP) (Marcelle, 2007). These networks, may carry calls over the internet, PC to PC, PC to phone or phone to phone interactions (Lassman, 2008). Beyond limiting calls between users on IP networks gateways can be used to convert packet data to circuit switched signals between an IP network and a PSTN network. This ability allows VOIP users to make various destinations without regard for type of network. These include: local, national, international and mobile destinations. This makes VOIP highly suitable for use in corporate networks, where companies transmit calls between offices over the corporate IP network and make calls to other networks too by means of a gateway. In the case of a corporate an IP enabled PBX serves as the device that routes calls across the IP network or PSTN network as

required. In addition to voice communications faxing and audio/video facilities can also be handled in the same manner (Cohen & Southwood, 2004).

By making use of compression algorithms to compress the voice data, multiple IP calls can be made over the equivalent bandwidth required for a packet switched call. This makes VOIP more efficient in terms of bandwidth and is therefore considerably cheaper than traditional circuit switched voice, which requires a dedicated end to end circuit to be reserved for the duration of the call(Cohen & Southwood, 2004).

VOIP presents various opportunities for organisations to derive benefits. Telecommunications operators can reap cost advantages for network rollout and can offer voice services that are competitively priced. The underlying technologies for IP networks are scalable and offer advantages in speed of installation. Once in place, IP networks offer the ability to provide rich communications combining voice, video and data on a single platform. New entrants have the ability to establish themselves as network operators because IP based networks can be financed in smaller units and with less punishing business models particularly in terms of up front fixed cost investment (Marcelle, 2007).

VOIP networks and associated applications are not without their limitations. Quality differences may be experienced between traditional voice telephony due to the dependence on there being sufficient IP bandwidth available to service the multiple calls in order not to lose any data packets between the two ends of the call. Insufficient bandwidth may lead to inferior call quality compared with that of a circuit switched call which uses dedicated “circuits” for each call thus maintaining a high level of quality, but at a higher cost. Quality of concerns of VOIP can be managed by means of using private or dedicated networks which can be scoped with sufficient bandwidth and provide a level of service quality (Cohen & Southwood, 2004). Further limitations include a dependence on grid electricity and the fact that directory and emergency services are not included in networks servicing retail customers if there is no connection to the traditional phone system. Marcelle (2007) states that the transition to IP networks involves extensive retraining and refashioning of the business models and technical planning frameworks of telecom operators. In terms of technological capabilities required there is a need for a

higher level of engineering and IT expertise required to integrate sub-elements of the networks.

2.3 Convergence

The above indicates that VOIP technology involves converged communications solutions by making use of connections typically associated with data services such as e-mail and file transfers, and combining voice and video capabilities on to a common IP platform.

The flexibility and cost savings that VOIP technology offers has prompted conventional PSTN operators to start implementing IP backbone networks for the transmission of calls that operate seamlessly in the PSTN environment. An example of this it British incumbent operator BT that had implemented a plan to completely convert its entire infrastructure to VOIP by 2009 (Werbach, 2005). A comprehensive assessment of VOIP in Africa estimates that 20-25% of African Telco's are shifting away from circuit switching networks to IP networks (Cohen & Southwood, 2004).

VOIP is thus an example of convergence between fixed telephony and internet technologies(Nystrom & Hacklin, 2005).

The literature relating to the subject of convergence in the telecommunications space focuses predominantly on technological convergence which occurs at 3 technical levels; handset or terminal, transmission network or switch level and considers what opportunities and the implications it presents (Ciancetta et al., 1999; Nystrom & Hacklin, 2005; Vrdoljak et al., 2000) However the concept of convergence extends beyond just technology. The telecommunication industry can be characterised by huge changes and rapid technological developments that shape the market. Nystrom and Hacklin (2005) indicate that this rapid technological change, coupled with liberalisation in telecommunications markets has been the foremost driver of convergence. Favourable regulatory changes have resulted in a shift of industry boundaries with previously separate technologies blending to create new products and thus revolutionising markets, resulting in disruptive effects on established business models. The process of technological convergence thus implies that previously different industrial sectors come to share a common knowledge and technological base (Nystrom & Hacklin, 2005) and as

a result existing value chains are deconstructed, industry boundaries are transformed and new competitive market spaces are created(Hacklin, Adamsson, Marxt, & Norell, 2005). The authors further state that established organisations in such converging markets face significant challenges in maintaining their existing value propositions in a changing environment, while competing with new entrants in newly defined markets. They indicate that a response to these changes is to “open up proprietary innovation processes in both horizontal and vertical perspectives”(Hacklin et al., 2005). In addition, they have to “support co-creation of knowledge and sharing future orientated activities for generating creative disruptive responses on an inter-organisational basis”(Hacklin et al., 2005). Convergence thus has both strategic and operational implications where strategic challenges consist of the management of technologies, competencies and partnerships, while operational actions relate to design and engineering for product services.

Convergence thus creates interesting opportunities on both the operational and commercial fronts for telecommunications operators, spurred on by liberalisation and market competition. These opportunities have manifested themselves in the form of fixed line operators implementing wireless solutions and mobile network operators adopting fixed-line network like solutions. IP technologies have assisted operators in increasing service creation abilities and reducing time to market of new service features. It has also been noted that most mobile network operators have been attracted to user classes traditionally associated with fixed-line networks (Ciancetta et al., 1999).

2.4 Telecommunications Technology and Industry Evolution

To thoroughly appreciate the impact of convergence on the telecommunications industry it is important to understand its structure together with the forces that drive the evolution of the industry. To this end Fransman (2002) provides the layer model as a qualitative tool for analysing the changing telecommunications industry. The layer model is presented below with examples amended for relevance in the South African context.

Table 2: The Layer Model (Fransman 2002)

LAYER	ACTIVITY	EXAMPLES
VI	Customers/Consuming	
V	Applications Layer, including contents packaging (e.g. Web design, on-line information services, broadcasting services, e-commerce etc.)	Bloomberg, Reuters, News24, iOL, MSN, Kalahari.net etc.
IV	Navigation and Middleware Layer (e.g. browsers, portals, search engines, directory assistance, security, electronic payment, etc.)	Google, Ananzi etc.
III	Connectivity Layer (e.g. Internet access, Web hosting)	Mweb, WebAfrica, Hetzner etc.
TCP/IP INTERFACE		
II	Network Layer (e.g. optical fibre network, mobile network, DLS local network, radio access network, Ethernet, frame relay, ISDN, ATM, etc.)	Telkom, MTN, Vodacom, Neotel, iBurst, DFA etc.
I	Equipment and Software Layer (e.g. switches, transmission equipment, base stations, routers, servers, CPE, billing software etc.)	Cisco, Ericsson, Nokia, Huawei etc.

The layer model is useful in identifying six issues that are important to understand the evolving structure of the telecoms industry. These are:

Industry Boundaries – Traditionally, the telecoms industry was thought to comprise of Layers 1 and 2 of the model. The evolution of the Internet has significantly opened up the boundaries by providing an effective way of transferring data across disparate networks, often at lower cost. The TCP/IP interface provides a platform on which several higher levels can be built to offer the end consumer a range of services, content and applications. So, new opportunities are created for telecommunications operators, at layers 3 - 5 in the stack, to extend their activities either directly or by acquisition.

Additionally they entered into new relationships, both competitive as well as co-operative with companies previously considered to be involved in separate domains. In order to more fully capture the changed domain in which telecoms companies now operate, the new term 'Infocommunications Industry' is applied.

Modularisation–This allows for specialists in a particular module to have knowledge only of the rules for connecting their module to complementary modules without in-depth knowledge of the workings of other modules. This allows new entrants to focus on their own activities while ignoring complementary activities thus easing barriers to entry. An example provided is the rapid entry of a large number of ISPs into Layer 3, which facilitated the rapid diffusion of the Internet.

Industrial organisation – Provides insight into which companies do what and why and how their activities are co-ordinated. The layer model helps to understand both vertical and horizontal integration of telecoms operators. For example, telecoms operators extend their activities vertically from Layer 2 into Layers 3-5. Or they integrate horizontally moving into providing mobile or data networks.

Location of R&D – Closely related to modularisation and industrial organisation. Prior to 1990, the development and design of telecoms equipment was focused in large central research laboratories of monopolist incumbents. This has moved to re-locating R&D efforts to specialist equipment suppliers who now supply new market entrants entering Layers 2 and 3.

Entry Barriers - Due to the fact that specialist equipment suppliers will now supply to anyone willing to pay, new entrants have been able to modularise equipment and network requirements, thus significantly lowering the barriers to entry into various layers of the model. Rapid and substantial new entry in turn intensifies competition and thus stimulates innovation. This has resulted in, for example, a significant reduction in long-distance and international voice and data tariffs.

Consumers/consuming – Fransman includes this layer to emphasise the importance of consumers and the process of consuming in the evolution of the industry. He states that from a demand-pull perspective this layer drives activities in all lower layers and that companies involved in the other 5 layers need to have in depth knowledge of Layer 6 in

order to determine what consumers want and what they are willing to pay. A further advantage of being closer to the final consumer is that firms in higher layers can react more efficiently that the firms in lower layers to specific demands and further generate revenues from this informational advantage (Krafft, 2003).

Fransman (2002) points out that while the layer model helps to understand the structure of the industry in a static manner it fails to capture the dynamics of change, which contribute to its evolution. He discusses the following additional issues:

Modes of coordination – The layer model assumes that appropriate modes of coordination between organisations in different layers are in place and that they work efficiently. Krafft (2003) provides an analysis of the vertical contractual relationships, which helps to explain that the development of a given activity is directly dependant on what occurs in upstream and downstream layers, or on what suppliers and customers do.

Intra-layer diversity - While the layer model focuses on differences between the various layers it neglects to highlight the differences within layers. An example of this is the fundamental difference, which exists between a mobile network and a fixed network, both of which fall into Layer 2 of the model.

Interacting Institutions – The layer model leaves out interacting institutions, which shape the structure of the info communications industry and how it works. These include institutions involved in the regulatory/legal/political processes. Additionally, financial institutions facilitate entry of new entrants and play a role in the processes of restructuring and consolidation in the industry. Lastly, institutions involved in the innovation process must be incorporated, including standard settings bodies and universities.

The cognitive dimension – The layer model implies that appropriate action will automatically follow the existing structure. However, Fansman (2002) refers to various examples, most notable being the bursting of the dot com bubble which dispels that assumption. Krafft (2003) refers to the need of a detailed understanding of the decision making processes by which industry players decode what occurs within the industry and

in the light of their own perception, adopt the appropriate strategies in terms of vertical specialisation or integration.

The theory of industry evolution is thus important in understanding the dynamics that exist between various actors and stakeholders. It helps to determine the industries boundaries, who does what and why within the industry and what forces are central to the functioning of the industry.

2.5 Opportunities for mobile network operators

Due to the evolution of the industry brought about through liberalisation incumbent operators and new entrants are facing a new service paradigm based on joint mobile and fixed i.e. converged service offerings, which create interesting commercial and operational opportunities (Ciancetta et al., 1999).

The scope is broad, as convergence is a multi-layered phenomenon. In its simplest form it involves shared back-office functions, which can occur when fixed-wire and mobile services are sold by independent parts of a telco. A more common model involves “bundling” which involves purchasing packages that incorporate elements of both mobile and fixed line services, which work independently in defined operating scenarios. However the ultimate objective of convergence is to provide customers with the ability to seamlessly make fixed-line or mobile calls, irrespective of location, with a single device, which intelligently switches from one mode to the other as a customer moves around. This level of convergence, however, presents significant technical challenges (Curwen, 2006). The varying levels of integration are collectively referred to as Fixed Mobile Convergence (FMC).

The literature distinguishes the factors that affect the adoption of converged technologies by operators as external and choice (internal) factors (Ciancetta et al., 1999; Cohen & Southwood, 2004; Vrdoljak et al., 2000). External factors relate to elements affecting the suitability of the converged services in relation to market position relative to the competition and regulatory and policy frameworks. Thus end-user (customer) requirements are considered in order to improve customer loyalty and increase service usage in order to set the mobile network operators apart from competitors. However

operators must find a balance in terms of defensively retaining current users as well as aggressively targeting markets by means of service differentiation. The predominant customer requirements that must be met include: convenience in terms of supplier relationships, value in service offerings and satisfaction with service usability. Convergence allows operators to address these requirements by providing the following benefits; a range of competitively priced and reliable FMC services and service packages, one number for both fixed and mobile connections, a single account for all services, one service provider for all value added telecoms needs, transparent control of communications expenses and savings created by tariff bundling. Curwen (2003) points out however, that operators providing both fixed and mobile services are anxious to avoid anything that will cannibalise existing business.

Choice or internal criteria are measures of the convenience of the convergence configuration, which takes into account potential market share, technical and management complexity and associated costs, the possibility of gradual introduction of converged services and time to market (Ciancetta et al., 1999).Vrdoljak et al. (2000) indicate that operators will consider solutions that enable operators to rationalise and optimise different networks and systems they already have. They further indicate that by adopting a FMC strategy, operators will enjoy the following benefits:

- Creation capability for new services and bundling of services to meet the needs of specific target markets.
- Integration created by a single interface for both fixed and mobile services
- Protection of previous investments
- Reduction in subscriber acquisition costs and overall operational expenses
- Establishment of a long term relationship with customers, thus reducing churn rates
- Greater market share
- Possibilities of increased revenue

Finally, service demand is affected by pricing choices and the customer demand to use converged services at a particular price level. These factors are affected by the attractiveness of related or alternative offerings and the feature benefits of the new

service. This requires operators to tailor converged models to the market segments they are intending to address (Ciancetta et al. 1999).

In terms of the market segments to address, the business market is a prime candidate for converged services. The presence of a PABX opens a range of possibilities to the mobile network operators. As an example, by directly connecting the business PABX to the mobile network all calls generated in the business environment can be directly routed to the mobile network thereby allowing them to capture all voice services from the business environment. VOIP is currently the technology of choice to connect business PABX systems to termination networks by means of installing a gateway or by making use of IP-PABXs to connect to an IP network. Additionally, the data services that businesses require for services such as email, file transfer and electronic banking provide an additional revenue stream for the mobile network operators and further threaten established fixed line players. Once IP connectivity is established a vast number of value added services can be bundled into the service offering, seriously threatening the incumbent fixed line operators that have traditionally held this market segment. A key differentiator for the mobile network operators is mobile VOIP, allowing users to use their mobile handset to generate cost effective calls across the data network. The ability to roam between the mobile and VOIP networks can save business customers money by making use of the IP network at their offices. The operators would benefit from lowering overall costs and increasing ARPU. Nystrom and Hacklin (2005) refer to a report by Pyramid Research that urges mobile network operators to integrate IP networks and mover towards mobile VOIP to avoid losing ground to fixed line, operators who are aggressively seeking to incorporate mobile services into their portfolios.

A key investment decision for operators is how far to implement VOIP use within existing operations (Cohen & Southwood, 2004). The scope is broad, from only using a gateway to connect with other IP operators and to achieve cost savings on calls transmitted between the networks. At the next level operators can consider implementing IP backhaul links between major centres which achieve cost savings of up to 30%on operational and capital expenses compared to existing switching and transmission equipment. At the customer level it is possible then to extend IP enabled services to them, allowing them the benefit of cost savings and added functionality.

It has been indicated that very few mobile network operators who offer enterprise telephony capabilities offer services beyond basic dial plan and flat rate tariffs. As such, the mobile network operators have been slow to identify the opportunities in meeting the enterprise users needs (Blood, Johnson, Lessman, & Costello, 2008).

This may be attributable to the fact that once large established networks are installed and customer bases have expanded, marginal costs decrease dramatically. As such these networks become great generators of cash and the incumbent operators benefit from inertia and are resistant to change (Marcelle, 2007). However incumbent operators are at risk of losing traffic to VOIP providers who are able to exploit arbitrage opportunities to capture market share (Cohen & Southwood, 2004). Additionally, mobile network operators face the issue of saturation; where penetration levels exceed 80% and new users become scarce (Curwen, 2006). This issue is reflected in the fact that the mobile network operators are seeing a decline in growth in traditional voice services and it is anticipated that high growth will be achieved in the area of IP-based services including VOIP (Pyramid Research, 2009). So it would appear that the mobile network operators are compelled to consider a disruptive technology such as VOIP as a means of maintaining revenues.

2.6 Technological Change and Innovation within the Telecommunications Sector

The literature relating to VOIP makes numerous references to the management topic of innovation and specifically disruptive innovation (Constantiou & Kautz, 2008; Hacklin et al., 2005; Nystrom & Hacklin, 2005; Rao, Angelov, & Nov, 2006; Yovanof & Hazapis, 2008). It thus warrants a review of these topics in order to understand the impact that VOIP may have on mobile network operators in South Africa.

