EMERGING ENTREPRENEURSHIP OPPORTUNITIES IN THE CHANGING TELECOMMUNICATIONS INDUSTRY

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Abstract

Technology and regulatory changes have profoundly altered and will continue to alter the way business opportunities are conceived. Entrepreneurs evaluate these opportunities and initiate the startup of businesses.

This study assesses whether the two major factors essential to the entry of smaller telecommunications startups, liberalisation and technology changes, result in entrepreneurship opportunities.

The South African telecommunications industry is entering its eleventh year of liberalisation and coupled with technological development and convergence in the telecommunications and information and technology sector, the market is set for growth. Technology trends such as wireless, broadband, and the convergence of voice, video and data are bringing dramatic change to the industry and a myriad of business opportunities.

The growing number of competitors found amongst Value Added Network Service Providers (VANS), Internet Service Providers (ISP's), Voice over Internet Protocol operators, Least Cost Routing operators and Wireless operators are clear signs that the telecommunications industry's competitive space is changing.

Information regarding entrepreneurship, technology and regulations served as input to compile four sets of questionnaires to conduct the empirical research. The population sample consisted of South African telecommunications industry stakeholders with a focus on new startups in the form of VANS, ISP's, USAL's and Wireless Access Service Providers.

Data were analysed in respect of the following sections:

- Profile information such as licensing category and size of turnover.
- Entrepreneurship.
- The impact of regulations on entrepreneurship.
- The impact of technology on entrepreneurship.

The collected data verified the existence and presence of smaller telecommunications players in South Africa. The existence of entrepreneurship opportunities in the South African telecommunications industry is created by entrepreneurial drive, innovation and technology changes.

The respondents believe that there are entrepreneur opportunities in the telecommunications industry but the current liberalisation measures are not sufficient to promote entrepreneurship in the telecommunications industry.

The respondents confirmed that technology is a much stronger opportunity creator than regulations and that IP communications, wireless and broadband technologies will create most entrepreneurial opportunities. Liberalisation of service-based competition and the unbundling of access networks will also create significant business opportunities.

Regulations are not in line with technological progress and prevent South Africa from becoming a true information-centric society. Although sufficient consumer demand exists for services, regulations act as a barrier to enter the market. The draft Convergence Act is not addressing concerns about free and fair competition.

A model of telecommunications regulation focusing on competition as a fundamental tool for achieving both economic and social objectives is recommended for implementation. New smaller competitors should be subjected to competition laws as opposed to regulator-specific rules. The aforementioned will result in entrepreneurship together with the achievement of free market goals such as fair competition, reduced cost of communication and a thriving e-economy.

The licensing framework should allow broad-based competitive entry in "fringe" or value added services. The regulator must become independent of other interests in the telecommunications sector and independent of political interest. The changing landscape of local interconnection with multiple operators providing different combinations of the same integrated services must be revisited.

Regulations should be brought in line with technological progress. The importance of advanced technology in the new e-economy is unmistakable, and technology should be applied in an entrepreneurial context. The South African government should seize technological opportunities in the changing telecommunications industry.

This however, requires entrepreneurship, good management, and frontier technical knowledge, a detailed understanding of consumer demand, wise public policy direction and effective regulation.

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Nature and Scope of Study

1.1 Introduction

International telecommunications began in 1801, when the first link was established between the optical telegraph systems of Sweden and Denmark (Standage, 2003). Both networks consisted of lines of towers and by replicating the configuration of panels at the next tower it was possible to transmit messages over great distances with 'unprecedented' speed. When Sweden was attacked, the news was transmitted using the first, ever, network-to-network (or "internet") protocol. Across the Oresund strait, the Swedes hoisted a flag to show that they had received the message.

Two centuries on the towers, panels and flagpoles have been replaced by an international web of fibre-optic links, undersea cables, powerful routing and switching computers, mobile-phone base-stations, computers and other devices, both wired and wireless. Industry revenues have increased to reach $1.37 trillion in 2003, there are 1.2 billion fixed telephone lines and 1.7 billion people carry mobile phones and around 874 million people now have access to the Internet (International Telecommunication Union, 2005).

Liberalisation encourages the lifting of barriers to entry to accommodate many players in a market and hence transform the market into a free and more open market (Oyedemi *et al.*, 2004: 27). The World Trade Organisation has prescribed liberalisation of the telecommunications market (Primo Braga, 1997). Since the processes of liberalisation and privatisation have been taken into consideration by countries such as India, Malaysia and South Africa, their telecommunication infrastructures have improved drastically and have seen the entry of more competitors (Oyedemi *et al.*, 2004: 28).

This study assesses whether the two major factors essential to the entry of smaller telecommunication startups, liberalisation and technology changes, result in entrepreneurship opportunities.

1.2 Problem statement

The South African government adopted phased liberalisation of the telecommunications industry. The South African telecommunications industry is entering its eleventh year of liberalisation and looming large in the future is the new Convergence Act. Coupled with technological development and convergence in the telecommunications and broader information and technology sector the expansion of the market is set for growth and the attraction of business startups.

The fact is that no regulations have had such a significant impact as technology and the Internet that has transformed the communications world. The actuality of the topic is further amplified given the recent regulatory and technology changes as well as the focus on job creation and affordability of telecommunications.

The changes should create an environment where an array of business opportunities will come to the fore. The regulatory and technological changes taking place in the South African telecommunications industry will be assessed to determine the impact it has on SMME business opportunity creation. Therefore it is necessary to fully understand and contextually relate regulatory and technology changes to new business startup opportunities. The research could further afford valuable information to both the entrepreneurship and telecommunications fields.

1.3 Study objective

The main objective of the study is to determine whether the two major factors essential to the entry of smaller to medium sized telecommunication startups, liberalisation and technology changes, result in entrepreneurship opportunities.

In order to determine the extent to which the regulatory and technology changes are stimulating entrepreneurship in South Africa the following sub-objectives will be assessed:

- Describing entrepreneurship and emerging business opportunities in the telecommunications industry.

- Identify regulatory and technology aspects that promote or constrain entrepreneurship opportunities in the telecommunications sector.
- The identification of the current regulatory and technology changes.
- Assess the entrepreneurship impact that telecommunications liberalisation and technology changes will have in South Africa.

1.4 Scope of study

The scope of the study is limited to the South African telecommunications industry with a focus on new smaller startups and the relation that technology and regulatory changes have on entrepreneurship. The scope is divided into the field of the study and the geographical reach of the study.

1.4.1 Field of study

The literature study is focused on the subject disciplines of entrepreneurship, and the relation between entrepreneurship opportunities and technology as well as the relation between regulatory changes and entreprenurship, in the South African telecommunications industry. In-depth discussions of each technology and regulatory change are not covered since the emphasis is rather on the potential thereof to create entrepreneurship opportunities.

1.4.2 Industry scope

The scope of regulatory and policy decisions considered are limited to those formulated by the following three major players, namely:

- The Department of Communications (DoC) together with the Minister of Communications, who are primarily responsible for policy-making.
- The parliamentary portfolio committee on communications.
- The regulator, the Independent Communications Authority of South Africa (ICASA).

The scope from a competitor profile is limited to companies who are licenced telecommunications service providers or operators. These companies provide voice and/or

data communication services and either support, supplement or compete with the following categories of players:

- Fixed line operators;
- Mobile and wireless operators;
- Internet service providers (ISP's);
- Under Serviced Area Licencees (USAL's);
- Value added networks (VANS); and
- Newer-generation players, such as Mobile Virtual Network Operators (MVNO's) and Wireless ISP's.

1.4.3 Geographical reach

The entrepreneurship research is focused on the South African market. Current regulatory changes taking place in the South African telecommunications industry are analysed to relate it to the topic of entrepreneurship. The theoretical boundaries of the technology changes are drawn from an international scale but the empirical analysis of the relationship between technology and entrepreneurial effectiveness is approached from a South African perspective.

The feedback is not limited to a specific region but reached the whole country. The empirical results are therefore statistically representative of smaller telecommunication startups operating in the South African telecommunications industry and the regulatory and technology trends that affect entrepreneurial opportunities can therefore be identified from the results.

1.5 Research methodology

The study consists of a literature study and includes empirical research. The literature and empirical research verify the prevalence of entrepreneurship and the extent of the relationship between entrepreneurial activity and opportunities brought about by liberalisation and technology changes.

1.5.1 Literature study

The literature study is focused on the subject disciplines of entrepreneurship and regulatory and technology changes in the telecommunications industry. The main objective however is to focus on the business opportunities created by technology and regulatory changes that currently impact on the South African telecommunications industry.

Given the objective to determine emerging telecommunications entrepreneurship opportunities, created by the regulatory and technology changes, a literature study was conducted on the following topics:

- Entrepreneurship and opportunities.
- Regulations and entrepreneurship.
- Technology and entrepreneurship.
- The telecommunications industry.
- The existence of entrepreneurship in telecommunications.
- The current telecommunications regulatory changes in South Africa.
- Technology changes in the telecommunications industry.

Reference material and sources used for the purpose of the literature study included reference books, journals, publications, research reports and the Internet.

1.5.2 Empirical research

The empirical study consists of four sets of questionnaires and free text questions. The survey was designed to both collect information and to serve as a quality control measure in reaching conclusions on whether the telecommunications technology and regulatory changes are contributing to entrepreneurship opportunities.

The questionnaires were distributed to owners and founders of new and established smaller telecommunication startups and established telecommunication operators. Each potential participant was contacted to ensure that all the respondents met the parameters and objective of the research.

The results were analysed to determine which specific regulatory and technology changes are creating entrepreneurship opportunities by developing a conduciveness matrix that rank each technology and regulatory change in terms of entrepreneurial relevance. Factors that promote or constrain entrepreneurship opportunities were obtained with the opinion survey.

The validity of the results are based on the following:

- the literature study was used as a guideline to compile the survey;
- the research population sample is representative of the smaller telecommunication startups; and
- the results were compared to trends experienced in other countries.

The information obtained from the emprical research and the literature study were analysed to conclude on the existence of entrepreneurship in the telecommunications industry and identify which regulatory and technology changes promote or constrain entrepreneurship.

1.6 Limitations of the study

One of the limiting factors of this study is the fact that the Convergence bill is currently in draft format and currently open for input from all stakeholders. The draft Convergence bill proposes significant liberalisation measures including a free market with open competition, but hence its current volatility holds only speculative value.

Technology is also changing at a rapid pace, which makes it extremely difficult to fully comprehend the potential business opportunities brought about by technological innovation.

The respondents are representative of the total South Africa telecommunications industry landscape but a higher focus is placed on truly entrepreneurial companies and organisations that met the licensing criteria as listed in paragraph 1.4.2. The study did not consider the impact of access to finance, entrepreneurial skills, the Information

Communication and Technology economic empowerment charter and other legislature that impact on the SMME sector.

Further studies in the field are nevertheless recommended to also consider the impact of the Convergence Act, once promulgated and applied to the industry, and the inclusion of informal or survivalist business activity.

1.7 List of definitions and terminology

The following definitions and terminology are widely used in the report:

Broadband: means a technology solution, wireless and/or cable or both that provides for the transmission of integrated voice, data and video service in a single logical channel between the network transmitter stations/lines and the subscriber.

Internet: means the TCP/IP-based interconnection of servers worldwide that provides communications and applications services to an international base of business, consumers, education, research, government and other organisations.

Public operator: means any entity with a public switched or a public mobile licence. In this document it usually refers to the SNO, Sentech (Multimedia licence), USAL's, MTN, Vodacom and Cell C. Also referred to as OLOs (other licenced operators).