In an ever-changing business environment new product development is an important organisational capability. Changes may be due to shifts in socioeconomic fields. Legislative changes may open up new opportunities or close down others. Competitors may introduce new products that represent a threat to existing market positions. Firms thus need the capability to respond to such changes through product innovation (Tidd & Bessant, 2009)

Innovation involves a moving target – not only is there competition amongst players in the game, but the overall context in which the game is played also keeps shifting, with the risk that the rules of the game will change and leave established firms vulnerable. Tidd and Bessant (2009) provide an example of the rapidly growing field of VOIP communications, which is not developing along established trajectories towards a well-defined endpoint. Instead, it's developing through a process of emergence. The broad parameters are visible – rise in demand for global communications, the increasing availability of broadband services, growing technological literacy amongst users and the stakes are high for both established operators and new entrants. A dominant design has not yet been established. Instead there are an array of technological possibilities, varying business models and potential players from which it will gradually emerge.

Tidd and Bessant (2009) summarise the innovation process for an organisation into four processes: Search, Selection, Implementation and Capture. These phases must all take place within the context of the organisation and will determine how well they are able to execute on innovation opportunities. These include information, decision rights, motivators and structure (Neilson, Martin, & Powers, 2008). Additionally the organisation requires a clear innovation strategy, which ensures that there is a clear sense of how an innovation will take the organisation forward and what path it should take.

The search process involves the search for innovation opportunities from multiple sources, which the organisation must be aware of, and the challenges involved in searching for picking up on the correct signals. Within the company or industry innovation opportunities arise from unexpected occurrences, incongruities, process needs and industry and market changes (Drucker, 2002). Drucker further indicates external sources of innovation opportunities are; demographic change, changes in perception and new knowledge.

Some sources of innovation as they relate to the South African telecommunications industry in the following manner include:

Economic incongruencies are shown in increased market growth but falling profit margins. For the mobile network operators the data market is increasing but margins are declining in comparison to voice revenues, thus they need to find innovating ways of maintaining profits.

Drucker states that when an industry grows more than 40% in 10 years or less it's structure changes. Established companies concentrate on defending their positions and tend not to counter attack when new comers enter the market. New opportunities rarely fit in with the way the industry has always approached the market, or defined it or been organised to serve it. Innovators thus have a good chance of being left alone for a long time. These market changes are a clear indication that mobile network operators need to continue to innovate to keep new entrants out.

Changes in perception help drive the case for VOIP. With the mainstream adoption of services such as Skype, perceptions around VOIP services are changing in the eyes of consumers, and that telephony services are no longer the exclusive domain of telecommunications companies in the traditional sense.

The selection process deals with how organisations choose and implement innovation options whilst building and capturing value from the intellectual effort involved. Insights are gained from customers, suppliers, competitors and the marketplace in general (Teece, 2006). Key to this process is the concept of absorptive capacity, which refers to the firm's ability to identify, assimilate and exploit knowledge from the environment.

Some authors have argued that when considering technological change and managing innovation in the developing world models and frameworks that include organisational learning and capability building are important (Marcelle, 2003). The technology capability building (TCB) process is a framework for assembling or accumulating technological capabilities (Marcelle, 2003).Internal mechanisms for TCB include recruitment, organisational development, technological evaluation and search and funding of learning. Externally focussed mechanisms involve interaction with industry and innovation systems (Marcelle, 2005). International technology suppliers are a major source of technological inputs for firms in developing countries. Thus supplier relationships have a role to play in the capability building process where suppliers are able to provide both equipment and technical services required to effectively develop, deploy and maintain networks based on that equipment (Marcelle, 2003).

The implementation phase considers ways in which innovation projects are organised and managed. The two approaches are to either establish ventures within the existing organisation versus setting up new entrepreneurial ventures. To balance the need for an

organisation to focus on exploiting existing capabilities in order to continue to generate profits, while exploring new opportunities for growth, an ambidextrous organisational model is best suited (O'Reilly & Tushman, 2004). Another approach is for larger established firms to acquire smaller technology based firms and manage them in such as way as to exploit their capabilities and technologies in a coordinated manner to benefit from their exploration capability and preserve their autonomy (Puranam, Singh, & Zollo, 2006). The authors conclude that the success of this approach is highly dependent on the developmental stage of the acquired firm's innovation trajectory. Thus management tactics that contribute to successful innovation differ from those that contribute to successfully exploiting current capabilities to generate profits.

The capture phase relates to capturing value from innovation efforts. This deals with innovation adoption and diffusion and ways that the organisation can work with and develop markets for a new innovation. In a study for residential VOIP customers in Denmark, Constantiou and Kautz (2000) list quality, reliability, price, security cost of new equipment and the value added prospect of new services as the key technological attributes when considering end user requirements. They add that key economic factors affecting the adoption of IP telephony were network effects, where the service becomes more valuable to a user as the number of users of the service increases, and switching costs which involves the costs related to moving to a new provider such as the cost of new equipment or subscription to a new network which may raises the cost of fixed line telephony.

Nystrom and Hacklin (2005) suggest that creating value for customers in the convergence process involves operators partnering with the most profitable industry partners for developing products and services. Thus various companies contribute to the value chain by specializing in one particular phase or process and partner with other companies who manage other parts of the value chain. For example incumbent operators would partner with organisations whose core competence is equipment installation or customer relationship management and are thus the most strategically positioned in the value chain to address the needs of customers.

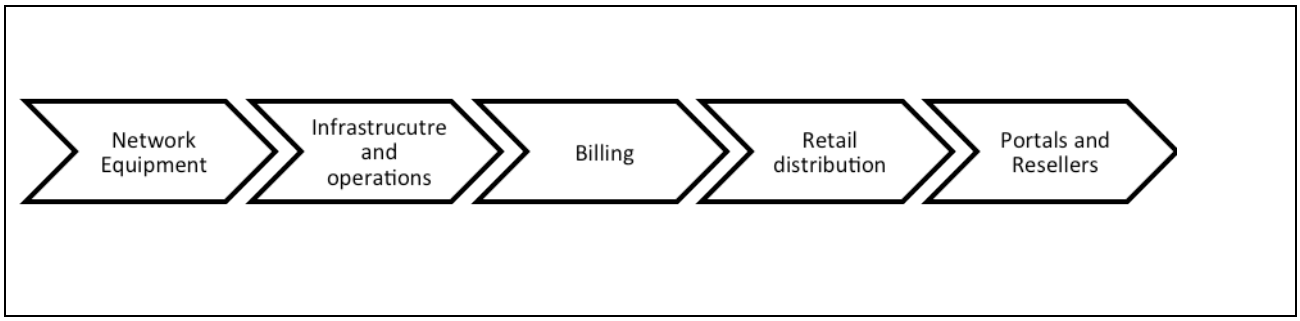


Figure 1: Example of Value Chain [Adapted from Peppard and Rylander (2006)]

It is suggested that in order for incumbent operators to succeed in the converging they form co-operative agreements with other organisations in order to enhance their competencies in the rapidly changing convergence environment(Dodourova, 2003; Hacklin et al., 2005; Nystrom & Hacklin, 2005; Olla & Patel, 2002; Peppard & Rylander, 2006).

2.7 Disruptive Technologies and mobile network operators

Innovation can be classified into sustaining and disruptive, where sustaining innovation are those that maintain or enhance existing products or services to produce higher margins, while disruptive innovations are those that help redefine the market place by bringing a different value proposition that had previously been available, but generally underperforming the established product or service in the mainstream (Yovanof & Hazapis, 2008).

Christensen (1999) defines disruptive technologies as those technologies that bring to the market something worse, not better, in terms of performance valued by the mainstream of customers and thus excludes the technology as an offering by established firms. By the time the disruptive technology improves sufficiently for the mainstream customers, established firms are not in a position to meet the demand. The author states that all firms have the capability to adopt disruptive technologies and disabilities that prevent success in using disruptive technologies. Those capabilities and disabilities reside in three areas: resources, processes and values. Success in using disruptive

technologies depends on how these three areas give the organisation the ability to properly frame the question of disruptive technology as a marketing problem as opposed to a technology problem.

When established firms begin to consider ways of responding to disruptive innovations they are faced with the fact that the new ways of playing the game are in conflict with established ways. This is due to the fact that the new innovation has new key success factors and requires the development of new activities and new supporting cultures and processes (Charitou & Markides, 2003). They indicate that new activities are incompatible with the existing activities due to different trade-offs. These trade-offs make is difficult for an established company to effectively respond to disruptive innovations effectively. By trying to compete in the existing and innovating space simultaneously they will threaten the value of existing activities and pose inefficiencies. Similarly any attempt to manage the innovation utilising the company's existing processes, incentives and mind-sets will only suffocate and kill the new innovation. In their research Charitou and Markides surveyed 98 firms with respect to their response towards disruptive innovation. They identified five responses to disruptive innovation, with each being appropriate under certain circumstances:

1. Focus on and invest in the traditional business

   Organisations may consider that the new way of playing the game will become successful but will never totally replace the old way of doing things. The established player does not necessarily need to embrace the new way of doing things, but rather respond by making its traditional ways more attractive than the new innovation. This response is generally followed in order to focus on established business and capitalise on large investments already made.

2. Ignore the innovation

   The new way of doing business with a disruptive innovation may target different customers, offer different value proposition and requires new skills and competencies and thus is so different that it constitutes a totally different business. Rather than make the mistake of assuming that the new market is easy to enter

and a quick way to achieve growth the appropriate response is to ignore the innovation.

3. Attack back and disrupt the disruption

   Established organisations are threatened by disruptive innovations that emphasise new, non-traditional product attributes that become attractive to new customers. Over time these innovations also appeal to traditional customers and thus they migrate away from established firms. In order to disrupt the disruption, established firms respond with by attacking the innovators by emphasising different product attributes. As an example Apple emphasises the design and style of their products as a response to an invasion of cheap products in their markets.

4. Adopt the innovation and play both games at once

   The established organisation may adopt the disruptive innovation based on careful cost benefit analysis. 68 of the 98 companies surveyed by the researchers decided to adopt the innovation. Issues that needed to be addresses involved the decision to enter the new market with a new business or with the existing business. On average it was found that separating the new businesses proved more successful. The risks in involved with this decision were reported by surveyed companies to be; the risk of cannibalising the existing customer base, undermining the value of the existing distribution network, destroying overall organisational culture and shifting customers from high value activities to low margin ones. Ultimately managing conflicts between the new business and old determined the success of the competing in two different businesses.

5. Embrace the innovation completely and scale it up

The final option to established organisations is to abandon existing ways of doing business and embrace the disruptive innovation completely. They will thus not only imitate the disruptive innovation, but also scale it up and grow it into a mass market. The authors state that this option was rarely considered despite the evidence that companies that pursued this option successfully created the basis for tremendous growth.

In studies relating to the introduction of disruptive technologies by firms it was found that new/small firms were better able to commercialise disruptive technologies over established firms by making use of technology push strategies as well as market pull strategies, and that they enjoyed significant advantages in time to market (Walsh, Kirchhoff, & Newbert, 2002). In the case of VOIP, Nystrom and Hacklin (2005) suggest that it is most likely that incumbent operators will be defeated by new entrants capitalising on convergence as well as those organisations that have more customer-focused strategies.

The way that organisations structure themselves strategically has an impact on the success of new technological changes. Bower and Christensen (1995) indicate that the only way to succeed with disruptive technologies is to setup a separate organisation and allow it to attack the parent organisation. He states that the probability of a company surviving a new technology transition from within the main company, or somehow changing the main company so it can be competitive in the next wave, is zero. Dodourova (2003) investigated Vodaphone Group plc. in the context of mobile network operators competing with Internet access providers, stating that the players are forced to stretch beyond their main business and existing capabilities. It was found that collaborative relationships allowed operators to overcome the problem that no single player has all the aspects needed to dominate in the new areas of market competition.

2.8 The Current South African Telecommunications Market

Liberalisation in the telecoms market since the 1st February 2005 has played an important role in changing the local telecoms landscape, with VANS being able to offer voice services as an alternative to Telkom's fixed-line network (Snyman 2007). VOIP was the technology of choice and held vast promise for reducing telecommunications costs (Goldstuck, Super, & Joslin, 2008).

According to Goldstuck (2008), market forces leading up to this point included the move of international voice trunking services to VOIP in the early 2000's, followed by national cores and backbones. Competition was intensifying between incumbent Telco's and 3G mobile networks resulted in the competitive roll out of broadband access services. In the corporate space it became apparent that it was cheaper to run telephony on the

corporate LAN as opposed to running 2 separate networks. The telecoms regulator ICASA has been criticised of slowing the development of the market by several years due to constant delays with respect to the entry of competition and international gateway access. For example, delays in issuing new self provisioning (ECNS) licenses filled the sector with uncertainty and delayed much needed investment in access technologies (Moya & Whyman, 2009).

Moya and Whyman (2009) indicate that the high margin corporate segment has largely been Telkom's exclusive domain from a fixed line services perspective, but they have lost out on a significant share of the corporate wallet in mobile services going to the mobile network operators.

Developments with the mobile network operators during this time have also had a significant impact on the local telecommunications landscape. Legislative changes have made it possible for mobile network operators to self provide facilities, freeing them from their dependence on Telkom (ITWeb, 2009) This allows them to lay both fixed and mobile infrastructure and capitalise on convergence. MTN and Vodacom have created separate commercial divisions to bring new corporate customers and services based on IP technologies to the market. Dedication to the corporate business is proven by MTN's acquisition of Verizon Business which was integrated into its "Network Solutions" business (Moya & Whyman, 2009). Similarly, Vodacom has subsequently established its Vodacom Business division, which focuses on data solutions offered over fixed line infrastructure to business customers (Vodacom, 2008). This shows commitment to the new market by purchasing Gateway Communications and StorTech in order to execute a plan of offering value added business services (Moya & Whyman, 2009). In their report Moya and Whyman (2009) indicate that these acquisitions by the mobile network operators mark the beginning of a battle for the corporate customer. In this segment they will need to compete with innovative value-added network service providers and resellers, who have already developed converged offerings including voice, data and managed services all with a single point of contact with the customer. They further state that MTN and Vodacom will have to make a significant effort to gain lost ground with corporate customers. Additionally the mobile network operators will need to focus on cost optimisation in light of current uncertain economic conditions in line with operators

around the world who are reviewing business models and outsourcing what they deem to be non-core functions.

The move by the mobile network operators into the data space indicates a move towards transforming themselves into a “new breed of player”, but Moya and Whyman (2009) caution how much they can handle without losing focus. This move will present a new set of challenges that require new skills that are currently not present in their organisations. Also the sales organisations of all product lines will need to be integrated to offer a converged product. In addition they warn that the mobile network operators will find difficulty in materialising synergies between the IP and mobile businesses due to organisational and commercial differences.

According to industry analysts JP Morgan, the total voice market in South African in 2006 was estimated at over R85 billion, with a 31% and 69% split in favour of the mobile network operators. For the business sector utilisation, patterns were split as follows: 65% mobile calling, 30% fixed-line calling (local and national destinations) and 5% international calling. The total spend on communications in the corporate market was split 70% on voice and 30% on data services. Included in the corporate spend figures for voice are a subset of calls referred to as cellular least cost routing (CLCR), which is estimated at about 2 billion minutes per annum.

CLCR makes use of a GSM gateway to achieve the most effective call saving on calls to mobile numbers. This process is more clearly defined as follows, “GSM gateways are devices containing one or more subscriber identity modules (SIMs) for one or more mobile networks, which enable calls from fixed telephones to mobile telephones to be routed directly into the relevant mobile network. A call made via a GSM gateway appears to the mobile network to have originated from a mobile phone registered to that network and so will often attract a cheaper call rate than an ordinary fixed to mobile call” (Ofcom 2005:1). GSM gateways are typically connected to the corporate PBX which handles the appropriate routing decision based on the number dialed. Price has primarily been the determining factor to determine the best call route to follow, but factors such as quality of the route and level of customer service are becoming increasingly important (Snyman2007). Internationally regulators such as the UK’s Ofcom have reported that the use of GSM gateways may be prone to network congestion and interference resulting in

inferior call quality. In addition, it points out that the cost savings are derived entirely from the exploitation of an arbitrage opportunity between regulated rates charged by mobile network operators for call termination on their network and (unregulated) rates the operators chose to charge for on-net mobile to mobile calls (Ofcom 2005).

Locally, the CLCR industry involves a chain of dealers and sub-dealers of the mobile network operators, who divide an estimated 28% margin across the value chain. The total contribution that CLCR made to the mobile network operators in 2006 was estimated at 150,000 lines, at an average return of R1450 per line. The revenues enjoyed by the top dealers of CLCR services in that year were reported to be in excess of R700 million (Snyman 2007).

The continued success of this industry is being threatened. Moya and Whyman (2009) report continued pressure on resellers who are being cut out of the value chain due to an observed trend in the market of acquisitions of several exclusive service providers by the mobile network operators. Additionally, changes in the regulatory environment; particularly as a result of the reduction in interconnects rates threaten the viability of the business model. Evidence of this is the write down, announced in 2010 by the ECNS operator VoxTelecom, to the value of R748 million directly attributed to changes in interconnect pricing (Voxtelecom, 2010). As a means of addressing these changes established LCR operators such as Nashua mobile and Autopage have acquired ECN and Technology Concepts respectively to incorporate an IP based service into their product offerings.

As a substitute to CLCR, VOIP provides a means of achieving operational efficiencies and the potential of capturing an additional 30% of traffic that is currently being routed to the fixed-line operator. However, this comes at the expense of cannibalizing the existing CLCR market, which is very lucrative for all parties in the chain.

In his “VOIP in South Africa 2008” report, Goldstuck indicates that in 2004 the implementation of VOIP was 31% across the corporations surveyed and has since steadily increased to 39%, 49% and 50% in 2005, 2006 and 2007 respectively. The value in 2008 was expected to be 64%. He attributes the growth in VOIP to the increased penetration of broadband services and VOIP attracting SME’s in significant numbers. He indicates that due to the fact that telephony can now successfully be run on

broadband and managed IP networks; it makes sense for Telco's and their customers to run all-IP networks for both voice and data services.

It is clear that IP communications will dominate telecommunications. If most communications move to IP it will surpass the traditional voice infrastructure entirely. This means that Telco's that do not switch to IP services in the next few years will face significant competitive pressures resulting in collapse or mergers(Goldstuck et al., 2008).In response to the transition to VOIP technologies it is proposed that industry value chains will evolve along with industry structures that will affect corporate strategies and the resulting competitive characteristics of the industry(Maitland, Bauer, & Westerveld, 2002; Olla & Patel, 2002). No longer will the vertical structure of the incumbent model succeed as it will be supplanted with a more dynamic, flexible and open ended structure (Esselaar, Gillwald, & Stork, 2006).

2.9 Conclusion of Literature Review

The literature indicates that future growth for the mobile network operators will be derived from the provision of data services, one of which is VOIP.

The benefits that VOIP offers are twofold; they offer operational savings and efficiencies for the operators. Such savings may be passed on to customers. In addition VOIP allows mobile network operators the opportunity of offering customers with "richer voice" environments that they would value over current offerings.

The decision to adopt VOIP offerings however, must consider the effects that such a strategy may have on the organisation. Adopting a disruptive technology is a risky endeavour for established firms. Adapting to the new technology requires structural changes in the organisation based on the strategic position the firm wishes to adopt in the marketplace.

The current SA telecom market offers opportunities for the mobile network operators to gain additional market share from business customers, which has traditionally been the domain of the fixed-line operator. However, this strategy may also pose threats to the established CLRC market and the value chain that exists. Configuration of the value chain may evolve in line with the changing technological environment.

The research seeks to investigate how the South African mobile network operators have responded to the changing telecommunications environment and the opportunities presented by IP technologies by addressing the following research questions:

1. How have they interpreted changes in the telecommunications landscape and sought new opportunities such as VOIP?
2. How have they implemented VOIP innovation within their organisations?
3. What are the implications of implementing VOIP technology on stakeholders in South African telecommunications environment?

3 RESEARCH METHODOLOGY

3.1 Research methodology / paradigm

In order to examine the factors that lead to the successful development of IP enabled communications services and the associated uptake by business customers the research will employ a qualitative research methodology, appropriate for the exploratory nature of the research problem. In order to understand the motives for developing IP enabled communications solutions, depth interviews will be conducted with industry experts on communications solutions to businesses in South Africa. The depth interviews will draw on themes gained from the literature review to gain perspectives on these themes and the issues faced by local operators in delivering IP communications services. This will be based on the literature review as well as information gained from the in-depth interviews.

3.2 Research Design

3.2.1 *A Qualitative study*

The qualitative research procedure to be implemented will be Depth Interviews with industry experts. Depth interviews are defined by Malhotra(1999) as unstructured, direct, personal interviews in which respondents are probed by an interviewer to uncover underlying motivations, beliefs, attitudes and feelings on a topic.

The primary use for Depth interviews is for exploratory research to gain insights and understanding. This method will be appropriate to develop an appreciation of the motives for developing an IP enabled product strategy and the issues that are faced in delivering these products to business customers. This process will also assist in confirming the findings of the literature review.

The advantage that Depth interviews provide is that great depth of insights can be uncovered and that they can be attributable directly to respondents, as opposed to focus

groups where insights are attributable to a group. However, the unstructured nature of the interviews results in difficulty in analysing and interpreting results. This also has an influence on the time required to conduct interviews and thus the number of respondents that can be surveyed is limited. (Malhotra, 1999)

In order to mitigate some of these disadvantages the researcher will apply a semi-structured approach to the questioning in order to at least cover the main themes from the literature with each interview.

Given the applications of Depth interviews as proposed by Malhotra (1999) they are appropriate in this context for the following reasons:

1. Detailed probing of the respondent is required
2. Detailed understanding is required of complex issues relating to changes in the telecommunications industry
3. Interviews are conducted with professional people in senior executive positions
4. The companies interviews are market competitors who would unlikely reveal such information in a group setting

The outcomes of the qualitative study will be to develop an understanding of the factors at play in the changes in the South African telecommunications with the delivery of IP enabled communications services to business customers from an industry perspective.

3.3 Population and sample

3.3.1 *Population*

The population for this research will be considered as all the operators, service providers, industry experts, consultants, regulatory experts and vendors who have an interest in the outcome of IP enabled communications services. As such they will be subject experts in the field of business communications technologies and have insights into the factors relating to IP enabled communications solutions in South Africa.

Six distinct groupings can be derived from the respondents chosen; Mobile Operators, Sales Channel Partners, New Operators, Industry Consultants, Regulatory Experts and

Technology Vendors. These groups will assist in triangulation of themes and opinions amongst the relevant stakeholders.

3.3.2 *Sample and sampling method*

The sample of respondents will be selected based on their expertise and knowledge in the field of communications solutions in order to elicit their perceptions and perspectives on the subject matter. As such the sampling method employed will be a non-probabilistic technique employing judgemental sampling based on the judgement of the researcher (Malhotra, 1999).

The sample size comprises of 24 respondents, representing the interest groups indicated in the previous section. All respondents interviewed are actively involved in the South African telecommunications market.

The total number of respondents in the service provider and market regulation and categories will be limited to the concentration of experts in those particular groups.

In addition to interviewing the South African mobile network operators, operators in the fixed-line and data space will be interviewed. These operators were previously classified as Value Added Services (VANS) providers who are now providing telecommunications services by means of VOIP. Cellular service providers, particularly those who provide least cost routing services, will also be interviewed as they play an important role in the value chain for mobile services to businesses. These organisations will be selected out of a combination of communications entities that are listed on the JSE, and those operators that are licensed to provide voice services according the Electronic Communications Act 2005 and are actively participating in the market. For this subset, the list of eligible operators will be those that are indicated on the Telkom retail price list as indicated on the Telkom website, as it is assumed that they are operational if they have published interconnect rates. As the mobile network operators are late entrants into the IP services market it will be beneficial to interview VANS operators and fixed line operators who have established experience and capabilities in the field.

Table 3: Table of Respondents

	Sector	Company	Name	Title
1	Industry Consultant	Altech Group	Ashraff Paruk	CTO: Altech Group
2	Industry Consultant	Private	Angus MacRobert	Independent Consultant
3	Industry Consultant	Private	Paul Inglesby	Independent Consultant
4	Industry Consultant	PerfectWorx Consulting	Jaco Voigt	Managing Director
5	Industry Consultant	World Wide Worx	Arthur Goldstuck	Managing Director
6	Mobile Operator	MTN Business	Justin Colyn	General Manager: FMC
7	Mobile Operator	MTN Group	Vino Govender	Senior Manager: Fixed Mobile Convergence
8	Mobile Operator	Vodacom Business	Alison Alberts	Portfolio Manager
9	Mobile Operator	Vodacom Business	Gary Hart	Executive Head: Managed Network & UC Services at Vodacom Business
10	Mobile Operator	Vodacom Business	Thami Masibuko	Executive Head: Enterprise Customer Solutions
11	Mobile Operator	Vodacom Pty Ltd	Basil Van Jaarsveld	Senior Specialist: National Interconnection
12	Mobile Operator	Vodacom Pty Ltd	Maxim Naidoo	Manager: Technology Research
13	Mobile Operator	Vodacom Pty Ltd	Riaan Naude	Manager: Technology Solutions
14	New Operator	Altech Technology Concepts	Wayne De Nobrega	Chief Executive Officer
15	New Operator	Arc Telecom	Steve Briggs	Managing Director
16	New Operator	Switch	Greg Massel	Managing Director
17	New Operator	VoxTelecom	Douglas Reed	CEO: VoxTelecom Group
18	Regulatory Expert	Ellipsis Regulatory	Dominic Cull	Owner at ellipsis regulatory solutions
19	Sales Channel	Nashua Mobile	Malcolm Turnbull	General Manager: Specialised Services
20	Sales Channel	Telemasters	Mario Pretorius	CEO: Telemasters
21	Vendor	Aastra	Hercules Schoombee	Managing Director
22	Vendor	Acme Packet	Louis du Toit	Regional Sales Manager: Middle East and Africa
23	Vendor	Broadsoft	Alex Doyle	Senior Director: Global Solutions Marketing
24	Vendor	Broadsoft	Yves Desmet	Vice President: Carrier Sales EMEA

3.4 The research instrument

A semi structured interview process will be conducted with all respondents. The researcher will gather demographic information regarding the respondent for the purpose of future contact.

The involvement of the organisation that the respondent represents will then be established in order to allocate them to a stakeholder group.

A series of five broad questions will then be posed to respondents in order to elicit their views and opinions on the subject. These questions will allow the respondent to approach the subject from any perspective, thus allowing new insights to be revealed. Probing questions are also included as a means of allowing the researcher to uncover specific details relating to the literature.

Finally, the respondent will be asked if there is anything else that they feel they wish to contribute, that has not been covered in the line of questioning.

3.5 Procedure for data collection

The research data will be collected by means of in-depth interviews with relevant experts in the field of IP enabled commutations services. Prospective interviewees will be contacted telephonically in order to inform them of the purpose of the study and determine their availability to participate in the study. The expected duration of the interview will also be communicated to the prospective interviewee.

The interview will take place at a time and location suitable to the interviewee as a means to ensure that they feel comfortable (Kalof, Dan, & Dietz, 2008) and the research data will be offered as an incentive to participate in the interview.

The interview will be non-directive but will make use of an interview agenda that consists of a relatively small number of open ended questions that act as triggers to encourage the respondent to talk about the research topic (Willing, 2008). Each interview will be recorded with the consent of the interviewee, who will receive confirmation of

confidentiality from the interviewer. In addition notes will be taken to assist in further probing or clarification during the interview process.

During the interview the researcher will be sure to adhere to the role of interviewer in order to have a successful interview. As per Kalof et al. (2008) this entails:

1. Building a rapport with the interviewer to make sure they feel comfortable, while at the same time remaining neutral
2. The interviewer must determine the topic, pace and relevance of what is being discussed
3. The interviewer must keep the respondent on track to maintain a reasonable interview length

3.6 Data analysis and interpretation

Analysis of the data will include content analysis and triangulation of data collected from various sources.

3.6.1 *Content Analysis*

Content analysis may be employed in the analysis of open-ended questions (Malhotra 1999). This process will involve analysis of the transcripts of the interviews to identify themes or topics. These may then be classified into categories (Malhotra 1999) for comparison and identification of frequency

3.6.2 *Triangulation*

Triangulation of data from various respondents involved in the telecommunications industry, specifically those with an involvement of IP communications, will be used to gain a thorough understanding of the subject matter.

3.7 Limitations of the study

Due to the relative immaturity of IP enabled communications and the potential capability that is holds respondents may not be able to provide greater depth on the subject beyond what is currently being offered today.

The role of the interviewer is critical to the success of depth interviews. The findings will thus rely on the ability of the interviewer to successfully conduct the interview by applying the following techniques proposed by Malhotra (1999):

1. Putting the respondent at ease
2. Remaining detached and objective, yet personable
3. Asking questions in an informative manner
4. Not accepting brief yes/no answers
5. Probing the responded for father detail

3.8 Validity and reliability

The value of research findings is based on the assessment of its validity and reliability. “Validity is concerned with congruence between the details of the research, the evidence and the conclusions drawn by the researcher” and is measured on the internal and external validity of the research. In the case of qualitative research such as this, additional criteria of credibility, generalisation and dependability may be applied (Kalof et al., 2008).

3.8.1 *External validity*

Kalof et al. (2008: 157) define external validity as, “the ability to generalise from the study to a larger population”. The total population of mobile network operators in South Africa is four and the research will sample the two largest and most established mobile network operators in South Africa. Due to this fact the research will have a high degree of external validity.

3.8.2 *Internal validity*

Kalof et al. (2008: 156) define internal validity to mean “that the study is drawing appropriate conclusions from the data at hand” or in the case of qualitative research the data should be credible in that it accurately reflects reality. This will be achieved by interviewing more than one respondent in a particular organisation or industry sector if possible to ensure that findings are aligned. In addition, the researcher will informally consult with peers in the telecommunications industry to validate the interpretation and conclusions.

3.8.3 *Reliability*

Kalof et al. (2008: 156) state that, “reliability is concerned with consistency” which implies that similar findings are revealed each time the research is repeated. However qualitative research is more appropriately judged on dependability, which reflects how truthful the research is(Kalof et al., 2008). The researcher will attempt to maintain a high degree of dependability by applying a systematic approach to interviews and data analysis, and report any changes that may have occurred in the process.

3.9 Conclusion

The research methodology employs a qualitative research technique of depth interviews, which are suitable for exploratory research in order to gain insights and understanding into complex issues. A research protocol has been used to guide the interviewer in conducting the interview and ensuring that respondents cover certain topics covered in the literature. By applying a structured technique to the interview process and recording of interviews the research will attempt to maintain the validity and reliability of the research findings.

The proceeding chapter will present the research findings from the 24 respondents sampled from the groupings if parties interested in the development of IP enabled communications.

4 RESEARCH FINDINGS

4.1 Introduction

This chapter reports on the findings based on the responses from 24 participants from various sectors in the telecommunications field. It reports on the views and opinions of respondents from MTN and Vodacom as well as the actions of these organisations. These findings are then balanced against responses from other industry players, which either reveal supporting evidence or a different perspective. This provides an objective review of the realities involved in implementing an innovation such as VOIP by the mobile network operators.

The responses to the research questionnaire by each of the research participants have been arranged in line with the research questions posed at the end of Chapter 2 and thus the chapter is divided into three sections. The findings address the telecommunications landscape and the changes facing the players in the sector. This includes the factors that impact the adoption of VOIP technologies. A summary of key success factors is provided. This is followed with findings on the manner in which the mobile network operators have gone about implementing VOIP technologies and the challenges that they have faced. Lastly, the chapter reports on the findings of the implication of VOIP adoption as it affects the mobile network operators, from the perspective of their customers and their existing sales channels.

4.2 Changes in the Landscape and Opportunities for VOIP Adoption

This section considers the response by the mobile network operators to the changing technological landscape in which they operate, and the perceived need for exploring converged IP solutions such as VOIP in order to maintain a competitive position. It presents findings from respondents on the factors that would drive the search process for VOIP technologies. The reasons in favour and those against the adoption of VOIP

technology are then presented by focusing on the technical and commercial benefits and drawbacks of the technology as perceived by industry players. Factors such as cost savings and additional features and benefits to customers are explored, which would directly affect the mobile network operators and thus contribute to their adoption of VOIP technology. Secondly, factors, which may enhance the products offered to customers, are then explored. These pull factors would likely have an impact on the adoption decision. Consideration is given to the role that suppliers play in bringing about technological change within the mobile network operators. The section concludes with the regulatory change and their influence in changing the telecommunications landscape.

4.2.1 *The Need for VOIP*

In order to determine the value of this research, it first needs to be established whether the mobile network operators deem IP services sufficiently important to consider as a product offering to their customers, or whether they can simply continue offering their traditional suite of products.

All respondents interviewed were unanimous in their belief that IP services cannot be avoided or ignored. As one respondent indicated, “mobile network operators don’t have an option to ignore VOIP due to convergence becoming a reality.” The mobile network operators themselves acknowledge that market factors are forcing a strategic decision to focus on IP services, “The market is moving to IP based services. ISP’s have the skills and the opportunity to add services on top of the IP network. Without value added services the Network Operator will turn into a bit pipe.”

Thus the mobile network operators need to review the services that they are offering to the corporate customers. As one respondent indicated, “the mobile Operator needs to transform its offering to remain relevant.” A number of reasons were provided indicating that VOIP would be the route to follow in order to achieve the objective of being relevant to customers. “VOIP is the most notable converged enabler around – IP networks allow a portfolio of services.” And in addition, “Factors such as customer demand, technology availability and costing are all favourable towards VOIP – it is the preferred direction to follow.”

Thus there appears to be a definite need on the part of the mobile network operators to strongly consider IP services but there appears to be a number of factors affecting their success in the VOIP space.

4.2.2 *Factors Influencing Adoption*

From a technical and commercial perspective respondents reported a number of benefits and drawbacks to VOIP technology. Initial indications of why VOIP would be a good technology to adopt in providing corporate services include the following reasons from various respondents. “Existing premicell least-cost-routing services can lock up to 30% of base station resources in high-density areas resulting in poor overall service due to overloaded infrastructure”, “VOIP has matured as a technology and now offers a quality service”, “There is a growing pool of technical capability to support VOIP services.” These factors contribute to the fact that mobile network operators consider that VOIP will be the true basis of converged services in the future.