Service provider: means an entity with a Value Added Network Services (VANS) licence or a similar licence refer to ISP's, VANS, Swiftnet, WBS and Sentech (Carrier of Carriers licence). Service Providers can also be described as any entity that is not a public operator.

Telecommunication: According to Carter (1999:147), telecommunication is the electronic transmission of information over a distance that includes both voice and data communications.

1.8 List of acronyms and abbreviations

The following acronyms and abbreviations are widely used in the report:

ICASA: means Independent Communications Authority of South Africa.

ICT: means Information and Communication Technology and refers to the combination of manufacturing and services industries that capture, transmit and display data and information electronically.

ISP's: means Internet Service Providers.

MVNO's: means Mobile Virtual Network Operators

PTN: means Private Telecommunication Operator.

SNO: means Second National Operator and the holder of the second public switched telecommunications services (PSTS) licence.

SMME's: means small, micro and medium enterprises (SMME's).

USAL: under serviced area licencees, that will receive a Public Switched Telecommunication services licence in areas with a tele-density of less than 5 percent.

VANS: means Value Added Network Services provider.

VoIP: means Voice over Internet Protocol.

WASP's: means Wireless Access Service Providers.

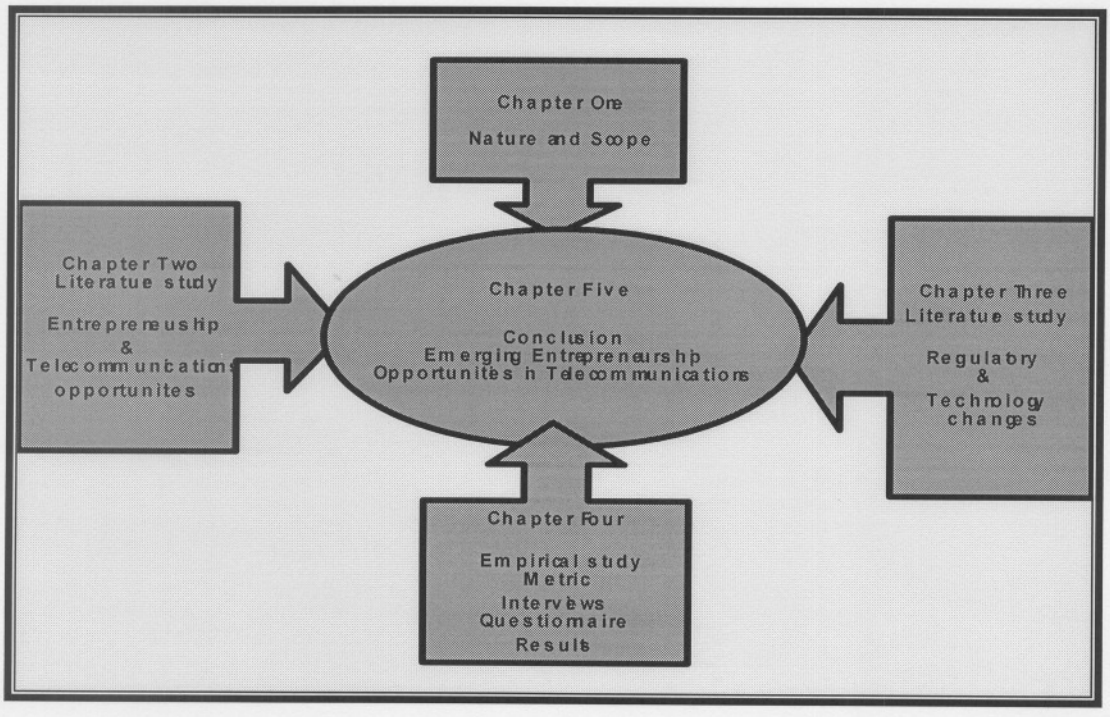
WISP's: means Wireless Internet Service Providers.

WWW: means World Wide Web.

1.9 Layout of study

The layout of the study is represented in figure1.1; a brief overview of the study follows.

Figure 1.1 - Layout of study



Chapter 2: Entrepreneurship and prevalence in telecommunications. The literature study is focused on the subject disciplines of entrepreneurship in general. The prevalence of entrepreneurship in the telecommunications industry and its relationship with technology and regulatory changes is discussed.

Chapter 3: Regulatory and Technology changes. This chapter is a literature study that describes the telecommunications industry. The current regulatory and technology changes are identified and described. The potential impact and effect of regulatory and technology changes on entrepreneurship opportunities are discussed.

Chapter 4: Empirical research. In chapter four the objectives and process for the empirical survey are discussed. The survey determines which specific regulatory and technology changes are creating entrepreneurship opportunities. The correlation between telecommunications entrepreneurship and technology and regulatory changes is also represented. A detailed account of the major results of the empirical study as well as the discussion thereof is provided in this chapter.

Chapter 5: Conclusions and recommendations. Major conclusions and recommendations that can be derived from this study are represented. Conclusions are drawn on whether the technology and regulatory changes are promoting or constraining entrepreneurship. Recommendations are made on the regulatory and technology factors that promote or constrain entrepreneur opportunities in the industry.

Chapter 2

Entrepreneurship in the Telecommunications industry

2.1 Introduction

This chapter reviews the available literature dealing with entrepreneurship and integrates the literature with regulatory and technology changes in the telecommunications industry.

Entrepreneurship is a way of thinking, reasoning, and acting that is opportunity obsessed, holistic in approach, and leadership balanced (Timmons & Spinelli, 2004:47). Entrepreneurship results in the creation, enhancement, realisation, and renewal of value, not just for owners, but also for all participants and stakeholders. In South Africa SMME (small, medium and micro enterprise) has also been identified by the South African government as a priority to stimulate the economy (Nieman & Bennet, 2002:445).

Two major factors are essential to the advent of entrepreneurship and broader competition in the telecommunications sector: Liberalisation and Technology (Lamberton, 1995: 6). According to Timmons and Spinelli (2004:83) the most exciting opportunities come from technological innovation. Technology and regulatory changes have profoundly altered and will continue to alter the way opportunities are conceived.

Telecommunication startups are attracted by the proven growth potential of emerging markets, as evidenced by the fast uptake of cellular technologies and Internet services. The liberalised or free-market state which is coming into existence intensifies economic and industry activity, driving demand for communication and information services, which opens the market to various service providers and Information Communication and Technology (ICT) players.

2.2 The entrepreneur

The English word ***entrepreneur*** is a derivative of the French verb *entreprendre;* that means literally, to "undertake something, to seek opportunities, to fulfil needs and wants by being innovative and starting businesses" (Clark *et al.*, 1993:9).

For the sake of this study, the definitions as derived from Cornwall and Perlman (1990:4), Van Praag (1996:3), Burch (1986:4), Mare (1996:3), Drucker (1996:25), Hisrich and Peters (1998:9) and Kuratko and Hodges (1998:31) are used. According to these the entrepreneur is regarded as an individual with the potential to create a vision from virtually nothing. This is fundamentally a human creative action. Energy is invested in the initiation process by initiating the startup of a company. This vision and actions include the willingness to take a calculated risk. This risk includes personal, social and psychological as well as financial components. Everything possible is done to achieve success and to avoid failure. A noticeable attribute within this frame of reference is the fact that the entrepreneur has the ability to identify an opportunity where the regular man on the street would see chaos, contradictions, ambivalence and confusion.

Entrepreneurs act as business catalysts, gathering resources needed to convert business ideas into enterprises that introduce new business enterprises to the economy. Through this process they add value by delivering products and/or services to the market, thereby satisfying customer needs (Nieman & Bennet, 2002:57). Entrepreneurs, therefore, use business entities, be it initially formal or informal, as vehicles to process their ideas into products and/or services that satisfy market needs. In this way they add value to the economy.

The entrepreneur is significant because the entrepreneur is the dynamic force that disturbs the equilibrium through innovation (what he achieves) by creating an entrepreneurial process (what he does) (Trevisan, Grundling & De Jager, 2002:128).

2.3 Entrepreneurship

Ireland and Hitt (1997) define entrepreneurship as the gathering and integration of resources to take advantage of identified opportunities. Morris and Sexton (1996:5) define entrepreneurship as "*the process of creating value by bringing together a unique package of resources to exploit an opportunity*". Livesay proposed a workable definition of 'entrepreneurship' as encompassing a "... purposeful and successful activity to initiate, maintain, or develop a profit-oriented business" (Livesay, 1982:10).

According to Stephen Spinelli and John Muller from Babson College entrepreneurship is a way of thinking, reasoning, and acting that is opportunity obsessed, holistic in approach, and leadership balanced" (Timmons & Spinelli, 2004:47). At the heart of the process are the creation and/or recognition of opportunities, followed by the will and initiative to seize these opportunities. In its report, State Entrepreneurship Policies and Programs, the Ewing Marion Kauffman Foundation's Center for Entrepreneurial Leadership defines entrepreneurship as "the ability to amass the necessary resources to capitalise on new business opportunities" (Timmons & Spinelli, 2004:47).

Brazeal and Herbert (1999:33) offer a model of entrepreneurship, integrating the fields of technology, psychology and business. The roles, played by "change", "creativity" and "innovation" are highlighted, recognising that entrepreneurship is enabled by the following:

- the current or potential existence of something new (an innovation);
- which may have been developed by new ways of looking at old problems (creativity);
- or the lessened capability of prior processes or solutions to respond effectively to new problem parameters brought on by new or emerging conditions (environment change);
- which can supplant or be complimentary to existing processes or solutions (a change); and
- when championed by one or more invested individuals (the innovator).

Audretsch (2002:4) states that entrepreneurship is about change, and hence entrepreneurs are agents of change. In terms of this definition it is important to highlight the fact that in a knowledge economy, change is brought about mainly by new knowledge and technology.

The classic expression of entrepreneurship is the raw startup company. Deakons and Freel (2003:3) examined the most important theories of entrepreneurship and summarised their insights as depicted in table 2.1.

Table 2.1 - Important theories of entrepreneurship

Author	Key role of entrepreneur	Additional insights
Say	Organiser of factors of production	Catalyst for economic change
Cantillon	Organiser of factors of production	Catalyst for economic change
Kirzner	Ability to spot opportunity	Creative alertness
Schumpeter	Innovator	Entrepreneur as 'hero' figure
Knight	Risk-taker	Profit is rewarding for risk-taking
Casson	Organiser of resources	Key influence of the environment
Schakle	Creativity	Uncertainty creates opportunity for profit

Source: Deakons and Freel (2003:3)

The core of entrepreneurship can, however, be seen in the development of the 'new', be it new business entrants, products or services with corresponding adding of value and profit driven decision-making. The reward for achievement is not only financial, but also involves personal satisfaction and independence.

Entrepreneurship is thus a process that creates value by sourcing and packaging resources to exploit identified opportunity (Morris, 2002). Entrepreneurship is also the emergence and growth of new businesses (Nieman & Bennet, 2002:57).