When considering if VOIP would be suitable to offer products to corporate customers it needs to be established if it is suitable in order to offer basic services. As indicated by a respondent, “Telkom proved 10 years ago that it made money from VOIP and it was competitive.” Thus based on this evidence it would be useful to determine if the mobile network operators agreed on the technical capability of VOIP. Responses such as the following indicate that it would be a suitable technology to deploy. “IP quality is not necessarily a problem. It can scale to the volumes required by mobile network operators and IP services can scale much more efficiently than TDM technology.”

Thus VOIP technology has been proven in a local operator’s network and the mobile network operators agree that is meets the quality and performance measures required. A third aspect then to consider in the adoption process is the cost involved. The majority of respondents agreed that VOIP was also a cheaper technology compared to existing TDM equipment. The findings revealed two cost components:

Capital Costs - From a capital expenditure perspective VOIP does appear to be cheaper to implement based on comments from respondents such as, “rolling out an IP network is

significantly cheaper that a TDM network," and "a key driving force for the adoption of IP equipment is the fact that it is cheaper than TDM equipment."

Operational Costs - Respondents agreed that VOIP would bring about operational efficiencies on a number of levels, all of which would contribute to lower operational costs. From experience with Telkom's VOIP efforts it is noted, "VOIP offers up to 30% savings on operational costs." Simplifying the network architecture, which reduces OPEX and CAPEX requirements for operators and provides the opportunity to centralize services and applications, brings this about. This brings down the cost of call control, as there is less distributed equipment. A responded indicated that a mobile operator who currently makes use of 20 switches nationwide could reduce that number to 2 or 3 devices in total. Further operational benefit of having one centralised platform is the ability to standardize skill sets in the core infrastructure. As one respondent indicated, due to VOIP technology being cheaper, skills for it would be more readily available and thus would imply lower staff costs. IP networks thus allow for technical and resource convergence from a network operations perspective and the management of core infrastructure could be shared across multiple applications. Speed to market is increased, as product developments are not dependent on building new core network services or rolling out new end user equipment.

4.2.3 *Drawbacks or inhibitors to VOIP adoption*

When considering the benefits of adopting VOIP, the drawbacks of such a strategy must also be considered. Although respondents provided motivating factors for the adoption of VOIP technology, they also provided reasons as to why the mobile network operators would not adopt VOIP.

From an operational efficiencies and cost saving perspective, respondents suggested that mobile network operators are heavily invested in existing infrastructure and would need to leverage their existing networks for a long as possible. Additionally, respondents suggested that the cost of adopting VOIP would initially be much higher due to the need to run two networks in parallel thus incurring high costs of new technology and investing in new skills. However these appear to be short-term concerns. More fundamental to the decision is the impact that VOIP would have on existing business models. Due to the

high cost of existing infrastructure, mobile network operators have the ability to justify high costs to the market. As a respondent commented, “the mobile network operators can’t re-invent the model without jeopardizing current revenues, and by moving to a VOIP network it will make it difficult to justify lower costs once they have moved away from perceived expensive networks.”

Respondents from the mobile network operators echo this idea stating “VOIP becomes highly disruptive when it threatens the existing models and draws revenues from existing cash cows.”

A further conflict presents itself at both a technical and commercial level. Although mobile network operators commented that VOIP technology may be cheaper to implement and operate, and that it offered service at a satisfactory level of quality a respondent indicated that “it would be difficult to justify using cheaper technology because it is perceived to be inferior.” The problem is further compounded at a commercial level when the mobile network operators don’t believe that they will be able to make money from IP services. A respondent raising the following question, which revealed this finding, “the way IP is framed is as a lower cost solution – how does one make money from a service that will bring in less revenue?” A respondent summed up the problem with the business case for VOIP as being “difficult to justify based on the discrepancy between per minute call costs versus the per Megabyte data charge. From a profit maximization perspective, the per minute call charge route is much more favourable.”

4.2.4 *Customer Requirements*

Once an understanding of the internal benefits and drawbacks are established it is useful to consider the influencing factors from a customer’s perspective. The needs of business customers may likely provide a driving force for the adoption of VOIP technology.

Currently the mobile networks IP services offerings to business customers are, “basic services providing alternative bandwidth data access solutions” and a respondent indicates “that it may take a while for customers to trust applications and services over these access services.” They suggest that segmentation of the mobile network operators

target market may assist in building this trust, as SME's are more likely to respond to new technologies than large corporates. Conversely, they suggest that the mobile network operators would only really make an effort on a corporate customer such as a bank, where "volumes would make it worth their while." This sentiment is supported by another respondent using the example of Nedbank, which has over 3000 branches with multiple PBX's and users with multiple extensions at various locations, as well as a mobile device. "If one were able to converge all extensions it would provide significant cost savings for the customer, it would be cost effective for the operator and it would allow it to provide the bank with a much wider range of products."

The opportunity for cost saving, coupled with the ability to extend the range of products offered to customers, was raised by a number of respondents. Additionally it was noted that "VOIP closes the gap of services that customers expect going beyond pure mobile services, but also offering fixed line services and PBX functionality" and that it "positions the operators as tech savvy by embracing new technology in order to deliver better services to customers."

It appears that the mobile network operators are starting to move in that direction as indicated by one mobile operator "VOIP is a cost effective solution and the price point is better than that of traditional LCR where customers are locked into cellular contracts and the quality is not necessarily there. The customer has one point of contact with a single service provider and leverages the same infrastructure for all business calls. VOIP simplifies the environment, making it easier to manage through one provider." They go on to say, "VOIP services are the foundation for any unified communications going forward."

4.2.5 *Vendor Influence*

Respondents who did not fall into the mobile operator or vendor categories had limited insights into the roles that vendors played in influencing the adoption decision. However, they did believe that the operators were highly influenced by vendors, as it was the path of least resistance to follow the direction laid out by them. A respondent added that the business models of vendors are changing, thus putting them in the driving seats. "Vendors are now in a position to finance new network rollouts through financing

schemes which would be highly appealing to the operators. In particular the Chinese vendors have the capability to change the financing terms to their customers." The operators are also tied to the vendors for the foreseeable future, and this is especially true if the vendors were financing new network rollouts. Respondents from mobile network operators confirmed the close ties with the vendors. "The operators are hugely invested in certain vendors and are heavily dependent on their technology roadmaps. The operators have trust in the vendors and this is particularly important in any integration plans into the existing networks."

Trusting relationships appear to be in place only with traditional GSM vendors but with new IP vendors the situation appears to be different with new IP technology vendors. The operators indicate that vendors have been proposing IP services for a number of years and to date the business case has not supported the purchase decision. They state that the vendors have not been able to meet the requirements of the operators. The following examples provide evidence of this situation. A respondent indicated that, "Vendors such as Cisco are not good at selling to mobile network operators, as IP is a new product that needs to be sold differently" There doesn't seem to be any doubt that IP will be the way of the future – "Everyone wants to go IP, everyone believes it is the right way to go." A respondent indicated that there are two fundamental differences in the approach used to Internet Service Providers compared to selling to mobile network operators. The first is in terms of financial models employed. "ISPs have much more conservative budgets compared to mobile network operators who typically over capitalize. Secondly, the vendor's business cases assume that the mobile network operators are running fixed line networks in their core. This is particularly relevant in South Africa where the mobile network operators have been built as pure mobile networks without the foundation of established fixed line networks such as their European counterparts." Local operators made use of leased infrastructure from Telkom, the incumbent fixed line operator in South Africa. Current initiatives by the mobile network operators to build fibre networks are limited to "point to point" connectivity, which supports existing TDM model deployed in mobile networks. However IP requires "cloud based connectivity" connecting multiple points together. To address this, a respondent indicated that, "building a transmission network is a possibility for the mobile network

operators, but it is all dependent on the business link justifying the investment. They are in a position where they have the means to make the investment into a network."

Ensuring that all customers can connect to the network is one piece of the service delivery puzzle. The next requires convergence in the core of the network to provide IP services to those customers. More than one respondent indicate that this has not yet happened. IMS is the technology that allows for convergence of legacy TDM and IP based networks by providing a middle layer between the two technologies. This poses certain complications within vendor environments "which is hampering the adoption of IMS technologies." As standards in IP technologies have developed and matured, so has the IMS technology become more plug and play, which results in the incumbent TDM vendors' position being threatened by new specialist IP based vendors. The dependence of mobile network operators on incumbent TDM vendors makes entry by new vendors difficult for various reasons. Despite the desire to implement new technologies engineers with the mobile network operators will "still revert to the incumbent vendors to rubber stamp technologies" to ensure compatibility and address integration concerns. Furthermore new IP entrants may not necessarily meet procurement and support criteria stipulated by local mobile network operators. A respondent from a mobile operator indicated that the there is a "material business risk dealing with small local vendors – they require significant financial backing." In addition to financial backing matters of corporate governance and shareholder influence are other factors raised, both of which influence vendor selection.

The on-going support and maintenance offering of the vendors also plays a significant role in the decision to adopt their technologies. A respondent indicated, "Existing mobile operator vendors such as Ericsson are full turnkey solutions providers who manage the network end to end." This is in contrast to IP vendors such as Cisco, which a respondent described as being, "only a channel to market; they are just selling a box!"

So there is a certain amount of customer involvement required on the part of IP vendors to build trust relationships with the mobile network operators. A respondent indicated that the role of vendors to bring about change in the mobile networks would involve the progression:

1. Replace obsolete technology

2. Bring about cost savings
3. Maintain voice quality
4. Introduce new applications

The challenge for IP vendors is to be able to move operators along the path as quickly as possible. The trend towards convergence will be a driver in this regard as business models transform to combine telco, IT and web technologies. Currently all the top vendors are playing in the convergence space. Additionally trends in operator structures are also changing. A respondent indicated, “Telco’s of the future will be small operators – with low staff compliments. This will be driven by outsourcing to external parties.” An example of this is New Zealand Telecom who has outsourced most of its operations to vendors.

A respondent summarized the critical success factors that would lead to the success of innovative converged IP services such as VOIP.

1. Ability to develop a channel into corporate customers with a well defined segmental view by establishing a direct channel. This is currently lacking in their capability.
2. As customers move slowly they also need a channel that will drive action from customers.
3. A core competence, which has not been exploited, is ability of successfully developing a portfolio of new products. Processes around price and other management encumber them, which is typical of mature operators going into a world that is immature and expecting to compete. It requires balance in their current processes and translating that into speed to develop new and relevant products
4. The ability for leadership to be strong enough to disrupt in the context of the organization is critical. Simply by treating the IP business as an add-on or converged play they will fail.
5. They need a fixed line network such as Telkom’s IP transmission network for the following reasons:

a. It is easier to be a fixed line operator entering into VOIP space than mobile operator entering VOIP space
b. Current pricing enables operators to make more money from existing network than it would to build an entirely new IP network.
c. It costs more to deliver IP minute than it does on current network. Thus the driver to develop an IP capability should be new market entry rather than just the need for higher revenues

4.2.6 *Regulatory Influences*

This section explores the influence of the South African regulatory environment on telecoms operators and their ability to compete in the market. Over recent years a number of changes have occurred in the regulatory space, which may have an impact on how operators respond to new technologies such as VOIP and use them to their advantage.

Initially, this chapter considers the importance of the South African telecommunications regulatory environment in terms of operators delivering innovative technologies such as VOIP. A respondent recalls that at the 2000 ITUT WTSA conference, a number of objections were raised against VOIP technology by the 191 countries and regulators attending. The counter argument at the conference, from a South African perspective was that not adopting VOIP would dampen future growth in the country, as it was seen as a key enabler for creativity and innovation of future capabilities in the telecoms sector. In 2003 a landmark ruling by the incumbent minister of communications allowed for the legalisation of VOIP. Since then, there have been more than 300 innovative companies applying for ECNS licenses. The majority of these companies are making use of VOIP to enable their businesses. Prior to the announcement in 2003, a respondent indicated that IP services were not viable under the standing regulatory framework as all VANS operators were prohibited from offering voice services, and it was the exclusive domain of Telkom and the mobile network operators.

Respondents indicate that the ECA has created a technology neutral landscape and allows more entrants into the market, thus increasing competition and lowering costs. It grants license holders amongst other privileges, the ability to self-provision infrastructure.

This has led to a number of initiatives in terms of international connectivity via undersea cables in the form of SEACOM and WACS. Previously, Telkom held a monopoly over the international cable. National fibre-backhaul project collaborations between Neotel, MTN and Vodacom have also arisen. For new market entrants, VOIP has lowered the barrier to entry into the telecommunications market.

Subsequent to the introduction of the ECA, the regulator (ICASA) has been on a drive to lower the cost of communications services. Amongst other initiatives it issued a requirement for mobile network operators to lower interconnect rates – the rates operators charge each other for passing calls between their respective networks – in an effort to have a positive effect on bringing down retail tariffs to consumers. A respondent indicated that "driving down the interconnect rates has no bearing on the retail rate. What has happened however is that the LCR market has been thrown into turmoil. SIM based LCR services existed due to arbitrage opportunities that existed between retail and wholesale prices for SIM packages." By making use of interconnect routes and VOIP, technology allows new entrants to disrupt this market by offering highly competitive call termination rates and value added services.

The full impact of the drop in interconnect rates has yet to be realised as the regulator has agreed to a 3 year glide path to decrease rates, that last step in lowering prices is due in March 2013.

In respect to pricing regulations, a respondent indicated that pricing regulation is necessary in the market when considering business models of existing incumbent operators who engage in bilateral pricing agreements, which allows for a cartel of operators determining pricing. They state that, "the regulator needs to step in to change the situation by eliminating the competitive issues relating to the way companies can independently change tariff plans."

A further development made possible by the ECA is that of number portability – where consumers have the ability to retain their number while moving to a different network. This opens the opportunity for new operators to offer customers voice services without the customer being affected by changes in numbering. A respondent criticised the number porting structure saying "it's controlled and financed by the incumbent operators and acts like a monopoly where the process does not work as smoothly as expected.

As indicated by a respondent all of these developments open up Telkom's monopoly, whereby anyone with the ability to leverage another operator's network and with a good billing system can offer corporate voice services.

After establishing what changes have occurred in the South African regulatory framework that favours new entrants, this chapter consider the ECA in terms of providing enablers or barriers for the introduction of new technology such a VOIP. The response from respondents has been mixed.

There is general agreement that market liberalisation has occurred resulting in increased competition due to a greater number of market entrants and the fact that incumbent operators are now obliged to interconnect with any license holder seeking interconnection. However, the theory of the open market seems to be hampered by a number of factors or obstacles borne by the regulator. The leading criticism of the regulator is that it is too slow to respond to new technologies in terms of licensing and approval. A respondent explained the need for the approval process, saying that it becomes very difficult to operate in an environment where technology standards are poorly defined or non-existent. "This creates an environment of no control over quality of service and thus no regulation or recourse for the consumer in the event of poor customer experience."

This is manifested with the impression that the regulator lacks the ability to enforce regulations and that the regulatory framework within which companies must operate is too vague. The direct impact of these so called vague regulations is that it impeded the planning and investment into new technologies due to high levels of uncertainty.

Two different respondents used the example of frequency spectrum allocation for wireless services to illustrate the slow progress of the regulator. "Wireless services in licensed frequencies would allow new operators to self provision new services at a much faster rate than traditional wired connectivity solutions, thus putting them in a position to effectively compete with the incumbent operators. However the regulator is making a hash of this process!" Another strongly contentious issue is that of local loop unbundling, which offers competitors access to Telkom's "last mile" network. This would offer new entrants direct access to customers via established infrastructure.

A respondent put these shortcomings of the regulator down to a shortage of skills in the regulatory sector. “The regulatory environment is confusing which suites the incumbent operators who control the resources. Due to the limited legal resources in the regulatory environment the operators can play the information asymmetry game to their advantage” Evidence of this are the numerous protracted litigations processes against the incumbent operators who have the means to spend years defending cases against them.

Despite the negative criticism of the regulator there does appear to be some balance in terms of addressing the needs of new entrants in the market. A respondent pointed out the following; “The current business models of least cost routing providers are built on inefficiencies in the market, which are being exploited to the advantage of these companies. They cannot cry foul when the regulator steps in to correct such inefficiencies.” He describes the characteristics of a voice provider as “an organisation that is solely in control of the network on which no one else can terminate calls and as such they have a significant market power.” From the regulators perspective he indicates “they cannot treat new entrants in the same manner as treating Telkom in order to allow them to grow their networks, however they must be provided with a structure in which to operate. The ECA now does this.” He indicates that the regulatory framework is straightforward and gives new entrants guidelines on how to interconnect and that “this is the first time there is an access network that favours new entrants. This should open up new opportunities.” He does however make the distinction between the right to access and the cost to access and cautions about how well this is actually understood by new entrants. He states, “Telkom is a price taker – they are playing a long term game” and warns “the new operators will price themselves out of the market and consolidation will be the end result.” He states that new entrants have not thought through the business models properly, however new entrants do indeed have the potential to take on incumbent operators and show up their collusive behaviour. He states that nothing should be taken for granted, however, “Neotel is a good case study of an organisation that has been given established fibre networks and customers and yet they have no market share.” In support of this statement, another respondent indicated that despite the high number of new entrants in the market with a license, very few of them are making an impact on the market.

“From the perspective of the mobile network operators they need to protect their existing customer base and revenue streams. VOIP is disruptive in the hands of third parties who are trying to gain some market share and enjoy lower barriers to entry with lower cost technology. The response of an incumbent operator towards VOIP would also be different depending on the services that they currently offer. For example, Telkom would respond differently to a mobile operator as it owns the fixed line network over which VOIP runs, whereas the mobile network operators are possibly only offering VOIP to specifically targeted enterprise customers via MTN Business and Vodacom business channels.”

The respondent continues by saying, ”the interface on which the incumbents do battle against new entrants using VOIP is around interconnect and termination rates. In order for new entrants to offer a viable service to business customers they need to be able to send a receive calls to other incumbent networks. Despite the fact that interconnect with new entrants is mandated in the ECA, there have been extreme delays in securing interconnect in the South African market.” Numerous respondents commented on the current stance of the mobile network operators, which is simply to “refuse to deal.”

When faced with this position there is little that a new entrant can do against this anti-competitive and obstructive behaviour. A respondent indicates that neither the competition commission nor ICASA are effective in addressing the matter.

From a mobile network operators perspective, they enjoy the same liberties as other licensed holders in that they can self-provision services and offer voice and data services. They certainly have the financial means to make significant investments into developing such services. However they are not using VOIP services to address the market in a meaningful manner. A respondent indicated that they would generally make the best of mobile services, which are more lucrative.

The threat that VOIP poses to mobile network operators across their own networks is that it cannibalises the revenue to streams from voice services by making use of cheaper data services. A respondent indicated “they have addressed this contractually by being permitted to prohibit the use of VOIP services across their networks, thus protecting their interests.” He also indicates that by allowing VOIP and selling VOIP services would make

it difficult for the mobile network operators to justify their current pricing levels; however there is no technical reason that they would not be able to offer the services.

Furthermore there is no competition or threat to mobile network operators as there is no spectrum allocation available to any other market entrants. Competitive pressure is a theme that was touched on by numerous respondents who inferred that due to their monopolistic market position they have very little incentive to behave in a competitive manner, compared with ISP players for instance who are faced with real competitive pressure in a sector with a vast number of players. This has impacted on their ability to innovate, as well as the pricing decisions they make.

4.3 Implementation

This section considers the manner in which the mobile network operators have implemented VOIP technology in response to the changing landscape in order to offer a viable product to a new market segment. Findings on the relative success that the mobile network operators have enjoyed with respect to launching new VOIP products to the market are provided as well as the challenges they face in this respect. It reviews the manner in which the mobile network operators have structured themselves to optimize the exploration versus exploitation activities required when implementing new innovations.

4.3.1 *Establishing IP focused businesses*

When determining the rationale behind establishing IP focused business platforms a respondent provided the following reasoning, which corresponds with the view of other market participants. “Mobile telephony is being saturated and there is a growing massive demand for mobile data. In a landscape of disruptive technologies and through convergence of mobile and IP systems the operators could not remain in mobile voice, as it would lose out on the market. As such a strategic decision was taken to start a new business with the driver to develop a range of converged IP products to take advantage of a single IP platform”

Supporting this, another respondent from a mobile operator commented that, “there are pressures to drive new technologies, voice revenues are being lowered as the market matures and data prices are also being pushed down, so there is a need to provide richer services to increase the base. IP services provide the opportunity to service the mobile market and serve the needs of the fixed line space. IP is more efficient to provision voice services over and allows you to serve more customers on the same platform.”

4.3.2 *Implementation Challenges*

A number of respondents indicated low levels of penetration of VOIP into the business space by the mobile network operators. One respondent indicated, “Vodacom business and MTN business haven’t touched the VOIP market – evidence of this is provided the number of minutes passed to and received from their networks.” Due to the fact that IP services make use of known number ranges, which are distinct from the mobile ranges this level of network traffic is easy to identify and measure. Other respondents agreed that it was surprising that the mobile network operators have not made an impact on the market. “They haven’t affected the market as expected despite their marketing and capital clout.”The reasons for this lack of success appear to be numerous as indicated by many respondents.

Despite the strategic intention of establishing businesses focused on IP services there appears to be a lack of commitment to the strategy. Telling comments from the mobile network operators that indicate this include statements such as, “there is a definite commitment to IP services but at the same time the company would prefer that VOIP was not there to disrupt and affect existing revenues”, “The executives cannot ignore VOIP, but rather understand what its effect will be. Must lose something rather than lose everything”, ‘there is resistance [towards VOIP] due to the fact that IP was an inferior quality service.”

Other market participants who indicate that, “the mobile network operators are making an investment as protection for the future, but not actively pushing the products, it’s just an insurance policy” support this resistance. They follow by saying that, “the MNO’s have no strategy in place for corporate voice services.”

The most notable factor contributing to the resistance towards VOIP services is the risk of cannibalizing the existing mobile network margins. Nearly all respondents raised this issue and so it would appear that the VOIP strategy is in conflict with the existing GSM strategy.

This places the mobile network operators in a difficult situation to offer VOIP services, which will likely compete with their existing mobile products. On the one hand they need to protect revenues from established products while the market changes, but on the other hand as noted by one respondent, “it’s extremely difficult to build a business case that then takes traffic away from the mobile network.”

The establishment of Vodacom Business and MTN business within the larger organisations is clearly the first step in addressing the changes in the market, but they still face a number of challenges before they can become successful. The respondents of both mobile network operators acknowledge this. A respondent from one operator indicated, “Our business poses a threat to the existing GSM business as we are drawing profits from the old business. Lots has been spent without immediate results, but ours is the business of the future.”

This internal conflict is experienced equally at both operators as indicated by a respondent from another mobile operator, “the smaller business becomes disruptive within the larger organisation which causes problems. Although we are part of the group, we are effectively working against the group and are thus deemed to be a disruptive influence.”

There is a very definite segregation between the mobile operator and the IP services business from a cultural and structural perspective. A respondent at a mobile operator referred to the “Bell Heads” (being from the traditional PSTN/analogue telecommunications school) and the “Net Heads” (from the IT/networking school). They explain, “The Telco culture versus the ISP culture is made up of different types of thinking and with different mind-sets. The result is a clash of cultures due to the different characteristics of each group.”

Bell Heads are characterized by traditional telco operators who are rigid, highly standards and process driven and operate in silos where each application has its own

network; own engineering teams and specific processes. The operational drivers supporting this mind-set have been capital-intensive investments into infrastructure in order to provide “telco grade service”. So a mobile network requires massive investment – but a limited number of players so a cartel can control and manage pricing. This justifies the prevailing mind-set, as there is little competitive pressure to change.

In contrast is the IP mind-set where “ISP resources run networks on shoestring budgets and take risks and are satisfied in offering good enough grades of service.” As such it appears difficult to justify higher costs and related higher revenues the VOIP space.

When considering the manner in which Vodacom Business and MTN Business have configured themselves in order to manage the innovation process and the disruptive effects it may have it appears that both approaches have benefits and drawbacks but neither model stands out as being more successful.

Vodacom Business is a wholly owned subsidiary of the parent organisation with integrated finance, marketing, sales and technical teams all falling under the executive teams of the parent organisation. Their approach was to build a business from scratch, which included recruitment of key staff from various industry sectors, the development of new networks with new technology and the establishment of a new customer base. Respondents from Vodacom indicated that the overriding benefit of this approach is that they have no legacy issues to contend with and can create their own organizational culture without the problems associated with mergers or acquisitions of organisations. Additionally there appear to be synergies and opportunities to leverage of existing structures, in terms of sales for example. However they list the drawbacks as numerous and include:

1. Finding the necessary skills in the market is difficult
2. Building a business from the ground and reaching a level of maturity takes a long time.
3. The reality of leveraging off existing structures has not worked out as anticipated. “The expectation that existing sales teams familiar with existing products would be able to seamlessly sell new IP products resulted in a dismal failure and required the recruitment and training of new sales staff to handle converged sales.”

4. The integrated approach does not overcome existing mentalities and slow bureaucratic processes leading to slow decision-making, which considering the fast paced competition in the ISP space is a significant disadvantage.

MTN took a different approach by choosing to acquire existing businesses rather than build. In addition the new MTN Business entity was a completely separate company from MTN networks – the mobile business.

Respondents at MTN indicate that the acquisition of Verizon Business brought in necessary skills and an existing customer base as the main benefit of this approach. However there are again numerous drawbacks also listed.

1. The two entities are separate and have different management structures, which limit potential for synergies.
2. Systems between MTN Business and MTN networks are totally disparate, causing problems and delays with integration.
3. Sales teams from MTN Business and MTN networks compete for the same business in the market.
4. The two businesses need to come together to realize the synergies that exist.

Thus it would appear that regardless of the approach taken by both operators they are plagued with similar problems relating to management of a new innovative business within the context of existing business activities.

These problems are further compounded by the fact that the mobile network operators are late entrants into the IP services market. Various respondents indicated that the mobile network operators have underestimated the difficulty in entering the business services market. Not only do they need to develop innovative new products but they will also need to convert customers away from the existing market leaders in the data services space such as Internet Solutions, ECN and Voxtelecom. One respondent summarised the problem as such, “Vodacom Business and MTN Business will eventually make their mark but will pay an expensive education as they are late entrants to the market. They have underestimated the task at hand, underestimated the opportunity cost and the cost of acquiring new customers. These are typical errors in the industry.”

4.4 Implications of VOIP Adoption

This stage of the innovation process considers the sustaining adoption and diffusion of a new innovation. This section provides findings on what the expected needs of business customers are for converged IP services, and the manner in which the mobile network operators provide these. Additionally, it considers the existing value chains and how they may change in light of the adoption of VOIP technologies by the mobile network operators.

4.4.1 *Understanding Customer Requirements*

When exploring the needs of business customers the majority of respondents provided three broad requirements that they believe business have. “Traditionally customers accepted what was offered to them – this is now changing.” Firstly customers require managed solutions, which involve services such as “cost optimisation and fraud detection, usage analysis and on-going adjustments to changes in service usage.” These require on-going involvement from a service provider to ensure that the service meets the customer’s expectations. It requires account managers and support structures to maintain the managed services offering. Systems such as telephone management systems assist in this process by reporting on telephone usage in the customer’s business environment.

Secondly, customers expect cost savings and service features, which enhance productivity. Part of these productivity-enhancing features requires that they are seamless for users, and do not requires changes in work processes or habits. Quality and reliability are also paramount for business customers who rely heavily on telephony services to operate effectively.

Thirdly, business users are expecting converged or unified solutions allowing them to make use of both fixed and mobile devices and for pricing to be suited to the service used and medium over which the calls are transmitted. As an example of this requirement, a respondent from a mobile operator indicates, “there is a strong demand from high end customers for in-zone calls at cheaper rates than breakout calls from their mobile devices”

A respondent summarises the services that business customers expect as follows:

1. Cost optimisation services
2. Unlimited voice on-net
3. National IP network to respond quickly to customer growth
4. Global network with a bundle of products
5. Fixed to mobile convergence solutions
6. PBX features with convergence

When investigating whether VOIP addresses these needs it would appear that it is a suitable technology to use for a number of reasons. In terms of managed services that customers require, VOIP fits well into existing managed data services that are currently offered by Internet Service Providers to their business customers. Regarding the matter of costs and features there are a number of opinions, which lend themselves favourably to VOIP. Various respondents indicated that early VOIP offerings were driven purely by cost savings, which was not necessarily a good long-term strategy as it has created the perception that it is a significantly cheaper option. Numerous respondents indicated that this perception is problematic when facing the reality that transmission and termination costs are still incurred with VOIP technology. Despite this perception respondents indicated that VOIP does make it easier to fulfil customer requirements, and does indeed offer additional features and benefits to business customers.

It is generally agreed amongst respondents that the value of VOIP is so much more than just cost savings, and that the benefits that VOIP offers depends on the mix of products offered. A respondent indicated that, “a compelling value proposition is not built overnight,” and provided a comparison of the offerings of leading business VOIP providers to indicate where they are positioned in the market. “Internet Solutions provides an LCR replacement with no inbound services and offers little additional value. ECN provides volume services at low cost. VoxTelecom has a stronger value proposition for consumers and corporate although their suite of services is not integrated at a technical level. They are however taking steps in the right direction.” They indicate that, “there is a huge gap in bundled services that the mobile network operators can easily close.” Adding value is, according to a respondent, imperative to success. “The mobile network operators are used to high margins as mobile services offer a huge value

proposition, and thus to maintain high margins in VOIP services they will need to add value on top of pure cost savings benefits." This is supported by the view from a mobile operator who indicates that, "the IP business model will result in thinner margins, but revenue from additional applications will be high as they provide value."

Respondents indicated that fixed mobile convergence is the key value added solution that would appeal to business customers. Fixed mobile convergence would allow a mobile operator to offer both fixed line and mobile services to a customer regardless of end device used, thus capturing all of their corporate traffic. Additionally, this is a key strategic advantage that the mobile network operators have over other telecoms providers.

When questioning if there were any fixed mobile convergence of converged offerings in the market no respondent was aware of any as yet. Respondents from the mobile network operators admitted that fixed mobile convergence was indeed an opportunity to exploit and a strategic advantage that they would have over any other market operator. Some reasons provided by respondents as to why fixed mobile convergence was not yet a reality included the following, "legacy systems are preventing them from offering anything quickly," and "currently the numbers don't justify a converged FMC solution. The business cases have not supported the solution up to now, but this is changing!"

Possibly a better indication of reasons behind the delay are revealed by investigating how well suited the mobile network operators are in addressing the needs of corporate customers.

From the perspective of providing IP and data services, MTN and Vodacom are not known as data providers beyond 3G services and they can't carry fixed line traffic.

A respondent indicated, "the MTN network is a wholesale services player and uses a Service Provider channel to have direct relationships with customers. In addition to this mobile network operators only have competence in offering mobile services and will need to move into IT services to address the needs of business customers. Thirdly they have identified that they cannot provide enterprise services without the necessary support structures and skills. They thus need to partner with or acquire systems integrators to provide support to data customers." The move to acquire Verizon Business

is considered a move in the right direction in addressing the sales and support models required to serve business customers.

This view is shared by another respondent who drew parallels with leading IT services company, Dimension Data saying, “the mobile network operators are not able to address the needs of business customers in the short term as the problem that they have, which is similar to any service provider, is to understand the customer LAN (local area network) environment. Dimension Data, for example, understands LANs well as they implement and manage them for business customers. The operators have network standards and architectures that they stick to. In an enterprise environment there is a much higher degree of complexity and variability and less control of the environment, which poses problems when integrating with standardised network structures.” They indicated that customers are also moving away from set methods, which are dictated by network operators. They use FNB as an example, who “have moved to an open source telephony solution, essentially revolting against the traditional telco operators and standards that they set, and are doing their own thing.” He continues by saying “the mobile network operators don’t understand the business market and the needs of business customers, so they don’t have the ability to translate customer needs into a product. Dimension Data however takes SIP trunks from operators and creates a value proposition by selling customer IP telephony services and endpoints. They offer the full value chain and unified communications experience.”

From a marketing and sales perspective, a respondent indicated “the mobile network operators don’t have skills to sell and position VOIP products – they can’t move from SIM card sales,” again placing emphasis that VOIP is a managed services business requiring on-going analysis and adjustment for the customers changing needs.

As a means of responding to the negative perception around serving business customers’ needs, a respondent provided some insights into how the mobile network operators intend to address the issue. “The organisation has an overall go-to market strategy at Group level with single account managers or directors. This ensures that there is an understanding of the customer’s requirements holistically. They have the ability to draw on both the mobile and ISP sides of the business (MTN SA and MTN

Business) to fulfil the requirement." The account manager would need to consider the following for a business customer to move across to a unified communications solution:

1. Where is the customer in their buying cycle?
2. How progressive is the customer in terms of embracing new technology?
3. How disparate is the customer in terms of different suppliers, different technologies and varying levels of quality?

The key will be to walk in with a single brand and single knowledge base and then co-ordinate internally to fulfil all of the customer's requirements."

Offering a different perspective on the issue another respondent suggested the following alternatives, "The mobile network operators must decide what they want to do and where to focus their efforts. The two options are to 1) develop their own in-house channel and serve customers directly. This will be a challenge as it is not currently strength of theirs. 2) Build a network with lots of world-class applications that a sales channel can take to market. Mobile network operators will thus enable downstream providers and allow them an opportunity to make money, benefiting both parties. However, existing examples of mobile network operators clawing back their service providers is an indication that they feel they don't need the channels anymore."

4.4.2 *Value Chains*

In 2007 SIM based Leased Cost Routing constituted a significant revenue stream for the mobile network operators. This model made use of the arbitrage opportunity caused by gaps in the market and the ability to bypass interconnect fees. VOIP provides a possible alternative to the LCR model, which could likely bring about benefits to all parties involved – the mobile network operators, the reseller and the customer. The impact of VOIP on LCR and the organisations involved in providing leased cost routing services is explored in this section.