2.3.1 The entrepreneurial process

The entrepreneurial process deals with innovation and much of what is accomplished is new and novel knowledge. Innovation is defined as a specific instrument of entrepreneurship or the act that endows resources with a new capacity to create wealth (Drucker, 1996:27). Innovation can therefore be defined as the successful implementation of creative ideas (Brazeal & Herbert (1999:36). According to Moore and Bygrave the entrepreneurial process is built on a cycle of four activities (Carlock, 1994:27):

- innovation;

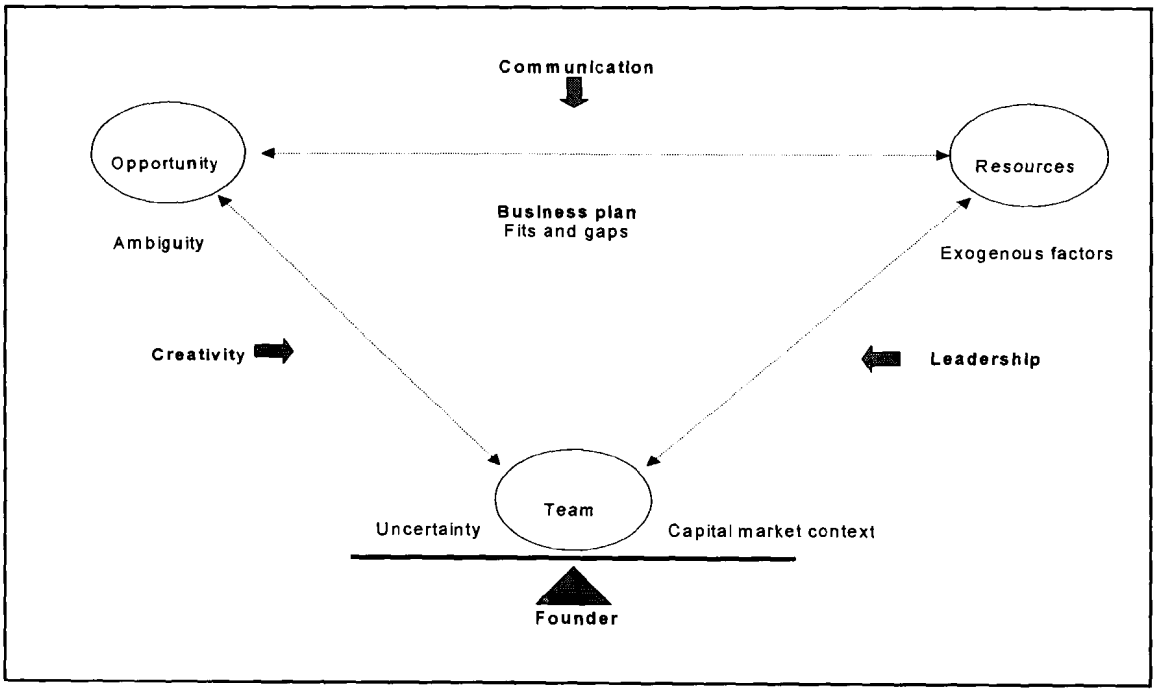
- a triggering event;
- implementation; and
- growth.

During the cycle, different variables interact with the environment to influence the entrepreneurial process. During the innovation phase, personal characteristics such as risk taking or experience interact with environmental forces such as opportunities. Schumpeter (1934), links innovation with "creative destruction" and entrepreneurship:

> "... the function of entrepreneurs is to reform or to revolutionise the pattern of production by exploiting an invention or, more generally, an untried technological possibility for producing a new commodity or producing an old one in a new way, by opening up a new source of supply of materials or a new outlet for production by reorganising an industry, and so on." Schumpeter (1934).

Timmons and Spinelli (2004:56) concluded that there are three driving forces underlying successful new venture creation, as depicted in figure 2.1.

Figure 2.1 - The Timmons model of the entrepreneurial process



Source: Timmons and Spinelli (2004:57)

The process starts with an opportunity, driven by a lead entrepreneur and an entrepreneurial team, it is resource parsimonious and creative, it depends on the fit and balance between the aforementioned and it is integrated and holistic.

Despite the great variety of businesses, entrepreneurs, geographies, and technologies, central themes or driving forces dominate this highly dynamic entrepreneurial process (Timmons & Spinelli, 2004:57). At the heart of the process is the opportunity and successful entrepreneurs know that a good idea is not necessarily a good opportunity.

2.3.2 Opportunities

Bygrave and Hofer (1991:14) define an entrepreneurial opportunity as a situation where a product or service can be created and sold for a higher price than it costs to produce. They go further to state that the situation can emerge because people have different perceptions of the value of resources, products, and services. Timmons and Spinelli (2004:82) suggests that for an opportunity to be entrepreneurial it must have the qualities of being attractive, durable, and timely, and is anchored in a product or service that creates or adds value for its buyer or end user. For an opportunity to have these qualities, there must be a 'window of opportunity', which is opening and remains open long enough. Further, entry into a market with the right characteristics is feasible and the management team is able to achieve it.

Sarasvathy (2002:2) states that opportunity recognition is the first process in the creation of a new venture, but may occur throughout the life of an enterprise or life of an entrepreneur. According to Van der Veen and Wakkee (2002:7) the opportunity recognition process starts when an individual has an initial idea.

Hills and Lumpkin (1997:1) define an idea as a stepping-stone that leads to an opportunity. Sarasvathy (2002:17) defines the opportunity evaluation process as the phase in the venture creation process when insights or ideas are analysed for their viability. Timmons and Spinelli (2004:91) suggest a detailed screening process to follow in order to evaluate a business opportunity.

The opportunity identification process starts from the creative ideas the entrepreneur generates by analysing the political, economical, social and technological changes taking place in the external environment (Thompson *et al.*, 2005:73).

2.3.3 Drivers of opportunities

In a free enterprise system, changing circumstances, chaos, confusion, inconsistencies, lags or leads, knowledge and information gaps in an industry or market spawn opportunities (Timmons & Spinelli, 2004:82).

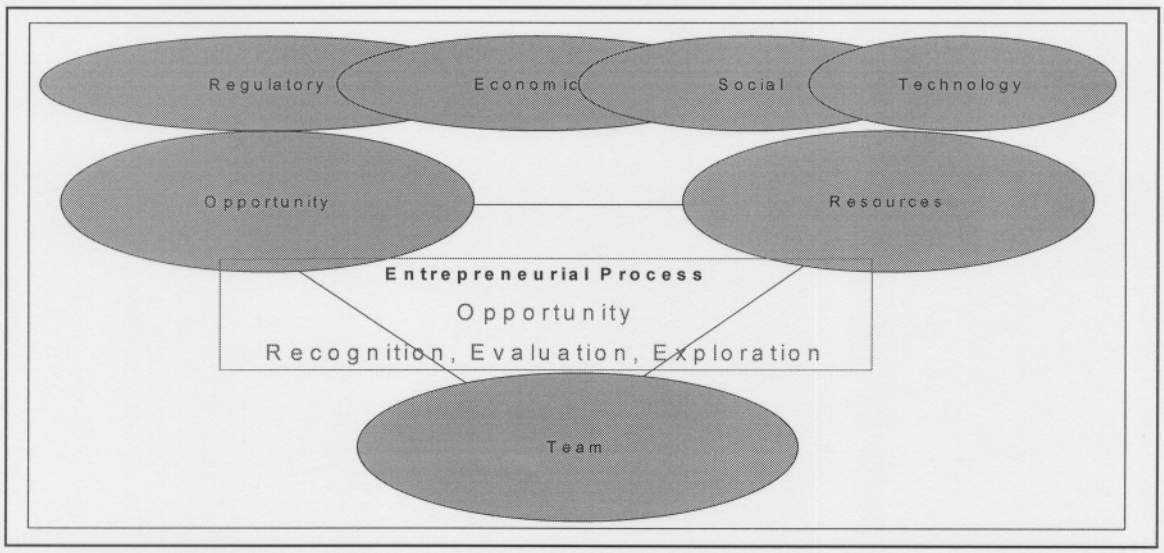
Timmons and Spinelli (2004:83) state that it is often incorrectly assumed that a marketplace dominated by large, multibillion-dollar players is impenetrable by smaller, entrepreneurial companies. Research have shown that it can take years for a large company to change its strategy and even longer to implement the new strategy. Timmons and Spinelli (2004:83) provide the example of Cellular One that was launched in Boston, where the giant NYNEX was the sole competitor. Cellular One grew from scratch to $100 million in sales in five years and won three customers for every one that NYNEX won, their difference was the entrepreneurial spirit and smaller size.

Timmons and Spinelli (2004:83) state that technology and regulatory changes have profoundly altered and will continue to alter the way we conceive of opportunities.

To understand how public policy and regulations can be implemented to promote entrepreneurship, Audretsch, (2002:3) state the supply of entrepreneurship is promoted by altering policies that shape opportunities for entrepreneurship. Such policies include the deregulation of entry into markets, the privatisation of services and access to government programs.

The great new ventures of the next generation will come about as a result of significant sea changes. These include technology, market and societal shifts, and even opportunities spawned from the Internet, as depicted in figure 2.2.

Figure 2.2 – Opportunity identification process



Source: Adopted from Timmons and Spinelli (2004:85)

Since this study aims to assess whether telecommunications liberalisation and technology changes result in entrepreneurship opportunities, the two remaining factors of the entrepreneurship model, resources and team, are not discussed.

2.4 Telecommunications

Information, Communication and Technology (ICT) services play a key role in any economy - from being an important intermediate input to business, an enabling medium for a range of content providers, a significant item in household expenditure, and a source of demand for numerous manufacturing and service industries. In 1995, the ICT industry contributed around 2.5 percent of South Africa's gross domestic product; by 2000 its contribution stood at 5 percent and this figure will double soon (Van der Kooy, 2001:9). The increased e-Economy has resulted in the requirement to communicate and transmit vast amounts of data to suppliers, consumers, friends and alike.

The telecommunication sector is at the heart of a competitive Southern Africa (McCormick, 2003), and telecommunications is both the core and infrastructure of the information economy (Afullo, 1999). Advances in communication technologies have enabled many countries to improve the lives of its citizens through improved health, education and public

service systems and economies (Kekana, 2002). Telecommunication infrastructure serves as a platform and a catalyst for other industries (McCormick, 2003).

Information, Communications and Technologies (ICT's) refer to the various technologies that enhance the creation, storage, processing, communication and dissemination of information (Oyedemi *et al.*, 2004). ICT's also refer to the different infrastructures used in these processes, their applications and the numerous services these infrastructures render. The following technologies are the elements of ICT's:

- Media of communication (e.g. radio, television).
- Information machine (e.g. computers).
- Telecommunications technologies and equipment (satellites, fibre optic cables, phones, facsimile machines).

Telecommunications infrastructures in particular have become the driving forces of ICTs; they have the capability to link all various ICT elements together.

(Melody, 2001a) points out that there are no clear correlations between the competitiveness of markets and market growth and identifies a number of other factors necessary to transform national and international telecommunication networks into information infrastructures capable of providing the types of enhanced services needed in the e-network economy. These include:

- An expansion of the bandwidth capacity in national and international networks to reduce unit-networking costs and provide for high capacity services.
- Expansion of bandwidth for local connections to business and residence users to facilitate the increasing demands for high-speed services.
- Internet services development which helps stimulate demand for new next generation Internet services.
- Development of innovative applications of new Internet services throughout the economy and society to business, government, education and entertainment.

The telecommunications industry fails to meet the expectations of consumers and a disparity exists between services offered by the telecommunications operators, and what

they think their customers want. Telecommunications operators acknowledge the need for high investment in value-added services, but are not able to respond sufficiently to meet market demand.

The lack of computer literacy and access to information and communication technology will be as serious a disadvantage to participation in society as illiteracy is now. The Internet is not just for commerce, but is also a space where students can learn, people can find employment and where communities communicate. Every society creates information to suit the needs of that particular epoch in human civilisation. The history of civilisation points to various levels and usages of information in everyday life as listed in table 2.2 (Oyedemi *et al.*, 2004).

Table 2.2 - Levels of information handling and technology

Levels of civilisation	Categories of human civilisation	Information handling and technology
Level 0	Pre-language	
Level 1	Language (pre-historic)	Own minds in relation to clan
Level 2	Writing (Ancient)	Info written in scrolls and stored in libraries
Level 3	Printing (Medieval)	Printing press and books
Level 4	Modern (computers)	Computer and telecommunications technology

Source: Oyedemi et al (2004)

Technological developments, together with the liberalisation of markets are critical to the development of effective modern economies. In the coming decade, our information infrastructure will become far more complicated and diverse, as a variety of technologies and companies try to fill distinctly niches. Both technical and policy decisions made in the coming decade could have unprecedented impact on our information infrastructure.