The first issue that was explored is how the LCR business model may be affected by the adoption of VOIP services by mobile network operators.

From the outset a number of respondents indicated that the LCR channel was not a voluntary structure created by the mobile network operators, but rather a model that came about due to gaps in the market, which were exploited through arbitrage mechanisms. Respondents indicated that these structures have been the cause of litigation on the part of the mobile network operators. One respondent went so far as to say that, “the LCR providers are hated by the mobile networks.” They indicated that the structure of LCR channels and related kickbacks have caused problems for the mobile network operators to justify high prices, and that VOIP provides the perfect opportunity to get away from this model of high commissions and connection incentive bonuses. The negative sentiment towards LCR providers is echoed by the mobile network operators themselves, with comments such as, the LCR market didn’t’ generate any customer or network loyalty –it’s all about getting the lowest cost from any provider”, and more strongly put “the LCR providers should be shut down as they work against the mobile network operators by bypassing interconnect routes.” Another respondent added that, “the mobile network operators have no economic reason to have LCR. It was borne out the fact that there was no underlying fixed network, and it cost too much to think through an IP change. This will change with more access to data links, which connect customers directly to operators just like any other interconnect. With a VOIP network they now have the ability to take Telkom traffic, and they have the scale and capacity to succeed in the market.”

On a more positive note it was mentioned that the operators did benefit from the innovative and entrepreneurial efforts for the LCR providers who extended the reach of the mobile networks customer base and increased penetration levels. “The LCR market has been the link to corporate fixed line termination market and has helped them to succeed in it.” The mobile network operators have also benefited financially through a “high margin LCR business which involved only on-net traffic.”

From a technical and network management perspective, SIM based LCR has been problematic due to congestion on base stations that affects both corporate and retail customers, in turn negatively impacting the reputation of the network.

LCR exists due to a lack of fixed line networks, and the arbitrage opportunity that was so financially beneficial for LCR providers.

For the mobile network operators, “it cost too much to think through a change to IP”. This will change as the mobile network operators gain more access to data and connecting customers directly to the network with IP links.

The introduction of VOIP creates the opportunity for new market entrants in the form of traditional data providers who now have the ability to offer voice services over their existing infrastructure. They have a head start on both the mobile network operators and LCR providers in this respect as they have the IP networks already. Thus the opportunity exists for VOIP providers to convert existing LCR customers to new VOIP customers. A respondent indicated that, “this is relatively easy to implement, but there is a long lead time to replace SIM services.” This is mainly due to the volume of the installed base. However IP providers currently have the greatest opportunity to capture market share from business customers by being an intermediary into the incumbent operators. A respondent provided an insight into the operations of LCR providers, “who were at an advantage to the mobile network operators who could only service a customer from the perspective of their own networks i.e. cost savings on on-net calls. LCR providers had relationships with all the mobile networks and were thus able to offer a full range of products across various vendors including Vodacom, MTN, CellC, Telkom and Neotel etc. combining the most suitable solution for a business customers needs.” IP providers are now equally well positioned to address both the data and voice needs of business customers. They have the data links into the customers and have existing wholesale interconnect agreements with the incumbent operators. They thus have the ability to capture all customer traffic and aggregate it at one point.

For the IP providers to become intermediaries to the mobile network operators requires them to interconnect directly on a wholesale level. The ability to do this is provided for in terms of the ECNS regulations. However, IP providers face a number of challenges in concluding these agreements and completing the technical implementation. Various respondents indicated that the mobile network operators seemed reluctant to enter into these agreements. “Mobile network operators have not been particularly forward thinking. They have a narrow-minded perspective relating to wholesale interconnect. The impression is that they are hard done by when entering into interconnect agreement and have no understanding of what wholesale customers require.” They add that “a mind-set

change is required - it's difficult to make a strategic decision to introduce wholesale services across the board."

Another respondent indicated that, "wholesale interconnects are difficult to setup with mobile network operators despite the fact that it is a better solution. Mobile network operators don't believe in channels such as Autopage and Nashua and they don't believe in resellers. They want to own customers directly and therefore make it as difficult as possible for someone to interconnect with them."

One respondent highlighted some of the challenges faced when interconnecting with the mobile network operators, "despite the fact that they are obliged to provide interconnect to any license holder that requests interconnect, the operators delay the process at each step. Firstly, they delay the release of the interconnect agreement and blame these delays on drafting and approval process required by the regulator. Secondly, they use blocking mechanisms such as stipulating minimum monthly charges that exclude a number of the smaller players who don't have the traffic volumes to meet these requirements or forcing technical requirements such as SS7 interconnect technology rather than IP technologies. Thirdly, the process of installing and configuring transmission links between networks is poorly documented and managed. The relatively simple process of ordering a transmission line and having it installed becomes a protracted exercise, hampered by bureaucracy, technical delays and lack of co-ordination on the part of the mobile network operators. The ability to interconnect with the mobile network operators is in stark contrast to the ease at which it can be achieved with Telkom who have embraced the wholesale interconnect model."

In response to these criticisms a Vodacom respondent provided the following feedback: "Interconnect agreements are hindered by financial viability. Over the last five years Vodacom has approximately eight viable interconnected partners out of over 350 VANS/ECNS license holders. The challenge has been to offer technology neutral agreements for IP interconnect and various applications. There is a requirement to offer what the customer wants – this thinking is setting in and becoming a driver. The LCR drive is to move traffic over formal interconnect routes as opposed to exploited retail based SIM products. There is a marked drive to drop retail rates and drive by regulatory pressure to drop mobile termination rates." He adds, "the attraction of a cheaper retail

rate from new entrants such as 8ta will result in a churn of customers. This churn will and associated loss in revenue may be offset by an increase in volumes over interconnect routes. The LCR providers don't have any loyalty towards the networks – they hunt for the lowest cost from any provider."

Distinction is made between the pricing of the retail and wholesale rate. LCR makes use of highly profitable retail rates, offering operators much higher margins than traffic over interconnect routes.

Vodacom Business and MTN Business are thus strategically placed to address the need created in the market by offering direct IP voice solutions to customers. As part of their strategy Vodacom Business have a 3 tier sales model. 1) Direct- addressing the top 500 corporates, which requires a strong sales capability, but is expensive to maintain. 2) Indirect – using business partners to resell Vodacom Business products with a rebate – to support mid to small segment of the market. 3) A retail segment via outlets, call centre and web portal. They plan to provide IP services in the reselling model to substitute LCR business. Vodacom Business claims that these products will generate additional revenue streams to the channel but add that the same incentives will not be available on IP services. LCR offered 28% discounts compared to 5% discounts that can be offered in IP services. This is due to a lack in margin.

When questioning whether the introduction of IP as an alternative to SIM based LCR would affect current value chains it appears that most respondents agree that the existing IP service providers are better suited to capture the business market by being intermediaries to the network operators. They indicate that a company such as Internet Solutions has a better chance of securing business over, for example, Vox Orion. This is justified by the fact that is it easier to add voice services to existing data services than it is to add data to voice, as IP is the base platform over which the voice applications run. A respondent indicated, "Traditional IP players will be more successful than traditional voice players."

4.5 Conclusion

This chapter reported on the findings elicited through in-depth interviews with the research participants on their opinions and view of VOIP technologies as they relate to the mobile network operators. The findings were organised into three sections covering: the changing telecommunications landscape and the factors that would influence the adoption of VOIP, the implementation of VOIP by the mobile network operators and the implications of such a strategy for customers and other stakeholders. In conclusion the significant findings in each of these sections are summarised.

There is no doubt that VOIP technology needs to be considered by the mobile network operators as the market moves towards IP based services. The traditional data providers in the form of ISP's are leading this. The viability of VOIP as a suitable technology in incumbent networks has also been established with the example of Telkom who has successfully used the technology for a number of years for its international calling services. The mobile operators agree that VOIP technology has matured sufficiently to provide quality services and that it can scale more efficiently than TDM technology. There is also agreement that there are cost saving to be made in terms of capital expenditure as well as derived operational cost savings through the efficiencies offered by VOIP technology.

With regard to internal factors that that the mobile network operators have a degree of control over there are a number of factors that indicate that the mobile network operators will not be successful with the adoption of VOIP technology.

It appears that the mobile network operators have not satisfactorily addressed the reasons for selecting VOIP as an opportunity for innovation. The overwhelming sense is that the mobile network operators will not succeed in generating financial gains from VOIP. The findings were highly contradictory in terms of the financial viability of VOIP services by the mobile network operators. It appears that they have not gained insights from customers who indicate that FMC would be a beneficial value added services for them Thirdly existing vendor relationships appear to be hindering the mobile operators in exploring and building capabilities in new technologies, due partly to their relative distance from the end customer in terms of the layer model. This begs the question as to

why the Mobile Network Operators would embark on the introduction of VOIP without having at least a level confidence that there would be benefit in the endeavour.

Despite this apparent gap the mobile operators have invested in acquisitions and strategies to develop IP based business units within their organisations. The findings indicated that that the mobile network operators are struggling with management issues related to implementing disruptive innovations. These are manifested in the form of a distinct cultural divide and a lack of synergies between the existing business and the new business. Assuming that the search and selection processes of the innovation process create a foundation on which to base an innovation project, it would follow that the mobile operators lack a concise strategy in terms of implementation.

Looking at the methods of capturing value from the innovation, the mobile operators are not making an impact on the business market. They have established that providing managed services are not strength but have no clear strategy either directly or via strategic partners to realise the value. This uncertainty leaves their existing partners in the LCR industry to seek methods of building their own networks and competing with the mobile operators directly and leaves customers without the value added service of FMC that they would benefit from.

Findings relating to external factors such as changes in the regulatory environment and its impact on VOIP indicate that the mobile network operators are unaffected by these changes from a strategic perspective and have the ability to block new entrants at the interconnect level. However for new entrants who have an existing customer base and are considered viable wholesale customer so the mobile networks it appears that they will succeed in gaining market share in the business VOIP market. In terms of the layer model they positioned in closer proximity to the end customer and thus have a better understanding of their needs and how to address them. While the mobile network operators grapple with internal complications of adopting new technology such as VOIP and defend existing market positions new entrants stand a good chance of being left alone to gain market share in the business services sector.

5 ANALYSIS

5.1 Introduction

This chapter provides an analysis of the research findings gathered from the various respondents and provides a comparison with the prevailing literature in order to gain an understanding of the various factors involved in the adoption of VOIP technologies by the mobile network operators in South Africa. It seeks to find meaning for the actions of the mobile operator's they deal with the changing environment in which they operate.

As the findings relating to the changes in the telecommunications landscape and associated evolution of the mobile network operators show, the process is temporal and does not necessarily follow a liner path. This is supported in the literature by Tidd and Bessant (2009) who indicate that the field of VOIP communications is not developing along established trajectories towards well-defined endpoint, but rather through a process of emergence .In order to provide some structure in which to interpret the findings the author has chosen to analyse the findings according to the four stages of the Innovation Process described by Tidd and Bessant (2009), namely Search, Selection, Implementation and Capturing Value. Additionally there have been a combination of internal and external factors that have contributed to the evolution and adoption of VOIP technologies by the mobile network operators, which are also presented.

Thus, a framework for ordering the components involved in the adoption of VOIP technology in the changing telecommunications environment is reflected in the following diagram:

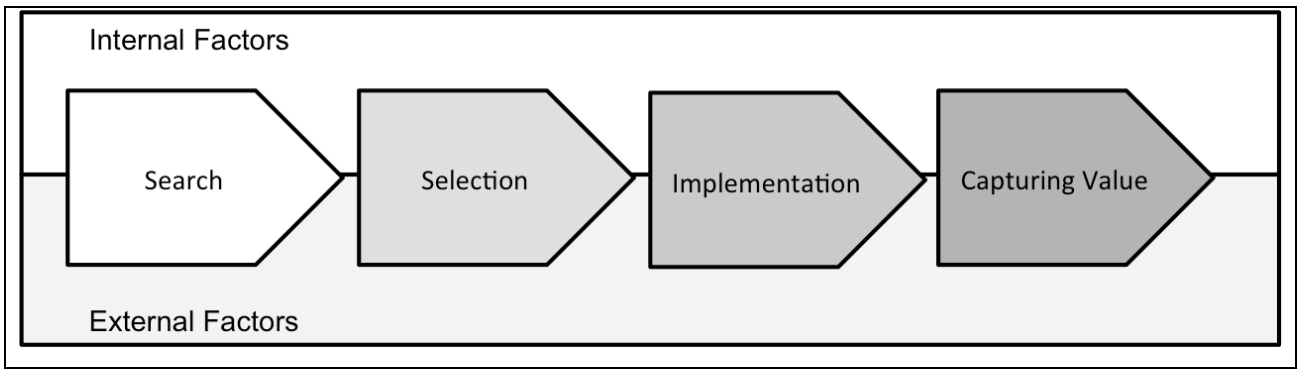


Figure 2: Authors Framework for Analysis of Findings

The analysis of the four stages together with the Internal and external forces that affect them are then mapped back to the three questions posed in order to address the research problem as depicted in the following diagram:

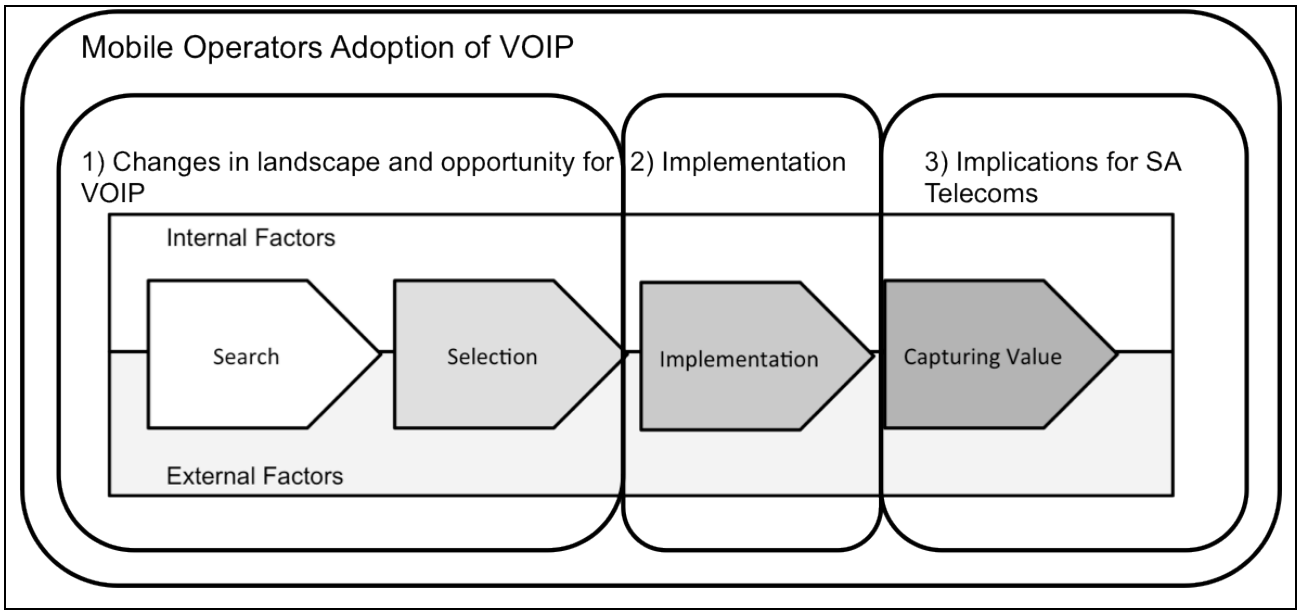


Figure 3: Mapping to Research Questions

Firstly, this chapter consider the internal factors involved in searching for and selecting converged technologies. The manner in which the operators have implemented the innovation opportunity that VOIP presents is then analysed followed by an analysis of their ability to meet customer needs, and the possible impact that it will have on value chains. This is followed with an analysis of the effect of external factors on the innovation process.

5.2 Internal Factors

5.2.1 *Search and Selection*

The suitability of VOIP as a technology to be implemented by carrier networks in South Africa as per (Cohen & Southwood, 2004; Marcelle, 2007; Werbach, 2005) is confirmed by the research findings which indicate that Telkom has successfully made use of the technology in its network for over 10 years. Respondents have confirmed that VOIP does offer operational savings and efficiencies in terms of network rollout and on-going support and maintenance. Additionally, respondents confirm that once in place, IP networks provide platforms for running multiple services across a common network thus making integrated or converged services a reality as indicated in the literature by (Ciancetta et al., 1999) Similarly, the drawbacks of implementing VOIP networks revealed in the findings correspond to those in the literature. Marcelle (2007) indicates that the transformation to VOIP involves extensive retraining and refashioning of business models and technical frameworks for operators. This is captured by the findings in this study as respondents repeatedly considered costs as a barrier to entry because the mobile networks are heavily invested in existing technologies and the introduction of a new parallel network would incur significant initial costs. The most significant concern however raised by operators is the impact that VOIP will have on existing business models and revenues due to cannibalisation and jeopardising their ability to maintain high prices on mobile services. Respondents indicated that the mobile network operators enjoy significant margins on existing mobile services and have become accustomed to high profits.