2.4.1 Entrepreneurship and telecommunications regulations

Government has a vital role to play in ensuring sustainable economic growth, and to allow telecommunications to play its part in national development (Pieterse & Pretorius, 2002).

Governments aim to achieve this through a number of channels, organisations facilitating development, reform of government policies and telecommunications sectors, promulgating new telecommunication policies, and putting in place independent telecommunication regulators (Stovring, 2004).

The strategic plan for the South African communications department focuses on the following broad themes:

- Achievement of higher rates of investment in the South African economy through reducing cost of doing business in South Africa.
- Increased competitiveness of the South African economy through contributing to the modernisation of the economy.
- Broad-based participation in the economy through facilitating SMME and black economic empowerment participation in the ICT industry.
- State delivery capacity improvement through e-government.
- Contributing to a better world through ICT-based second economy interventions.

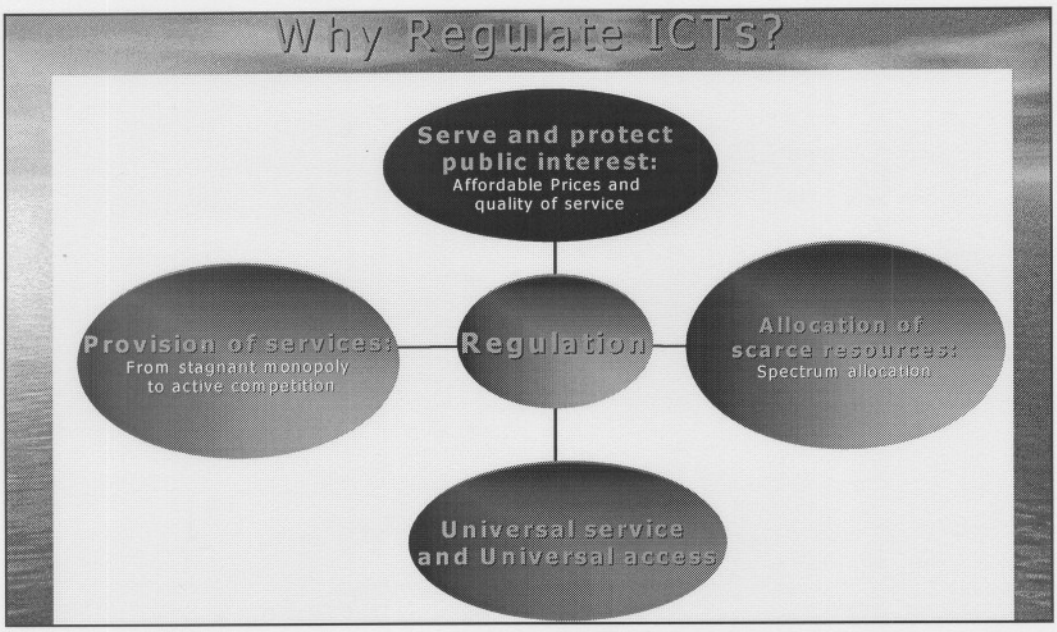
Regulations should support the above objectives but it is often a tricky balance to implement market-supporting regulations. Rules and standards to protect consumers must be sufficient, but not so costly as to discourage innovation and halt progress (Beardsley, 2005:48). Governments are too inclined to frame policy through trial and error, confusing economic goals with political and social ones. Thus governments sometimes - and often unintentionally - devise rules that hamper competition and create long-term drags on growth (Beardsley, 2005:48).

Barriers to entry by new firms are one reason why an industry may be more concentrated than economies of scale alone would indicate. In such cases, the government stops short of creating a pure monopoly but still limits the number of firms to a figure below that which would exist under conditions of free entry (Lindsey, 1988:261-262).

Telecommunications service providers should provide absolutely good service to their clients, be they small or big corporate clients. Poor service is therefore not acceptable and regulation aims to eliminate such poor or slow, internationally - uncompetitive service. The

reasons why licencing should be used as a barrier to limit telecommunication startups are shown in figure 2.3.

Figure 2.3 - Why regulate telecommunications



Source: Oyedemi et al, (2004)

The South African draft Convergence bill sets out the following reasons why licensing should be used as a barrier to limit telecommunication startups.

- manage spectrum and standards;
- impose conditions of licence, empowerment, diversity of communities involved in provision;
- provide universal communication services and connectivity for all;
- safeguard, enrich and strengthen the cultural, political, social and economic fabric of South Africa; and
- promote a broad range of content services in all official languages providing a diversity of news, views, information and entertainment.

Pertinent economic trends affecting telecommunications is the de-monopolisation of state-owned industries and the liberalisation of markets (Fricke, 2005:15). The combined effect of these trends ensures a more "open" market to industry players and a competitive environment. The push for complete liberalisation of the telecommunications markets and the collaborative attitude of members towards trade, commerce and development have

increased the probability of economic and technological advancement.

The discovery of the potential for competition in telecommunications means that telecommunications can become a market like any other market, governed by the general laws that apply to all businesses, and disciplined by competition (Ryan, 2005). Increased competition from deregulation improves the incentive to innovate in the long run, as producers of new products displace producers of old products.

The McKinsey Global Institute (MGI) (Beardsley, 2005: 48) believes that poor regulation is the main factor-limiting productivity and growth in economies throughout the world, particularly developing ones. To create competition in telecommunications regulators often try to lessen the market power of incumbent former monopolists. One common approach involves requiring them to let new retailers use their networks at a favourable wholesale price while still insisting that they provide universal coverage for profitable and unprofitable customers alike. Competition is vibrant in such former monopoly industries of most developed economies. The transfer of profits away from the incumbents has been substantial, and prices have tumbled in some sectors: from 1990 to 2002, for example, the cost of fixed-line telephone calls fell by almost 50 percent in the countries of the Organisation for Economic Co-operation and Development.

2.4.2 Liberalisation of telecommunications

The telecommunications industry was traditionally a natural monopoly, where one telecommunication company supplied the telecommunications services and the collection of products. The single company makes all the output and price decisions, it has complete control over the market (Oyedemi *et al.*, 2004).

According to Gillwald (2001) a solution to poor delivery by monopolies lies in the privatisation of the incumbent monopoly and the liberalisation of the market. This new regulatory environment in a liberalised sector, argues Gillwald, will put an end to high-cost, inefficient monopoly provision. Competition induces suppliers to become more efficient and offer a great variety of product choices to beat their competitors, and at prices lower than those of their competitors.

A prediction about the evolution of telecommunications startups over this next decade depends largely on assumptions about the decisions of government policy makers. As potential telecommunications revenues rise, and equipment costs fall, the extent of competition often depends on how hard it is for smaller and newer ventures to enter the market and survive in it (Peha, 2000:204). Startups need connections with the networks that are already in place, which process is governed by the policy makers. The smaller carriers rely on the backbone of established carriers' networks and hence a fair pricing system should be provided for by regulations. The state of telecommunications in 2010 depends less on technical innovation, than on when policy makers recognise changes in the technology and business climate, and how they react to it (Peha, 2000:205).

Liberalisation of the Information Communication and Technology (ICT) sector encourages the entry of new telecommunications companies and fosters greater competition in the sector (Lamberton, 1995: 6). Liberalisation of the telecommunications market which leads to removal of barriers to entry, coupled with privatisation of telecommunications corporations which encouraged private investment are precursors to the advent of full competition in the telecommunications sector. The introduction of competition means that a well-established telecommunications monopoly operator has to compete with new entrants in the different segments of the market (Oyedemi *et al.*, 2004). An example is a telecommunications company providing Internet service and competing in the Internet service provision market.

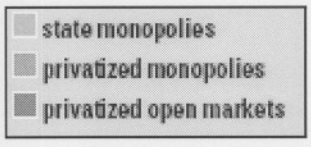
The World Trade Organisation (WTO) has prescribed liberalisation of the telecommunications market (Oyedemi *et al.*, 2004). Many countries have endorsed the WTO's liberalisation guideline and subsequently open their telecommunications markets, leading to open and competitive markets. Specifically, it has brought about an era of competition in the telecommunications sector. The liberalisation of the telecommunications industry opened the doors to competition and brought an end to a period when telecommunications was considered a natural monopoly (Melody, 2001b). Coupled with technological development in the telecommunications sector, competition has revolutionised the sector remarkably.

Since the passage of the Telecommunications Act of 1996, the United States telecommunications industry saw the overall number of local exchange carriers increased from 57 in 1996 to 146 in 1998. Some industry analysts estimate that these SMME's will soon control more than 50 percent of the U.S. telecommunications market. Without competition, the benefits from increased private participation will not be fully realised (Wellenius, 1997:3).

In Latin America, for example, countries that granted monopoly privileges of six to ten years to the privatised state enterprises saw connections grow at 1.5 times the rate achieved under state monopolies but only half the rate in Chile, where the government retained the right to issue competing licences at any time, as shown in table 2.3.

Table 2.3 - Growth in open markets

	1984–89	1989–94
Brazil, Colombia, Ecuador, Peru, Uruguay	7.0	7.8
Argentina, Mexico, Venezuela	6.7	11.3
Chile	6.6	20.5



Source: Pyramid Research 1996 and World Bank

Rural areas, too, can become an attractive business under liberal entry and pricing policies. In Chile, government subsidies equivalent to less than 0.5 percent of total telecommunications revenue, allocated through competitive bidding in 1995, mobilised twenty times as much private investment to extend basic telephone access to rural areas (Wellenius, 1997:3). The program brought service to about a third of the rural population lacking it.

The telecommunications policy environment continues to change dramatically, driven by technological innovation, which results in new equipment and services, but also new entrants and alliances between companies with experience in a wide range of information industries from telecommunications to broadcasting to computer hardware and software to publishing (Melody, 2001b:387).

2.5 Entrepreneurship and technology

Burgelman *et al.*, (2004:2) defines technology as the theoretical and practical knowledge, skills and artifacts that can be used to develop products and services as well as their production and delivery systems. Chang (1997) defines technology as the "*cumulative sum of the organisation's knowledge and ability to produce quality goods and services*".

Technology and knowledge are important in the knowledge economy, as they are the key factors of production (New Zealand, 1999:4). Technology can be embodied in people, materials, cognitive and physical processes, plant, equipment and tools. Technological entrepreneurship is defined as activities that create new resource combinations to make innovation possible, bringing together technical and commercial worlds in a profitable way (Burgelman *et al.*, 2004:3).

The relationship between technological advancement and entrepreneurial action is evident. The abilities to innovate quickly and adapt to customers' changing demands are major characteristics of entrepreneurial activity (Ahmed, 1998).

The technological revolution has resulted in the convergence of computing, communication and intelligent control systems, which has spawned the electronic economy and forever changed the industrial economy paradigm. The importance of advanced technology in the new e-Economy is unmistakable, but technology should be applied in an entrepreneurial context (Baumgartner *et al.*, 1998). Often, there is no consensus regarding which of several competing technologies will win out or which product attributes will prove decisive in winning buyer favour - as is the case in high-speed Internet access where cable modems, digital subscriber line, and wireless technologies are competing vigorously (Thompson *et al.*, 2005:204).

Recognising the dynamic nature of telecommunications technology and service opportunities, it is probably more important that the barriers to entry be minimised and the door to competition be opened (Melody, 2001b:16).

2.5.1 Telecommunication technology

Telecommunications is a technological intensive industry (Jehiel & Moidovanu, 2000:1). The growing development in communication technology has increasingly made it impossible for a monopoly telecommunication corporation to provide the varieties of services available in the telecommunications sector.