From a financial perspective, a curious finding from respondents within a mobile operator is the question of “how do we make money from cheaper services?” This question would be relevant to the search and selection stages of the innovation process, while the mobile network operators were still seeking an innovation opportunity and considering adopting a disruptive technology such a VOIP. Charitou and Markides (2003) indicate that only after detailed cost benefit analysis should established organisations consider adopting disruptive innovations. However it seems clear that both MTN and Vodacom are committed to IP services as they have established dedicated commercial divisions

within their organisations and made significant acquisitions in order to strengthen their capabilities as indicated by Moya and Whyman (2009). This contradiction is also revealed in these research findings where respondents have commented that there is “no clear strategy for VOIP” by the mobile network operators and they are only adopting it “as an insurance policy.” However if one considers the corporate market that has been serviced by Telkom for fixed line services and LCR providers offering mobile services respectively, a simple analysis indicates that there is definitely revenue opportunity in the business communications space. To illustrate, the following example is provided. With an existing corporate least-cost-routing SIM card, the mobile network operators sell the card for a fixed monthly amount and the traffic generated on that SIM generates only on-net traffic. Due to the fact that Caller Identification is blocked on the SIM, no inbound traffic would be generated back to the network. Rather the call would be made back to the corporate fixed line number, generally a Telkom number, which results in foregone revenue for the mobile operator. In addition, the mobile operator incurs interconnect costs when the receiving party returns the call back to the corporate. The assumption is that the greater amount of traffic that is maintained on net will be more profitable for the operator.

Furthermore, VOIP would allow the MNO to capture all of the traffic to and from the corporate customer. Assuming an industry standard outbound calling mix of 40% to fixed line destinations and 60% mobile destinations – the revenue potential increases by at least the 40% of traffic which is currently routed to fixed line networks.

From a technological perspective, a respondent indicated that, “it would be difficult justifying implementing a cheaper technology [of VOIP] because it is perceived to be inferior”. This appears to indicate that the mobile network operators have difficulty in framing the problem. As per Christensen (1999), success in adopting a disruptive technology depends on framing the problem as a marketing problem rather than a technological one. Delving deeper into the matter it appears that the mobile network operators are unable to justify the business case for VOIP “due to the discrepancy between the per-minute rate versus a per megabyte charge, as a per minute rate is significantly more favourable in terms of revenues.” However nowhere in the literature or in the research findings was it indicated that customers require a new metric for measuring telephony services. New entrants are successfully servicing business

customers by providing them with managed services and enhanced value while still using a per minute billing method.

The needs of customers may provide a likely driving force for the adoption of VOIP technology by the mobile network operators. As per Fransman (2002) the customer layer plays a demand-pull perspective to all layers beneath it in order to determine what customers want and what they are willing to pay. Currently, corporate customers make use of a PBX device connected to Telkom's fixed line infrastructure for calls to fixed line networks and in order to derive cost savings, may install LCR equipment for outbound calls to mobile destinations. From a cost perspective, one can argue that prices for an alternative service need only be as cost effective as current LCR offerings, provided that the quality of the service is on par. Various respondents agreed that the quality of VOIP was of a sufficiently high standard and also remarked that LCR is prone to its own quality problems. To further enhance the value to customers, VOIP provides the foundation for a range of value added services provided by means of convergence. For example, converging fixed line PBX services with the mobility of a mobile handset in the form of mobile PBX would greatly enhance the functionality and productivity benefits to corporate customers, who would not be bound to their office premises to make extension calls to fellow office workers or receive customer calls on one number regardless of their location at that time. As indicated by a respondent, VOIP enables all of the customer criteria laid out in the literature, including convenient supplier relationships, value in service offerings and satisfaction with service usability in the following manner. Customers are no longer locked into long term cellular contracts and they can deal with one provider for all business calling requirements. The value of VOIP is realised in that it is cost effective, "where the price point is better than traditional LCR." In terms of service usability it has been agreed that the quality of VOIP is not inferior to that of LCR services and as a respondent indicated VOIP offers improved manageability thus ensuring an improved service offering to the customer. Additionally VOIP provides the foundation for unified communications, which opens up a range of enhanced features going forward. However at the moment this is not a reality as indicated by a respondent, where IP services offered by mobile network operators are limited to basic services. These results correspond with Blood, Johnson et al. (2008), who indicate that few mobile network

operators offer enterprise telephony beyond basic dial plan and flat rate tariffs and thus they are slow to identify the opportunities in meeting business user's needs.

So, from the analysis of the research findings, synthesised in terms of the Tidd and Bessant's (2009) search and selection process, it appears that the mobile network operators did not purposefully seek out market signals and identify a new opportunity in the business sector by exploring VOIP technologies. They seem unable to establish financial viability of VOIP technology and technically are hampered by its legacy of being cheap and inferior to their way of doing things. This despite acknowledging that there are financial benefits to using the technology and that it compares favourably in terms of quality. Secondly, it seems that the Mobile Network Operators have not read signals from customers who seek value added services of which FMC is one which would be a key competitive advantage over other market players.

5.2.2 *Implementation*

The manner in which the mobile network operators have implemented the innovation opportunity present by VOIP technology is analysed in this section.

The prevailing approach for implementing a new business innovation within an organisation is to separate it in some way so as to provide it with the autonomy for it to steer its own path (Bower & Christensen, 1995; Charitou & Markides, 2003; Christensen, 1999; O'Reilly & Tushman, 2004; O Reilly & Tushman, 2004) The literature provides varying degrees to which this can be implemented. O'Reilly and Tushman (2004) suggest an ambidextrous organisational configuration which allows the organisation to balance the exploitation of current market activities with the exploration of new growth opportunities. More extreme is Christensen (1999) who indicates that the only way to succeed with disruptive technologies is to setup a separate organisation and allow it to attack the parent organisation. In the study, research findings suggest that the approach taken by both MTN and Vodacom has been to setup dedicated business units to develop and offer IP services to business customers. Within the context of the larger organisation, both operators are now playing in both the mobile space and fixed line IP services space and according to Charitou and Markides (2003) this leads to a number of conflicts within the organisation when playing two games.

From the findings it is clear that an internal conflict is present in both organisations. A distinct cultural clash has arisen between the established mobile business and the new IP based business, or “Bell Heads” and “Net Heads” as termed by a respondent, which have been indicated to cause problems in terms of technology choices and investment decisions amongst other issues. This problem is further exacerbated by the fact that both of these new businesses are late entrants into the business services market. As indicated, large amounts of money have been invested into these businesses with no immediate results. This poses challenges as revealed by a respondent saying, “our business poses a threat to the existing GSM business as we are drawing profits from the old business. A lot has been spent without immediate results, but ours is the business of the future.”

Attempts to exploit synergies within the organisations also appear to have posed significant challenges with respect to benefits from shared IT systems, network technologies and integration and sales forces. Regardless of the level of integration claimed by each operator they both faced problems with similar outcomes. Vodacom Business claims to be integrated at various levels within the larger organisation however they have not been able to overcome existing mentalities and slow bureaucratic decisions making which has significantly disadvantaged them. Conversely MTN Business claims to be an autonomous business unit but has been affected by the lack of integration between systems and sales teams for example. These findings correspond with the view of Moya and Whyman (2009) that the mobile network operators will find difficulty in materialising synergies within the mobile business due to organisational and commercial differences. Fransman (2002) indicates that understanding the vertical and horizontal movement with layers is important to understanding evolution in the industry. He indicates however that what is not conveyed in the layer model is the inter-layer diversity and the modes of co-ordination required to identify differences between the layers, which may occur within the same organisation. In the case of the mobile network operators they are experiencing both a horizontal move from mobile to fixed line services as well as undertaking a vertical move up the layers.

A clear indication of the mobile operator’s inability to derive synergies within the mobile business is revealed considering the following findings. Respondents have indicated that, “Due to the fact that VOIP allows for convergence, operators have the ability to run

any application on the same network making integrated services a reality." This dramatically increases the scope of additional services that can now be pushed down to end users allowing operators to seamlessly offer data, voice and multimedia services to customers. Another respondent pointed out, "As it stands, more than 50% of broadband services in South Africa are currently provided over 3G; therefore the mobile network operators have the lead in broadband services." Therefore, if the mobile operators are already offering data services they can seamlessly offer voice and multimedia over the data network. However the respondent also indicates, "there is no convergence of voice"

It would appear that there are key strategic and leadership issues, which need to be evaluated in order to rectify this situation. Tidd and Bessant (2009) indicate that the innovation process must take place within the context of the organisation and that there needs to be a clear sense of how an innovation is taken forward. This gives credence to the statement of a respondent who indicated, "A key element to the success in the IP services space by the mobile network operators is the capability of leadership to be strong enough to disrupt within the context of the organisation."

So the implementation process of adopting an innovation of VOIP is hindered by significant cultural clashes and an apparent inability for management to bring about synergies between the two businesses. It stands to reason that if the search and selection process was not followed with intent of bringing about new innovation opportunities, that the implementation thereof may lack the necessary strategic direction and leadership support required to make it succeed.

5.2.3 *Capturing Value from VOIP*

The capture phase of the innovation process considers the manner in which the organisation is able to develop and grow profitable new markets by means on innovative offerings. Key to this is ensuring that there is sufficient market uptake of the new offering. The literature indicates that key considerations that drive customer adoption of VOIP in residential markets include quality, reliability, cost and the prospects for value added services. In addition network effects and switching costs also play a role. The findings in the research reflect the needs of business customers but do have some common points. Respondents listed cost savings, managed services, productivity enhancing features and

the ability to converge fixed and mobile into one unified solution. The need for managed services sets business customers apart from residential customers.

A key strategic advantage that the mobile network operators have over other market participants is an existing mobile network. They are therefore best suited to provide seamless FMC solutions to customers over any other operator in South Africa. However this is not the case. However it has already been established that FMC solutions are not being offered. A respondent indicated, “There is much talk about unified communications but no one is doing it yet.” From the research findings it would appear that the mobile network operators are not well suited to deliver these key attributes to customers as they are too far removed from the end user to fully understand their requirements. This may be due to the fact that, as indicated by a respondent, the mobile network operators are structured as wholesale providers to the service providers, who in turn address end users. This model however does not appear to suit the managed services needs of business customers, which involves account management and regular direct contact with the customer as indicated in the findings. Findings from respondents however do indicate that the mobile network operators have identified these requirements and are implementing strategies to address the shortcomings. They have identified the need for competencies in IT services as well as having the necessary support structures and skills to service business customers. Thus the mobile network operators will need to move their way up the layer model into layers 3 to 5 in order to be closer to end customers and fully understand their requirements.

The research findings presented two options available to the mobile network operators in order to address their ability to server business customers. They can develop their own in house sales capability and server customers directly. It was indicated by several respondents that this would be a challenge for the mobile network operators as they currently have no capability in that area. The other alternative is to form strategic agreements with companies more experienced in serving end customers directly. (Dodourova, 2003; Hacklin et al., 2005; Nystrom & Hacklin, 2005; Olla & Patel, 2002; Peppard & Rylander, 2006)

Service providers currently provide business services by means of LCR. VOIP provides an alternative to the LCR solution but would possibly have implications on the current

sales channels. A respondent indicated that, “the mobile network operators are desperate to roll out direct channels but they haven’t got their pricing models right.” If this happens it leaves the LCR service providers at a loss, as the mobile network operators wouldn’t support them. So various scenarios are created which could all potentially play out as indicated by respondents.

1) VOIP allows the mobile network operators to go directly to business customers, thus cutting out the existing sales channel. Indications are the mobile network operators would prefer to take customers directly via a subsidiary rather than supporting a channel strategy which to date has been costly as indicated by a respondent. However this model would also bring about certain complications. A respondent indicated, “the difficulty arrives in deciding which business entity will offer the service to the end customer for example MTN Business or MTN SA? If MTN SA sells SIMS and MTN Business sells data solutions and cost savings on voice a conflict would arise between the two businesses competing for the same customer.” So currently the sale structures and strategy issues are holding MTN back in terms of realizing this scenario. They do have the customer base to do this and the experience to support customers. Additionally cannibalization would threaten existing revenues for MTN SA. SIM based LCR is high margin business as all the traffic remains on their network. If the plan is to do away with SIM base LCR they must have an alternative offering to maintain that revenue and customer base. Pricing plans may be a means of owning the market. Alternative operators need to deal with the cost of interconnecting as well as infrastructure to carry the traffic to a central point. A way for the mobile network operators to compete is just to drop the retail rate thus keeping the VOIP rate comparatively high. Declining revenues appear to be inevitable. By offering VOIP services directly to customer the mobile network operators would need to compete in the same space as everyone else and risk losing the customer to a more experience competitor. Or they cut the retail rate and lose revenues.

2) The LCR providers make moves to build their own networks and provide services to their existing customers. Due to legislative changes any company with an ECNS license can provide voice services. VOIP technology is an enabler for this. A respondent was critical about this route saying that, “all LCR providers are building their own telco businesses. They are all going to have an expensive education, which will result in high

rates of attrition and failure." This is due to the fact that, "the cost of building or buying a network are high and skills to run them are in short demand."

3) Rather than dealing with the inherent problems mentioned above a third option exists involving a combination of the above scenarios where the mobile network operators provide IP products and services as an alternative to SIM based products, which are offered to the LCR service providers to take to market. A respondent from one of the mobile network operators indicated that, "they will look at providing solutions to their existing channel to substitute the LCR business. The benefit to the LCR players is that they would have new revenue streams available to them."

The viability of this option may be unclear due to the conflicting responses provided. Some respondents indicated that VOIP is not nearly as profitable as the SIM based LCR businesses, thus, "there will never be the opportunity to make the same revenues as have been made with LCR in the past." This would clearly be negative from the LCR provider's perspective. This is supported by the statement from one mobile operator saying, "The same incentives are not available on IP services Due to the lack of margin available with VOIP services, prospective resellers would receive 5% in rebates selling IP services compared with 25% currently received on reselling SIM based services." In contrast another respondent from another operator indicated that, "there is sufficient margin in the value chain to support a two or three tier business model. This would be the same model as LCR, just more efficient and offers the opportunity to add more value to small businesses."

Thus the ability for the mobile network operators to capture value from the adoption of VOIP technology appears to hinge on their ability to satisfactorily address the managed services component necessary in addressing the needs of business customers. They can go it alone and face the challenge of building this capability while competing with their existing channels that would need to build the technical network capability for themselves. Or they could continue to offer VOIP services on a wholesale level and continue to partner with strategic allies who are best suited to serve the needs of the end customer.

5.3 External Factors

As per Drucker's (2002) sources of innovation opportunities it would appear that changes to the regulatory environment have been a significant driver for innovation in the South African telecommunications space.

The regulatory environment prior to 2003 had significantly hindered innovation in the communications sector. Subsequently VOIP has been legalised and the telecommunications regulations were completely redrafted in the form of the Electronic Communications Act (ECA).Since regulatory changes starting with the legalisation of VOIP in 2003 the market has seen the introduction of over 300 new license holders (ICASA, 2011), all of which have the ability to enter the market using VOIP technology with lower entry barriers. Additionally the regulator has implemented pricing regulations, forcing down the price operators pay to each other to transmit calls between their networks. From a costing perspective this allows new entrants to enter the market with aggressive pricing in order to gain market share. Number portability further encourages competitive behaviour in the sector as customers can maintain their fixed line numbers thus lowering indirect switching costs as per Constantiou and Kautz (2000).

Respondents indicated that the role of the regulator is hampered by its access to skills and resources. Their ability to bring about significant changes that would disrupt the mobile network operators would be immediately opposed on a legal front as respondents indicated that the mobile network operators have the skills and resources to tie the regulator up in litigation should they deem it necessary . Similarly the slow action of the regulator in terms of standards setting and policy decisions sets the pace at which the mobile network operators will make investment decisions. Without certainty on critical issues such as spectrum allocation, local loop unbundling and WiMax licenses operators will be reluctant to invest until there is clarity on these matters.

Thus from a competitive perspective the mobile network operators have little need to actively adopt a VOIP strategy as a defensive tactic against new entrants. They control who connects to their networks and can exploit regulatory inefficiency to their benefit knowing that there is little or no recourse to any aggrieved new entrant. These tactics are apparent from the findings where it can take several years for new entrants to

interconnect with mobile network operators. During that time it is likely that a new entrant may fall by the wayside before gaining any market share.

In the LCR market where regulatory pricing changes have indeed had a significant competitive impact the mobile network operators also have options in terms of how they proceed. This market exists purely due to price disparities between wholesale and retail prices, which are entirely under the control of the mobile network operators. They have the option to simply lower prices to maintain market share and keep new entrants out. Alternatively they can adopt VOIP technology and serve the market directly, thus saving on the costs incurred on the existing channel.

These regulatory changes have a much more significant impact on the incumbent fixed line operator Telkom who are not only open to the threat of new entrants into the market but by the fact that the mobile network operators now have the ability to enter the fixed line services space.