Competition will influence the rate of process and product innovation in the telecommunications sector and therefore facilitate South Africa to 'close the technological gap' with other countries and realise higher rates of productivity improvement and product innovation (Botha, 2001:99). Telecommunications technology is unstoppable in forging an entirely new industry structure.

Governments, however, often struggle to create flexible frameworks that anticipate and respond to conditions as markets evolve. In telecommunications regulators are struggling to take account of new technologies that, along with existing regulations, are changing the balance of power between incumbents and attackers (Beardsley, 2005:48). Although alternative platforms such as cable, wireless, and VoIP (Voice over Internet Protocol) are substitutes for traditional fixed-line telephony, they tend to be regulated separately and, in some cases, circumvent regulation altogether.

Today most developed countries are or have introduced competition in the telecommunications market that was once monopolistic in nature. Driven by technological developments, competition has come to dominate a market that was once a monopoly (Gillwald, 2003:6).

The technology trends currently driving the telecommunications industry are wireless, broadband, and the convergence of voice, video and data together with the convergence of telecommunications and information technology. Technological progress and regulatory vigilance will overthrow the local-loop monopolies some time during the next ten years (Economist, 2003). Already fixed-line voice-based networks are being eclipsed by a multitude of packet-based data networks on which voice is just another kind of data.

Eventually, all of those packets of data will be carried using Internet protocol (IP), which continues to reach into every corner of telecommunications, pushing aside rival technologies (Joslin & Goldstuck, 2005:48).

The evolving nature of competition in telecommunications and information activities in general is interwoven with the technological trajectories and policy fashions (Lamberton, 1995: 6).

2.5.2 Entrepreneurship and telecommunication technology

Technical innovations allow new telecommunication startups to compete for a piece of the industry (Peha, 2000:200). The advent of new services and technology will facilitate broader entry of competitors. Today the technology is here and nations across the globe are taking advantage of the likes of broadband Internet access, high-speed wireless, VoIP, and Satellite to realise unprecedented e-business growth.

Telecommunication startups are attracted by the proven growth potential of emerging markets, as evidenced by the fast uptake of cellular technologies and Internet services (Fricke, 2005:15). The liberalised or free-market state which is coming into existence intensifies economic and industry activity, driving demand for communication and information services, which opens the market to various service providers and Information, Communication and Technology (ICT) players.

Traditionally telecommunications services were limited to basic voice transmission; today we witness the availability of a gamut of telecommunication services brought about by innovations in communication technology (Oyedemi *et al.*, 2004). For instance the introduction of commercial Internet into the telecommunications market brought in an era of competing Internet service providers and development in wireless technology-specifically has resulted in the era of cellular service providers.

The digital economy presents enormous opportunities for entrepreneurship and new business startups in existing and emerging sectors. Barriers to entry in all sectors of the global economy and in all markets are being eroded. Using e-business, new businesses

around the world are creating new products and services that are instantly accessible by a global audience. Internationally, there is strong entrepreneurial activity in developing technologies and services that support the development of e-business. The incumbent will see its market share eroded in favour of smaller entrants benefiting from the decision to liberalise access to the fixed-line networks (Economist, 2003).

Business are using the Internet in innovative ways to transform the provision of traditional products and services and larger business are increasing the outsourcing of their e-business needs to smaller, specialist technology and support service companies. e-Business offers a real window of opportunity for a step change in the number of new startups and in the culture of innovation and entrepreneurship in South Africa.

2.6 Small, medium and micro enterprises

Small business has different meanings in different contexts. It differs from country to country and from sector to sector. Different characteristics are used to constitute its definition. Typically a small business is the primary source of income for its owner(s), consumes the majority of their time and efforts, and is seen as an extension of the owner's personality (Carland *et al.*, 1984). The classification by StatsSA for telecommunications SMME's is based on the criteria as shown in table 2.4.

Table 2.4 - Telecommunications SMME classification

Size or class	Total full-time employees	Total annual turnover	Total gross asset value
Medium	100	R20m	R5M
Small	50	R10M	R2.5M
Very small	10	R2M	R0.50M
Micro	5	R0.15M	R0.10M

Source: StatsSA, 2005

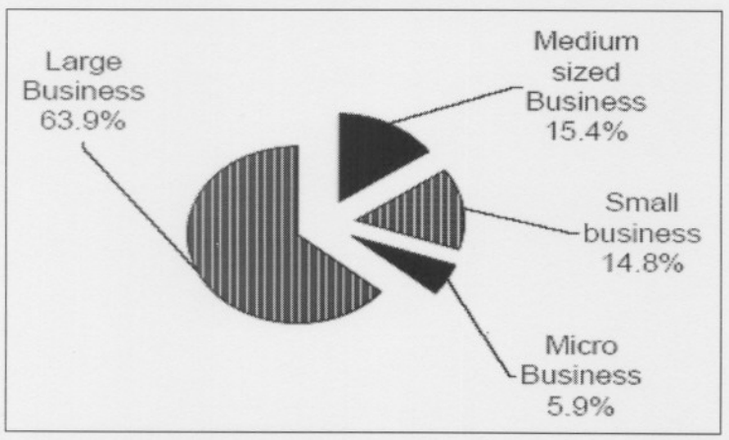
According to Kotze (1991:28-32) characteristics include, number of employees, turnover, independent ownership, asset value, independently managed, as well as the degree of formalisation.

In the United States of America (USA), the small business sector is very active in innovative products and new job creations and assists in giving the USA its global competitive edge; in Japan, SMME's form the majority of their business enterprises (Ladzani & Van Vuuren, 2002:154). All over the world the importance of the small business sector in the economic and social development of countries are recognised. By creating value for stakeholders cash flow may increase, enabling investment in further products, services and processes, closing a reinforcing loop (Janszen, 2000:7).

According to NTSIKA (2003) public and large (corporate) enterprise sectors are shedding labour and small enterprise sectors have a net positive contribution to employment in South Africa. According to NTSIKA (2003) small, medium and micro business contributes 57.3 percent to employment in South Africa; Micro businesses contribute 20.8 percent to employment, small business contribute 24.2 percent and medium sized business contribute 12.3 percent to employment in South Africa.

The contribution of the SMME business sector to the well-being of South Africa cannot be understated; small business contributes approximately 36.1 percent to the gross domestic product (GDP) of South Africa, micro enterprises make up 5.9 percent of this contribution, small enterprises make up a further 14.8 percent and medium enterprises make up the balance of 15.4 percent of the GDP as shown in figure 2.4.

Figure 2.4 - Contribution to GDP by business size



Source: Ntsika, 2003. State of small business development in South Africa

Most countries have recognised that if their information, communication and technology sectors are in a position to encourage smaller startups to seize the new technological and service opportunities; entrepreneurship, good management, frontier technical knowledge, a detailed understanding of consumer demand, wise public policy direction and effective regulation all are essential (Melody, 2001b:1).

2.7 Startups in telecommunications

The international telecommunications market has historically been closed to competition due to the presence of monopoly carriers in almost every country (Timmons & Spinelli, 2004:368). The regulatory situation, however, is changing rapidly as countries all over the world look for ways to make their telecommunications industries more competitive.

More and more national governments are liberalising and introducing competition (Oyedemi *et al.*, 2004). The liberalisation and technology changes of the telecommunications sector have brought competition to the telecommunications markets.

2.7.1 International telecommunications startups

In June 1990, the European Commission directed members of the European Economic Community to begin deregulating all enhanced telecommunications services. Similarly, the United States and Japan negotiated the International Value Added Network Services agreement, which created an opportunity for Fax International (Timmons & Spinelli 2004:368). The company started with $ 250,000 venture capital and grew to sales of $1.4 billion in two years.

Timmons and Spinelli (2004:74) report on a case where a young entrepreneur heard about major deregulation changes in the telecommunications industry. The entrepreneur knew that deregulation was opening up tremendous opportunities and started a company with $30,000. Four years later the company was thriving and the partners were making money, as much as $1 million a piece a year.

The VarTec telecommunications analysis report of October 2004 specifies that it experiences significant competition in long distance services from newer entrants as well as other dial-around resellers. In addition, long distance telecommunications providers have been facing competition from non-traditional sources, including as a result of technological substitutions, such as VoIP, high speed cable internet service, e-mail and wireless services.

Vonage, a small telecommunications company based in Edison, New Jersey, has rustled up some magic with its breathtakingly clever phone technology (Economist, 2003). Vonage's phone service provides unlimited calls within the United States and Canada for $34.99 a month. Subscribers plug a standard phone into a small black box called an analogue telephone adaptor (ATA) and then plug the ATA into their existing broadband Internet connection. Because the phone is plugged into the Internet, it can be anywhere. People dialing the number from New York are charged for a local call, and you can continue to call people just as if you were back in New York. Mobile phones have already introduced the idea of a phone that works around the world. The logical conclusion of the Vonage model is the demise of distance- and time-based charges, with telephony becoming an Internet-based subscription service.

In Portugal the fixed market was fully liberalised on 1 January 2000. At the beginning of 2002, 41 licences to operate telecommunications networks had been awarded and 16 operators were commercially active. In the second year of liberalisation, alternative operators took 8 percent of the long-distance market and 20 percent of the international market from the incumbent. This was done largely through indirect access to the local network.

TU Media, a consortium of South Korean companies, delivers television to mobile telephones and other small handheld devices via a new technology, digital multimedia broadcasting (Lee, 2005: 63). Korea pioneered the mobile television business by developing special chips enabling cellular telephones to receive satellite television signals. The Korean Ministry of Information and Communications estimates the global market for mobile television at 126 million viewers by 2010 - a $35.5 billion-a-year business. TU

Media plans to attract 6.6 million customers by 2010 (Lee, 2005: 63).

PaletSoft is one of many young and growing telecommunications firms attempting to market their wares directly to consumers via the Internet, thus avoiding the telecommunication carriers. From ring tones to wallpaper to games, the market for cell phone content is growing. In the United States alone, the market size is $300 million, worldwide, this figure is $3.1 billion (Grapentine, 2005:4). Carriers control most of this market, but these smaller technolgy companies are biting at their heels. The Japanese experience of engaging with audiences through rich content and supporting it with an infrastructure and delivery approach makes sense. But the most striking success in the Japanese market is mobile commerce. Beyond ring tones and games, the Japanese are already using their mobile phones to pay for bottles of Coke at special vending machines, rent films from the local rental store or buy theatre tickets.

There's also money to be made in being a niche player. A new German reseller is targeting a small but potentially lucrative group of customers; gay men and women, who are willing to pay more for greater convenience on services ranging from calling cards to a personal "secretary service" to charging theatre tickets or flowers to their phone bills (Blau, 1999:43). Violet Telecommunications aims to carve a niche in Europe's growing telecommunications market by aiming a variety of value-added, highly personalised services at a narrow group. Violet's primary target group is homosexuals. Chairman Udo Droste estimates the size of the homosexual community in Germany alone at about 6.5 million people and the company plans to expand into several other European cities with large gay communities, including Amsterdam, London and Paris.

2.7.2 South African telecommunications startups

The prevalence of new and smaller entrants is also found in the South African telecommunications industry. Conditions in South Africa are reasonably favourable to telecommunications startups, and as illustrated in table 2.5, the country is considered to be a cautious implementer of an electronic society.

Table 2.5 - Electronic Culture

Early Leaders	Cautious Implementers	Visionary Followers	Slow Starters
Australia	Italy	France	Belgium
Canada	Japan	Germany	Brazil
Singapore	Netherlands	Hong Kong	Ireland
USA	South Africa	New Zealand	Malaysia
		Norway	Mexico
		Spain	
		United Kingdom	

Source: Statement on Telecommunications, e-Business and the Information Society. National competitiveness council, June 2000

The Finance week edition of 23 March 2005 report that Wireless G, which was formed three years ago, was at the forefront of the hotspot wave and managed to position itself to take advantage of a market that is rapidly maturing. They further state that mobile broadband services must still be seen as a niche market, and the creation of new value-added services will fulfill the needs of the market. Wireless G is consolidating a cost-effective value chain in order to service the next stage of hyper growth, where the masses will adopt WiFi technology as a standard in converging mobile technologies.

According to ITWEB, 22 July 2005, a cellular handset that street vendors can use as a public payphone could create a million jobs in Africa over a 24-month period. The payphone, developed by Cape Town-based SharedPhone International targets informal business owners such as taxi owners and hairdressers, who can make the service available to anyone who cannot afford a handset or airtime. Described as a breakthrough technology in the cellular telecommunications sector, the payphone has been rolled out locally by MTN, Gemplus and Motorola, with several hundred units already in the market. SharedPhone operators can buy airtime from MTN, set minimum billing tariffs at a fraction of the standard price, cut calls when the customer's money has run out, and return change to a customer whose call ends early. Nigeria, Mozambique, Lesotho, Cameroon, Tanzania and India have already rolled out the payphones.

Wireless Business Solutions, a provider of wireless broadband solutions to retail customers in South Africa, has announced i-Go, a new service which makes connecting to the Internet more affordable for many South Africans. The i-Go offering provides up to 1 Mbps

(megabits per second) - which is the speed of data transfer - of data connectivity with a 500MB limit which can be topped up for R139 for a further 500MB or 1GB for R229. Consumers can now purchase iBurst on a monthly contract and enjoy the use of high-speed access for e-mail and web browsing without the hassles of dialing-up each time.

Telecommunication centres, known, as tele-centres that are owned by either an individual or communities are good examples of entrepreneurship encouragement by the South African government. Telecentres are community-based mechanisms of providing Internet access. The government encourages ways and means of providing access through the implementation of telecentre projects and small telephone co-operatives (community-owned networks). There are currently 981 collective access points such as cybercafés, post offices, digital villages and telecentres now available with variable usage (Thomas, 2005).

2.8 Summary

The entrepreneur has the ability to identify an opportunity where the regular man on the street would see chaos, contradictions, ambivalence and confusion. Entrepreneurs evaluate opportunities and initiate the startup of businesses, take calculated risks, gather and integrate resources and take advantage of opportunities to initiate and develop a profit-oriented business. The opportunities are brought about by change in the form of new technology, emerging environment conditions and the political and economical changes taking place in the external environment.

Technology and regulatory changes have profoundly altered and will continue to alter the way opportunities are conceived. Technological developments, together with the liberalisation of markets are critical to the development of effective modern economies. Pertinent economic trends affecting telecommunications is the liberalisation of markets and technology changes. Liberalisation of the ICT sector encourages entrepreneurship and the entry of new telecommunications companies.

Telecommunications is a technological intensive industry, which was traditionally viewed as a natural monopoly. The introduction of commercial Internet into the telecommunications market brought in an era of competing Internet service providers and development in wireless technology has resulted in the era of cellular service providers.

Technical innovations allow new telecommunication startups to compete for a piece of the industry. The advent of new services and technology will facilitate broader entry of competitors. Today the technology is here and new telecommunications entrants across the globe, including South Africa, are taking advantage of the regulatory and technology changes to transform the opportunities into viable businesses.

Chapter Three
Regulatory and Technology Changes

3.1 Introduction

The Information age has arrived, but it has yet to reach its full potential in South Africa. Societal, technological and economic forces drive the shift from monopoly and state control to deregulation and competition (Trauth & Pitt, 1992:1). The aim of regulation is to facilitate fair competition, and to bring about greater competition means stronger productivity growth, which in turn means a faster-growing economy and more wealth to share (Beardsley, 2005: 48).

The South African telecommunications industry is going through a managed liberalisation process. The industry, historically non competitive, has experienced significant structural changes. According to Neilson and Hurst (2004:60) the regulatory framework has a considerable impact on a new entrant's decision to enter the market. The extent of competition further depends on whether there is enough demand to support multiple companies, whether there are barriers to enter the market, and whether new entrants can capture the enabling resources (like a spectrum licence or interconnection). The latter two factors are often in the hands of policy makers.

The two major factors essential to the entry of smaller to medium sized telecommunication startups, liberalisation and technology changes, could result in entrepreneurship and business opportunities (Lamberton, 1995: 6). Looming large in the future is the Convergence Act and together with the technology adoption the market is set for growth and the attraction of telecommunication business startups.

3.2 The South African telecommunications industry

The South Africa telecommunications industry was traditionally a natural monopoly, where Telkom supplied the telecommunications services and the collection of products. In a

monopolistic market structure, the company and the industry are identical. Today most developed countries including South Africa have introduced competition in the telecommunications market that was once monopolistic in nature.

According to the Telkom 2005 annual results the South African telecommunications market is currently the largest in Africa based on customers and revenues. The market has grown substantially in the past few years with total market penetration of 27.8 million (59.6 percent of the population) in March 2005. Fixed-line penetration based on the current South African population figures was 10.1 percent, while mobile penetration has risen to 49.5 percent. South Africa currently has an estimated 5.2 million Internet users served by about 250 Internet Service Providers (ISP's).

The central theme of the 1990's era was a monopoly by Telkom, mobile duopoly by MTN and Vodacom, and partial VANS liberalisation (Finnie *et al.,* 2003:83). The 1996 Telecommunications Act opened up certain service licence categories to competition, including VANS and Private Telecommunications Networks (PTN's). There are approximately 320 licenced VANS-providers and approximately 43 licenced PTN's today. VANS were restricted to the carrying of data only while PTN's were allowed to carry internal company voice.

Societal, technological and economic forces drive the shift from monopoly and state control to deregulation, privatisation and competition (Oyedemi *et al.*, 2004). In response to global regulatory and technological trends and national socio-economical development objectives, South Africa embarked on a 'managed liberalisation' process with the promulgation of the 1996 Telecommunications Act, further amended in 2001. Current policy as embodied in the Telecommunications Act of 1996 and the Telecommunications amendment Act of 2001 support competition enablers.

The Telecommunications Act of 1996 sets out the different telecommunication services that can be provided. There are three broad categories: services that are freely competitive and that can be provided without a service licence, services that are freely competitive but which do require a licence to be granted and services for which licences can be applied for

only in response to an invitation to apply issued by the Communications Minister. Licences are currently granted in certain distinct categories based on the nature of the technology.

The market is segmented into seven main licensing and operating categories: Public Switched Telecommunications Networks, Land Mobile Networks, Under-serviced Area licences, Value Added Network licences, Private Telecommunication's licences and Paging and Trunking services which require only radio licences.

The period from 1996, when Telkom was licenced, to 2006 when the Second Network Operator (SNO) should at last begin operations, should therefore be regarded as a specific era that is coming to an end. As well as the licensing of the SNO, a third operator, Sentech, has begun to offer multimedia services to some subscribers. The growing number of competitors found amongst VANS, ISP's, VoIP operators, Least Cost Routing (LCR) operators and Wireless operators are clear signs that the industry competitive space is changing.

3.3 Telecommunications liberalisation in South Africa

The Independent Communications Authority of South Africa (ICASA) regulates the telecommunications and broadcasting industries in South Africa. The BMI South Africa Telecommunications report for quarter one of 2005 states that ICASA came into being in July 2000, following the merger of the telecommunications Regulatory Authority (SATRA) and the Independent Broadcasting Authority (IBA). ICASA is permitted by the Telecommunications Act 1996 to regulate on any matters which may be prescribed by regulation, including ensuring universal service, setting licence conditions, licensing operators, approving telecommunications equipment and safeguarding the rights of consumers.

The South African policy and regulatory environment also include the Department of Communications (DoC) and parliamentary portfolio committee who together with the Minister of Communications, have primary responsibility for policy making. A fundamental problem with the current regulatory structure is the joint jurisdiction that the Minister of

Communications and ICASA has over both core regulatory and licensing functions.

Historically, telecommunications services were provided by the South African Posts and Telecommunications (SAPT), which was a classic post, telephone and telegraph monopoly (White, 2003:3). It was classified as a "state business enterprise" and operated out of the office of the Minister of Transport and Communications. In 1991 the posts and telecommunications functions of the SAPT were separated and the telecommunications arm of SAPT was corporatised. The new entity was called Telkom SA Limited (Telkom) and the state was the sole shareholder.

White (2003: 3) goes on to state that in 1993, the year before the first democratic elections, the government granted two mobile cellular licences to Vodacom (in which Telkom has a 50 percent stake) and to MTN (a consortium made up of M-Net (the pay-TV broadcaster), Cable and Wireless, Transtel (the telecommunications arm of the transport parastatal) and a grouping of black business people.

After the 1994 elections, the new government set to work re-regulating the telecommunications sector. In 1996 the Telecommunications Act number 103 of 1996 was passed. The Telecommunications Act was amended in 2001 and included items not accommodated in the 1996 act. These carry-over items sought to address multiple objectives and attempted to address convergence, satisfy multiple stakeholders, appease the mobile community, encourage investment, and protect minorities and disadvantaged users.

The era of industry convergence means that you can listen to the radio over the Internet, send an e-mail message from a cellphone and shop on the television set. Government responded to the convergence of the broadcasting, telecommunications and information technology sector by hosting a colloquium on convergence policy. This culminated in the draft Convergence bill. The bill acknowledges the need to restructure the market and licensing regime to better accommodate converging and liberalising markets. The bill proposes a move away from the current licensing system based on the nature of the technology to a system based on the nature of the service being offered.

The draft Convergence bill separates the telecommunications and data market into four layers, the content provider tier, service provider tier, network provider tier and the infrastructure provider tier. The draft Convergence bill identifies seventeen principal objectives including universal provision of communication services and connectivity for all, encouragement of investment and innovation, and promotion of competition.

On 2 September 2004, communications minister Ivy Matsepe-Casaburri announced liberalisation measures unparalleled in the South African telecommunications history. The decades-old telephone monopoly ended on 1 February 2005 with the removal of the restriction on voice over Internet protocol (VoIP) transmission (Joslin & Goldstuck, 2005:8). This implies the removal of monopoly on retail voice services and the introduction of competition into the sector. For the benefits of the February 2005 reforms to be realised, a fair playing field will be required that facilitate the entry of new entrants to compete in the new markets effectively.

3.4 Regulations and competition

The experience with competition in regulated industries generally shows a strong tendency for both politicians and regulators to prefer selecting and managing competitors than promoting an open competitive marketplace, thereby creating a comfortably closed market for the chosen "competitors", not the open one intended by competition policies (Melody, 2001b:15). This tends to lead to duopoly/oligopoly behaviour and the establishment of very high artificial barriers to entry for any new players. Recognising the dynamic nature of telecommunications technology and service opportunities, it is important that the barriers to entry be minimised and the door to competition be opened.

Telecommunications policy objectives have not changed significantly in recent years. Rather changing circumstances have made it clear that the old models for implementing the objectives - public service monopoly or regulated private monopoly - were not functioning well and would have to be updated (Melody, 2001b:24). A new model of telecommunications regulation focusing on competition as a fundamental tool for achieving both economic and social objectives will achieve the desirable changes.

Licensing, enforcement of licence obligations, rate rebalancing and review, interconnection rules, accounting standards and frequency allocation all normally require a significant degree of regulatory oversight - at least until fair competitive market rules are firmly established (Melody, 2001b:335).