As indicated by Moya and Whyman (2009) a number of new entrants have been able to sift through the regulatory uncertainty and have carved their own unique space in the market and bet on future understanding of customer needs. From the findings data providers such as Internet Solutions, ECN and VoxTelecom have strategically positioned themselves with particular value propositions that appeal to specific target markets within the business sector. They already maintain strong positions in the data services space and are now making use of VIOP technology to extend the range of services that they can offer their customers, thus becoming a single supplier for all of a business's communications needs. Analysing these new entrants in terms of the layer model puts them in a favourable position to gain market share in an evolving telecommunications environment. They are typically more involved in layers 3 to 5 and thus are closer to the end consumer than the network operators are. They benefit from the concept of modularisation by not needing to concern themselves on running a carrier network, but rather lease facilities from the networks and provide services on top of those networks. Thirdly they benefit from lower entry barriers in terms of technology implementation due to a lack of legacy infrastructure. From a competitive perspective they stand a good chance of being left alone while the incumbent operators defend their existing positions in the market as indicated by Drucker (2002).

The role that vendors play in the adoption of VOIP technology was also explored in the literature as well as in findings from respondents, which provide some indications into the actions of the mobile network operators.

Respondents indicated that the business case for IP services such as VOIP did not support the purchase decision. Ciancetta, Colombo et al. (1999) indicate that the criteria used to measure the purchase decision include technical and management complexity and associated cost, the possibility of gradual introduction of converged services and time to market. The findings revealed that most fundamentally the costs and complexity of adopting VOIP is significantly hindered by the fact that the mobile network operators do not have fixed line networks in the core of their networks. Furthermore, the capability to gradually introduce converged services and the time to market was found to be hampered by the complexity within the established vendor environments, which delayed the introduction of IMS platforms. These platforms bring about convergence between TDM and IP networks. The reliance by the mobile network operators on incumbent vendors and their technological roadmaps put the operators at a disadvantage in terms of moving quickly to adopt new technologies. It was indicated that established new IP entrants due to the plug and play nature of VOIP technology threaten vendors as it matures. This is in keeping with the modularity of technology as described by Fransman (2002). This threat, however, may still be mitigated by the incumbent vendors, as engineers in the mobile network operators will still seek approval to implement new technologies. The incumbent vendor may dissuade such activity based on technical incompatibilities. The concept of modularity may be entirely mitigated by the contractual agreements that the vendors enter with the operators. With full turnkey models such as those offered by vendors such as Ericsson, who manage the network end to end for the operators, there could be very little threat of being displaced by challenging technologies. Similarly if vendors are able to participate in the financing of operator networks they will likely dictate the pace of new technology introduction to suit their financial models and to coincide with their technological capabilities.

As indicated by a respondent, the manner in which IP vendors sell their products to the mobile network operators needs to fundamentally change from that of a “box drop” to a more collaborative and supportive role. This ties in with the role that suppliers have in the capability building processes within mobile operator networks as indicated by Marcelle

(2003), where technology suppliers are able to provide both equipment and technical services required to effectively develop, deploy and maintain networks based on that equipment. In this case it would appear that incumbent suppliers to the mobile network operators only supply equipment and technical services but do not contribute to the capability building process in new technologies such as VOIP and more importantly in addressing the needs of end customers. The author proposes that the difficult in vendors contributing to the mobile network operator's ability to address the needs of customer is related to their relative position in the layer model proposed by Fransman (2002). Operating at level 1 of the model places the vendors even further away from the end user than the mobile network operators. In keeping with the proposition of Krafft (2003) is that firms in higher levels of the layer model can react more efficiently to the specific needs of customer than the firms in lower layers.

5.4 Application of Analysis to the Research Questions

Once the research findings have been analysed in terms of the innovation process model the results can be mapped to the research questions posed by grouping steps in the process as follows:

Search and Selection relate to the manner in which the mobile network operators have picked up on changes in the telecommunications landscape and effectively sought innovation opportunities to address these changes. The implementation stage maps directly to the manner in which the mobile operators have implemented VOIP. Lastly the capturing value stage relates to the implications for stakeholders in the South African telecommunications environment. The ability of the mobile operators to successfully adopt VOIP technology to serve business customers is still unknown. Their current actions will offer insights into the implications for stakeholders in the South African telecommunications environment.

5.5 Conclusion

The analysis of the findings was synthesised to match the four stages of the innovation process in order to provide structure to the development of VOIP, which does not follow a well-defined trajectory but rather is developing through a process of emergence.

Internally, it was identified that the Mobile Network Operators do not appear to have a well-defined foundation for addressing an innovation project such as VOIP due to high degree of contradictory findings relating to the financial viability of adopting VOIP.

Despite this uncertainty the Mobile Network operators have invested significantly in terms of making acquisitions and developing separate business units to address IP services. However they are facing the challenges of exploiting existing capabilities while exploring new opportunities for growth. The management challenges to overcome those difficulties appear to be made more difficult due a lack of clear direction in terms of identify clear opportunities to pursue.

With regard to external influences it would appear that the mobile network operators are relatively unaffected by the regulatory changes and have the necessary means to monitor and react timeously to regulatory changes that may impact it from a VOIP perspective. However, existing vendor relationships do not seem to allow the mobile network operators to build capabilities in new technologies due to their dependence on the end-to-end services from incumbent vendors.

The implication of adopting VOIP technology by the mobile network operators will result in the deconstruction of the value chains as per Nystrom and Hacklin (2005). The final configuration of the value chains has yet to be determined, but some possible configurations include.

1. The mobile network operators addressing end customers directly and leaving their existing channel partners such as existing LCR providers out of the chain.
2. The existing LCR providers will develop capabilities to provide VOIP services to end customers directly as has been seen in the market already. They will then compete directly with the mobile network operators.

3. The mobile network operators could decide to provide VOIP services on a wholesale basis to existing LCR providers with the necessary incentives to dissuade them from developing their own networks and thus support the literature findings that in order to succeed in convergence they should form co-operative agreements with other organisations in order to rapidly gain competencies in converging environments.

While these uncertainties exist and the mobile network operators face the internal challenges of adopting VOIP technology the landscape looks promising for new market entrants, making use of VOIP to provide services to business customers, who have the ability to operate unchallenged by the mobile operators. This supports the propositions by Nystrom and Hacklin (2005) that suggest it is most likely that incumbent operators will be defeated by new entrants capitalising on convergence technologies and who have customer focused strategies.

6 CONCLUSION

6.1 Introduction

This final chapter provides responses to the three broad research questions posed in chapter 2, based on the analysis of the findings in chapter 5. This is followed by recommendations to stakeholders involved in the South African telecommunications landscape based on the findings of the research. Finally suggestions for further research are provided.

6.2 Responses to Changes in the Landscape

With regard to internal factors that that the mobile network operators have a degree of control over there are a number of factors that indicate that the mobile network operators will not be successful with the adoption of VOIP technology.

It appears that the mobile network operators have not satisfactorily addressed the reasons for selecting VOIP as an opportunity for innovation. The overwhelming sense is that the mobile network operators will not succeed in generating financial gains from VOIP. These sentiments appear to be predominantly based on perceived ideas around VOIP technology being cheaper, and by inference, inferior. These perceptions then impact the viability of the business case for VOIP as they assume revenues will not be maintained, and worse, that VOIP will cannibalise existing revenues. The perception around lower revenue generating capabilities appears to be rooted in the belief that VOIP is charged on a per megabyte data charge as opposed to a per minute call cost.

From the perspective of customer requirements acting as a pull factor to adopt VOIP technology it appears that the mobile network operators would only make a significant effort into VOIP if the size and traffic volumes of the customer requesting it made it worth their while. Despite this they do acknowledge that VOIP closes the gap between fixed line and mobile services and would allow a single service provider to meet all the needs

of business customers. It appears that they have not gained insights from customers indicating that FMC would be a beneficial value added service for them.

The role of technology vendors was also considered as an external source to bring about a change in the mobile network operators. It was found that IP vendors have difficulty in introducing new products to the operators due to their sales approach. The current TDM vendors provide end-to-end services to the mobile operators and also have the ability to vet the introduction of any new technologies, thus keeping new vendors out. Another important finding is that the mobile network operators in South Africa have been built as pure mobile networks without the foundation of fixed line network such as networks in Europe. This placed IP vendors at a further disadvantage in terms of positioning their offerings. In order for new vendors to bring about change in the mobile operator networks they need to assist them in moving up to the applications layer. Thus existing vendor relationships appear to be hindering the mobile operators in exploring and building capabilities in new technologies, due partly to their relative distance from the end customer in terms of the layer model

Lastly, the findings about the regulatory changes as they impact the introduction of VOIP services were presented. It was identified that the liberalisation of the market has indeed introduced competition in the form of new entrants competing in the fixed line space, thus threatening Telkom's monopoly. The mobile operators are also freed from this monopoly with the ability to now self-provision transmission services. It was also established that the introduction of lower pricing regulations has had little effect on the retail rate, but has significantly affected the LCR providers reselling the mobile network operators products. The regulator has been criticised for its delayed response to technology changes and its lack of resources, in order to effectively regulate the market. This has resulted in impeding planning and investment in new technologies. The mobile operators have been able to use these shortcomings to their advantage in order to slow the progress of competitors using VOIP technologies at the interconnect interface which they control.

These factors beg the question as to why the Mobile Network Operators would embark on the introduction of VOIP without having at least a level confidence that there would be benefit in the endeavour.

6.3 Implementation of VOIP

Despite apparent shortcomings in the process of identifying new innovation opportunities the mobile operators have invested in acquisitions and strategies to develop IP based business units within their organisations. The findings indicated that despite their significant market presence and financial resources the mobile network operators have not made an impact in the VOIP market. The reasons for this include an apparent conflict between the GSM and VOIP business and the risk that VOIP poses in cannibalising the existing customer base being a significant cause for concern in driving the strategy. Furthermore, it appears that there is a significant cultural clash between the traditional GSM business' "Bellheads" and the "NetHeads" driving the new IP business. These cultural clashes combined with the threat that VOIP poses to exiting revenues and that returns are yet to be seen, make proving the business for case VOIP difficult.

In accordance with the literature findings the Mobile network operators have separated their new business units order for them to operate autonomously and pursue new opportunities for growth is then presented. The findings reveal the neither the approach to acquire an established business nor starting a new business from scratch has allowed either network operator to gain a strategic advantage. Both operators' business units are reportedly being hampered by a lack of synergies and both appear to lack support from the parent organisation. Thus the mobile network operators are struggling with management issues related to implementing disruptive innovations. These are manifested in the form of a distinct cultural divide and a lack of synergies between the existing business and the new business. Assuming that the search and selection processes of the innovation process creates a foundation on which to base an innovation project, it would follow that the mobile operators also lack a concise strategy in terms of implementation.

Late entry into the VOIP market has been reported as a significant contributing factor to their poor performance of the mobile network operators as they have underestimated the difficulty in entering a new market dominated by data services providers.

6.4 Implications of VOIP

Looking at the methods of capturing value from the innovation, the research findings have indicated that the mobile operators are not making an impact on the business market. They have established that providing a managed service is not a strength of theirs but they have no clear strategy, either directly or via strategic partners, to realise the value that managed services holds. The LCR providers are most significantly impacted by the introduction of VOIP technologies. The mobile network operators have the opportunity to rid themselves of the apparent problematic channels of the past and can service customers directly. This uncertainty leaves their existing partners in the LCR industry to seek methods of building their own networks and competing with the mobile operators directly. It was also found that despite the mobile operators having a key strategic advantage of controlling a mobile network, that no other market player can offer, there are no fixed mobile convergence solutions being offered as yet. The mobile operators appear to be unable to create a value proposition to business customers in terms of offering IP based services. For as long as there are no compelling FMC services available companies that have existing experience dealing with customer LAN environments and providing managed services have the opportunity to gain market share.

Findings relating to external factors such as changes in the regulatory environment and its impact on VOIP indicate that the mobile network operators are unaffected by these changes from a strategic perspective and have the ability to block new entrants at the interconnect level. The findings reveal that the mobile network operators have been obstructive towards new entrants entering the market and seeking interconnects with them.

However for new entrants that have an existing customer base, and are considered viable wholesale customers to the mobile networks, it appears that they will succeed in gaining market share in the business VOIP market. In terms of the layer model they positioned in closer proximity to the end customer and thus have a better understanding of their needs and how to address them. While the mobile network operators grapple with internal complications of adopting new technology such as VOIP and defend

existing market positions new entrants stand a good chance of being left alone to gain market share in the business services sector.

6.5 Recommendations

The following recommendations emerge for the mobile network operators to best tackle the evolution of the industry in the light of convergence brought about by IP technology:

1. Review their absorptive capacity, which assists the firm in identifying, assimilating and exploiting knowledge from its environment. A framework such as the technology capability building (TCB) process (Marcelle, 2005) would identify key focus areas. This would ensure that the mobile network operator identify successful innovation opportunities without the uncertainty that is currently present.

2. Develop a firm strategy around the implementation of IP services for business customers in order to bring about alignment between the existing business and the new innovation venture. This will include leadership strategies that bring about disruption within the organisation in a positive manner.

3. Innovation processes should be opened up in both horizontal and vertical perspectives and key strategic partners involved in the value chain should be identified with whom the mobile network operators can partner and collaborate in value creating opportunities brought about through convergence. For example, they should identify existing ISP providers who have experience in addressing the needs of end customers and collaborate with them in offering VOIP services to end customers to the benefit of all parties involved.

6.1 Suggestions for Further Research

The research presented in this report provides a broad view of the adoption of VOP services. From this a number of further areas for research have been identified.

1. A quantitative evaluation of the market performance of mobile network operators against new market entrants using VOIP to determine relative success in addressing the needs of business customers in the South African business segment.

The findings of this research have supported the literature stating those new entrants are more likely to be successful that incumbent operators in converged environments. A quantitative analysis of the relative success of new entrants would provide an extension to this research report and offer quantifiable values against to which to benchmark their success.

2. **Consumers perception around value added services provided via IP technologies**

This research was based on the literature stating that business customers seek value added services that can be offered using IP technologies. Identifying key value added services and weighting them in terms of relative importance to customers, by means of a quantitative study, would prove valuable to network operators planning to deliver such services and ensure that the needs of business customers are truly met.

3. **A quantitative study on the profitability of VOIP services**

The research has identified that VOIP has the ability to bring about cost savings and operational efficiencies; however these propositions have not been tested against other technologies. A detailed analysis comparing the input costs and associated revenue generated of VOIP services against other technologies such as TDM of GSM would provide quantifiable evidence on the level of profitability that VOIP services may provide.

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APPENDIX A

Research protocol and semi structured interview process

Opening Statement to Research Participant

Thank you for agreeing to contribute to this research study. The interview should not last longer than an hour and all information will be used solely for academic purposes. All contributions will be anonymous, neither your name nor company will be linked to any to be statements or comments made.

For the purpose of consistency and accuracy this interview will be recorded. Please confirm that you are in agreement with this?

The purpose of this research is to investigate the factors that affect the adoption of VOIP communications services and what impact this strategy has on the organisation. The research will be of benefit to any organisation that has an interest in the development of corporate voice communications solutions.

Questionnaire:

1. **Demographic Details**
   - Respondent Name:
   - Job Title:
   - Organisation:
   - Contact Telephone Number:
   - Email Address:
   - Date:
   - Duration of Interview:

2. **Qualifying Questions**
   - Does your organisation offer commercial VOIP services to customers?
   - If so, how long has the organisation been offering commercial VOP services to customers?
   - If you are not involved in offering commercial VOIP services, please explain your involvement in the telecommunications industry?

3. Key Research Questions

The research is based on the assumption that VOIP communications services offer a new wave in the telecommunications industry promising lowers operational costs for operators and the ability to offer customers a richer voice environment. This will allow for an extension to products offered to customers and a potential area for growth. I will be investigating the motivations for and against adopting such a strategy and the changes that may be required by operators in following this strategy.

3.1. Question 1

What would be the motivating reasons for an organization to develop a commercial VOIP offering to customers?

3.2. Question 2

Would South African businesses benefit from VOIP?

Probe

- Would they benefit from cost savings?
- Would they benefit from additional features?
- Would customers prefer additional features to cost reductions?

3.3. Question 3

VOIP has been termed a disruptive technology. Why do think that this is the case?

Probe

- Do you think that established firms are at a disadvantage compared with smaller, more flexible firms?
- Would VOIP result in changes to the needs in the market and how would telecommunications services are marketed?

3.4. Question 4

How do you think the adoption of VOIP services will affect the structure of organisations that offer it?

Probe

- Do you think that current value chains would change?
- Would new entrants with related ICT competencies become a viable channel for telecommunications services?

3.5. Question 5

Do you feel that there are any additional points that are pertinent to the adoption VOIP in the SA telecommunications market and it being offered to business customers?

Closing Remarks:

Thank you very much for your time and valuable contribution to this research.

Would it be possible for you to review a transcript of the interview to ensure that all points from this interview have been accurately collected and interpreted? This will contribute to the accuracy of the research findings.

As soon as the results of the research are available a copy will be forwarded to you for your interest.