Integration of digital services will require significant reassessment of how services should be classified for regulatory purposes. Distinctions between "basic" and "value added" may not hold, as more and more "enhanced" features such as store and forward and subscriber interactivity become essential features in the most fundamental communication links (Melody, 2001b:345). Similarly, "mobile" and "fixed" technologies will increasingly be mixed on integrated networks. Perhaps most significantly, the changing landscape of local interconnection with multiple operators providing different combinations of the same integrated voice; video and data services will require a significant overhaul of pricing and interconnection rules. Internet telephony will force this issue as local operators lose the ability to determine the quantity and type of "calls" that enter their networks.

3.4.1 Network infrastructure facilities

South Africa's prohibition of facilities-based infrastructure competition is severely undermining the viability of a thriving service-based VANS market (Gillwald & Esselaar, 2004). The Telecommunications Act requires ICASA to prescribe guidelines relating to facilities leasing agreements. These guidelines are critical given the fact that Telkom (and soon the SNO) has exclusivity over the provision of public switched telephony services and over the provision of certain telecommunications facilities, thus making it difficult for telecommunication service providers to obtain facilities from other suppliers.

International experience suggests that the introduction of resale and self-provision of facilities by service providers and other network operators requiring fixed links is unlikely to threaten the revenues of incumbent operators (Gillwald, 2003:39). While some self-provisioning may occur, by and large it is not cost effective for other operators and service providers to self-provide and service providers are typically more concerned with accessing incumbents facilities at cost-based prices. With the correct market incentives and

regulatory framework, the network operators can be induced to encourage access to their networks and facilities and increase the wholesale aspects of their business, avoiding the unnecessary duplication of infrastructure and creating strong revenue streams, thereby supporting new entrants (Gillwald, 2003:39).

According to ICASA any operator may self-provide facilities, as long the equipment they purchase is from a registered ICASA equipment supplier. However, the 1996 Telecommunications Act states that only fixed line operators have rights-of-way in terms of laying down telecommunications infrastructure in South Africa (Gillwald & Esselaar, 2004:31). Mobile operators can lay down fixed-line infrastructure for their own use, but are not fixed-line operators (that is, cannot sell access to these lines to retail customers). ICASA has recognised that the Act will need to be amended to be in line with the September 2004 directive on facilities self-provision. The ability of VANS operators to self-provide in the new dispensation will also mean that they need new licensing agreements.

The draft Convergence bill proposes positive measures to ensure entrants have access to essential facilities on reasonable terms (Collins, 2004:7). The draft Convergence bill stipulates that all network service providers in future could be obliged to lease their facilities to others on demand. Facilities providers would be obliged to lease facilities at wholesale rates to other operators according to the draft Convergence bill.

Mobile operators will then be at liberty to utilise any facilities providers for their fixed links or deploy their own fixed links. PTNs will be permitted to deploy their own facilities, and both will be permitted to re-sell their excess capacity (Gillwald & Esselaar: 2004:33). This opening-up should certainly have the effect of driving down wholesale prices, with knock-on benefits for retail customers. A range of low-cost services and applications not feasible at current bandwidth costs should become available. Longer-term positive impacts should include greater innovation in the sector, as bandwidth becomes a less scarce and cheaper resource, allowing the country to be more competitive in the global economy.

The current policy allows SNO to lease facilities from Telkom but SNO will most probably roll out its own infrastructure by employing newer technologies like fibre and wireless local

loop. SNO will most probably resell some of its backbone infrastructure to small players such as ISP's, USAL's, and VANS. The lack of clear regulations in this space will thus stifle competition but opportunities could be created for smaller VSAT operators.

The regulatory framework should not attempt to impose infrastructure construction where it is not viable. Such an attempt might actually result in less infrastructure competition in the long-term, not more (Kiessling & Blondeel, 1999:422). Unbundling should be limited to infrastructure elements, which are essential for reaching customers and/or enabling competitors to carry on their business, and which cannot be replicated by any reasonable means.

3.4.2 Interconnection

The regulatory body must regulate interconnection agreements, and generally this includes structuring the access of current infrastructure to new entrants (Kiessling & Blondeel, 1999: 425). To have a meaningful role on the market entrants require fair interconnection with the incumbents. Resale rates should be greater than interconnection rates for service providers and greater than interconnection rates for infrastructure operators. Startups must at least be allowed to interconnect at cost-oriented interconnection rates.

The regulatory interconnection framework has a considerable impact on competing operators' incentives to enter the market as resellers or service providers or infrastructure-based operators. The new entrant's incentives to invest in own infrastructure versus leasing transmission capacity is affected by the prices for resale, the termination and origination charges that service providers have to pay, and the interconnection prices that infrastructure providers have to pay. Local interconnect - interconnection of a new entrant at the local switch level of the incumbent, as opposed to regional or long distance switch interconnection, reduces the new entrants' variable (per minute) interconnection costs substantially (Kiessling & Blondeel, 1999: 425).

The Telecommunications Act of 1996 requires ICASA to prescribe guidelines relating to the form and content of interconnection agreements and generally this includes structuring the

access of current infrastructure to the new entrants. The Telecommunications Act of 1996 and subsequent regulations require the public operators in the market to interconnect and have an interconnection agreement concluded.

The interconnection guidelines, established by ICASA three years ago, are now generally accepted by industry and policy makers alike, as a legitimate framework for fair competition (Neilson & Hurst, 2004:10). The interconnection regime will grow more complex with additional players entering the market in the form of the SNO, USAL's, Sentech and potentially VANS. The new entrants will however require more support to bargain with strong established operators.

While new interconnection guidelines have been established for under-serviced area licencees, revision of the broader interconnection guidelines should be undertaken. As envisaged in the supplementary guidelines for USAL interconnection, asymmetrical termination charges for national long distance services is designed to enable new operators to win market share without extensive capital on facilities (Finnie *et al.*, 2003:177). Extension of asymmetric pricing principles for all new entrants and across all operators declared as major operators should be considered. The Ministerial determinations of 3 September 2004 allow VANS to offer Voice over IP (VoIP) to retail customers in competition with Telkom, the SNO and mobile operators. The existing interconnection framework will consequently have to be re-worked.

Interconnection agreements are important from a legal perspective and a cost/revenue perspective (Fricke, 2005:106), and often determine the extent of competition and successful entry of new players.

3.4.3 Local loop unbundling

Over the past few years, most of the developed world has been asking incumbents to share their networks with rivals, technically known as "local loop unbundling". Local loop unbundling and open access are effective tools to increase competition. The unbundling of local loops remove significant barriers of access to markets (Reynolds, 2001: 21).

How best to promote competition over the "local loops"- the wires that run from telephone exchanges into homes and offices - is by far the most controversial topic in telecommunication regulation (Economist: 2003). Ideally, competitors would put an end to the incumbents' local loop monopoly by building their own networks. But building a competing network with the same reach is expensive and time-consuming. By allowing competitors to lease or resell lines, regulators have been able to foster competition in both telephony and broadband access.

If third party service providers cannot get access to incumbent local loops, it makes it difficult to establish a competitive access market (Finnie *et al.*, 2003:176). Local loop unbundling is one of a range of options available; others include shared access, bit stream access and wholesale digital subscriber line services. Local loop unbundling is the most desirable because it enables service providers to innovate on price and product features (Finnie *et al.*, 2003:176).

The introduction of local loop unbundling will require legislative amendment in terms of its current prohibition within the first two years of an operational fixed line duopoly. However, shared access is mandated under existing facilities sharing rules and could be a compromise position.

The unbundling of local loops is biased towards service-based competition whilst it creates barriers to entry for infrastructure-based competition (Kiessling & Blondeel, 1999: 425).

3.4.4 Carrier selection

Carrier selection is a crucial enabler as it allows consumers to pre-choose their default traffic carriers (Neilson & Hurst, 2004:10). Innovative regulatory rules can enable healthy infrastructure competition such as employing a numbering policy to promote smaller entrants. Policy measures, which could achieve this, include infrastructure rollout obligations by rewarding the operator with a short 1-digit carrier selection code as opposed to a longer 4-digit access code, which in turn confer upon the operator interconnection cost advantages.

3.4.5 Number portability

Number portability is the ability to change your service provider, service or location without changing your number. The type that occupies regulators most is service provider portability because this is the type that affects competition. Number portability between service providers are found in markets were there is competition. At present this is only the mobile market but when further liberalisation occurs it will apply also in other markets such as fixed geographic and non-geographic telephony.

Significant price reductions were observed amongst mobile operators in Hong Kong when the decision was taken to licence additional operators and introduce number portability. South Africa already has a requirement in the Telecommunications Act for number portability to be implemented in 2005. Current policy indications are that number portability will only be introduced during 2006 but it will only lower entry barriers for the SNO and hold no significant benefits in debated form for smaller operators.

3.4.6 Fixed – Wireless Services

The formulated policy and regulations are technology-neutral and thus allow new entrants to employ any type of technology to provide a service (Machanick & Neilson, 2004:3). This is of significance to service providers who will be allowed to create local access networks who can now use less expensive wireless technologies to reach customers. The fixed and mobile Internet worlds are colliding in terms of access technologies. Using GPRS or 3G data technologies, it is already possible to access the "fixed Internet" wirelessly. In this context, the fixed Internet becomes the mobile Internet without a need to adapt the content or the user experience. Fixed-wireless technologies bring down the cost of service delivery. Although this offers limited roaming (to a specific area), it is clearly acknowledging that wireless technologies are more effective in dealing with universal service (Hodge, 2003).

3.5 New industry players

Liberalisation is slowest in basic services. Commonly competitive entry is allowed first in "fringe" services such as mobile services (cellular, paging, trunking), value added services, closed user groups or private networks, very small aperture terminal satellite services, teleports and terminal equipment (Melody, 2001b:335). Competitive entry in any basic services, i.e., plain old telephone service, is still relatively rare throughout the world.

Telecommunications incumbents have been facing competition from non-traditional sources, including as a result of technological substitutions, such as VoIP, e-mail and wireless services.

Smaller entrants will mostly benefit from the decision to liberalise access to the incumbents' local networks. The smaller entrants will also enjoy success in this rapidly growing industry driven by technology innovation. Leo Grey, an Australian media lawyer formerly with the Australian Broadcasting Tribunal, stated, "there is very little point in having any detailed structural rules for regulating ownership and control, the only objective that seems capable of being realistically pursued is the encouragement of real competition" (Grey 1992, 22). According to Gillwald (2001) competition induces suppliers to become more efficient and offer a great variety of product choices to beat their competitors, and at prices lower than those of their competitors.

Telecommunication regulation will evolve as the pressure to reduce the cost of communication drives more liberalisation. Market forces having attained a position of power will result in legislation changing. The South African industry is experiencing a number of new industry players, in the form of USAL's, increased entry of ISP's and VANS, Sentech, wireless access entrants and many others.

3.5.1 Under-Serviced Area Licences (USAL's)

New carriers invariably choose to operate in a smaller unserved market rather than compete with an incumbent in a larger market. Government decided to grant USAL

licences to dedicated providers who could make a business of serving sparsely populated areas and outlying areas.

The USAL licences offer an opportunity for SMME's or a co-operative to gain a foothold in the market (Neilson & Hurst, 2004:12). The USAL's will receive startup and operational funding from the universal agency and can use any technology to provide services. These small operators are entitled to offer facilities to VANS operators, PTNs and mobile operators in their areas, and to offer voice services. November 2004 saw the licensing of 4 USAL's by ICASA, with three other USAL's getting provisional licences. To help them along the Universal Service Agency (USA) will offer them a subsidy of R15 million over the first three years of operation. The SMME objectives of the USA include the licensing of 27 under-serviced areas.

The USAL licences seemed like a good idea eight years ago but in the four years it took to promulgate legislation and the further four years to implement it, cellular technology has completely leapfrogged the concept. Between the major cellular networks 98 percent of the country is covered and many rural citizens have taken to pre-paid cellular technology as the only viable communication option. Policy initiatives such as the Under-serviced Areas Licencees have the potential to bring SMME's particularly those from historical disadvantaged communities into the sector, but they will require a far more supportive regulatory, licensing and tax regime than they currently enjoy (Gillwald & Esselaar, 2004:39). If, however, they are entrepreneurial and support the initially financially draining start up process with other services they could be successful.

3.5.2 Value Added Network Services and Internet Service Providers

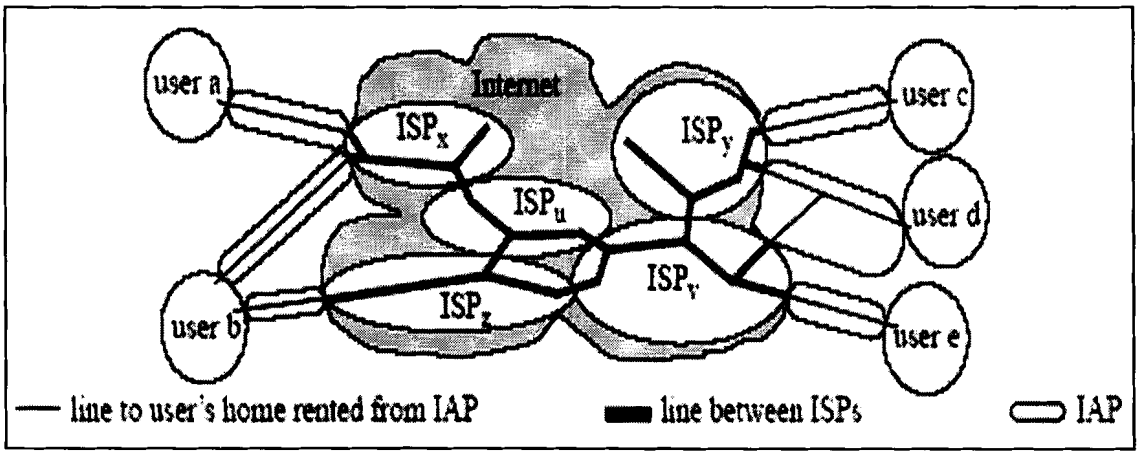
The government licenced VANS in an effort to open the market for more competition in the provisioning of data services. There are currently 320 VAN operators and approximately 250 ISP's (World Wide Worx, 2004). The liberalisation of the telecommunications market will grow the VANS and ISP sector.

The VANS market value is R 3,3 billion (2004), not including Telkom's operations in this segment. The ISP and VANS market share forecasted for 2008 is set at R3.5 billion and recent estimates suggest that there are about 5.2million Internet users in South Africa (Neilson & Hurst, 2004:62). The typical services provided by the VANS are electronic data interchange, e-mail hosting services and managed data network services. VANS can only provide services by using Telkom or SNO infrastructure facilities.

The Internet Service Providers (ISP) market is reasonably competitive. There were estimated to be 250 ISP's that provided digital leased-line services in 2003 (Goldstuck, 2004). Most ISP's operate with a temporary VANS licence with a significant amount of regulatory greyness surrounding them. ISP's are the intermediaries between the providers of telecommunications infrastructure and the Internet users.

The service-provisioning layer of the market in which the ISP's compete is expected to experience the largest set of competitive dynamics in the future (Gillwald & Kane, 2003). The fact that ISP's may carry voice services such as VoIP will stimulate the demands for the development of Internet-related business and consumer applications such as e-commerce. The Internet is a dynamic network whose topology is steadily changing. The topology of the Internet, as shown in figure 3.1, is determined by the interconnection between ISP's and users.

Figure 3.1 - Internet topology



Source: Altmann and Varaiya, (1999:2)

The ISP and or VANS market segment should soon see further dramatic growth as a function of the Ministerial policy directives of September 2004, which took effect in February 2005. These directives permit VANS to offer voice services and to acquire their facilities from providers other than Telkom and the future SNO. Simple resale of voice and data services by ISP's could be provided on a regulated cost plus basis for basic services such as voice minutes and the provision of leased lines (Finnie *et al.*, 2003:176). The regulations must however allow ISP's to engage directly with retail customers, and the regulations must provide numbering resources to ISP's and VANS.

VANS including ISP's are not yet allowed to install their own network infrastructure. The current Telecommunication regulations do not allow interconnection between incumbent telecommunications operators and the new generation of ISP/VAN providers. VANS interconnection with incumbent operators could allow the incumbents to sell, cede, sublet or relinquish control of spare capacity on their networks.

3.5.3 Mobile Virtual Network Operators (MVNO)

Competition from a new set of operators, mobile virtual network operators (MVNO), could be encouraged if regulations permit it. MVNO's could provide all the service currently provided by the mobiles by leasing infrastructure and buying minutes at wholesale rates to be resold to retail consumers (Finance Week, 2005:38). The MVNO concept is well-proven in Europe and allows customers additional choice without incurring expensive infrastructure build investments.

3.5.4 Second National Operator (SNO)

The SNO has been delayed for over two years due to the failure to find a strategic equity partner. South Africa's government confirmed that Tata Africa has been awarded the final 26 percent stake in the SNO. The SNO shareholder agreement was signed in August 2005 and should be licenced during the last quarter of 2005. Some indirect business opportunities will be created for SMME's when the SNO becomes operational and start to focus on wholesale facilities provisioning, leaving opportunities in the resell business.

3.5.5 Sentech

Telkom's monopoly on access to the international data gateway was broken in 2002, with the granting of multimedia and international "carrier-of-carrier" licences to Sentech (Gillwald & Esselaar, 2004:15). Sentech was licenced in 2003 permitting them to carry third-party traffic internationally and, together with its multimedia licence, offer non-voice service directly to customers. Under its multimedia licence, Sentech is required to install a minimum of 8,500 Internet-connected computers in rural areas.

The company has struggled under a limiting regulatory framework and onerous licensing regime to get off the ground. The international gateway licence restricts the company by only being able to carry third-party traffic. In November 2004, Sentech has however announced a new broadband service built on its multimedia licence, and using fixed wireless as the delivery platform.

3.5.6 Least Cost and Call Back Routing Operators

Least cost routing (LCR) is a concept that, as its names implies, route telephony calls over the cheapest route. The industry had good growth stimulated by the incentives that cellular operators offered LCR providers for each account they attracted. The industry is worth R2 billion per year (Finance Week, 2005). Regulations on LCR are non-existent and intelligent call routing found in customer premises equipment will see companies install international leased circuits to facilitate automatic call back routing for international calls. This will see the entrance of players focusing on LCR and call back operations. Players similar to the likes of Orion Cellular, Autopage and Nashua will enter the market and form alliances with ISP's and VAN's to provide converged services. Least cost routing is however losing market share because of the legalisation of VoIP.

3.5.7 Provision of public pay phones

From February 2005 any individual will be able to apply for a pay phone licence. Setting up community phone-shops in under-serviced areas have been very successful, created and

aimed at promotion of SMME's. While small public-access phone operators have burgeoned in the absence of widespread public access in the country, the prices charged by such entities are exploitative (Gillwald & Esselaar, 2004:33).

3.5.8 Cellular Service Providers

The mobile network providers do not retail to the public but instead wholesale network access to a group of service providers. These providers in turn offer retail outlets to access customers; they stock and sell the phones and perform credit checks, link the customer to the network and perform all billing and debt collection.

3.5.9 Wireless Application Service Providers (WASP's)

Technological advances also lead to the creation of new WASP's startups in the cellular industry. There are now almost 200 WASP's operating in South Africa. These companies provide bulk SMS carrier services, ringtones, personalisation purveyors, picture messages and community-based services, such as eBlockwatch. The most pressing need for these smaller startups is a clear legal and regulatory framework. The WASP's compete with the bigger networks in areas such as content and location-based services, but at the same time they are dependent on the networks to carry their applications (Finance Week, 2005).

3.5.10 Municipal Networks

A global trend as reported by ITWeb Market Monitor (2005), is the phenomenon of cities deploying broadband networks for internal use and for shared use with residents. Over 600 cities worldwide have embarked on broadband self-provisioning. Knysna has boundary-to-boundary coverage, Cape Town has a large mesh network, Tswhane has rolled out 45km of fibre and already has 4Mbps broadband into home test sites. The City of Johannesburg completed their "Broadband Roadmap" and installed a PTN successfully. Regulatory obstacles are par for the course all over the world and the same is true in SA. Many of SA's cities are directly involved with the 2010 Soccer World Cup and believe that the event could yield long-term advantages in terms of broadband re-use for residents of those cities.

3.6 The draft Convergence bill

The draft Convergence bill is designed to replace the Telecommunications Act of 1996. The new bill seek to deal with convergence of voice, video and data and make the industry easier to regulate and easier for companies to comply and open up the industry to a wider range of less expensive services.

The strategic objective of the Convergence Act is to position South Africa as a leading environment for ICT services by encouraging much more vigorous competition. The Convergence Act will create a more fertile environment for VANS and ISP's that believe that the current regulatory environment is making it difficult for them to meet all of their business goals, such as offering flat rate Internet access without any dial-up charges. The bill will create a completely new licensing framework.

The draft Convergence bill will separate the telecommunications market into four layers, the content provider tier, service provider tier, network provider tier and the infrastructure provider tier. The bill anticipates amongst others the following policy goals:

- the promotion of an innovative and responsive sector through the development of broad and diverse service offerings;
- a competitive manufacturing and supply sector;
- the promotion of competition;
- investment and stability in the sector, and
- encouraging a diverse shareholder base through the promotion of SMME's and historically disadvantaged groups and individuals.

For nearly a decade South Africa has articulated a vision for itself of an information society inclusive of all its citizens, participating in the network economy with the associated developmental dividends (Gillwald, 2003:5). This remains the challenge South Africa faces as it forges a forwarding-looking and enabling convergence framework. This will require a change in the current market structure with its emphasis on vertically integrated network operations, distinctly regulated along technological lines, toward a more horizontal market design.

A new licensing regime that reflects this new horisontal market structure will need to be devised through the introduction of separate network, applications and services and content licences, some of which may require nothing more than a registration. In the longer term this will move the regulatory regime from the traditional economic regulation of the sector to a potentially less regulatory resource-intensive competition regime.

Henten *et al.*, (2002) have developed a useful framework, table 3.1, to understand convergence.

Table 3.1 - Industry convergence

	IT	Telecom	Broadcasting	Other media
Content/ services	Software based content	Telecom based services and content	Broadcast programs	Film, music, newspapers, etc.
Transport/ software	Generic software	Network services	Transmission	Cinemas, video rentals, etc.
Equipment/ hardware	Hardware	Telecom equipment	Broadcast equipment	Reproduction of films, printing, etc.

Source: Henten, Falch and Tadoyini, 2002

Integration of the IT, telecommunications, broadcasting and other media sectors has largely been evidenced in the equipment, infrastructure and applications layers. That is to say a single piece of customer equipment can be used increasingly for data, telecommunication and video services.

Convergence of services on packet switched digital networks will culminate in effective competition enablers for SMME's such as VANS, ISP's and WASP's wishing to provide more enhanced value add services to customers.

3.6.1 Global phenomenon

Convergence has emerged as a global phenomenon as a result of digitisation, which has allowed traditionally distinct services to be offered across interchangeable platforms

(Gillwald, 2003:5). These technological trends have been accelerated by the liberalisation of markets allowing for the development of global digital communication networks offering multiple services across national borders. The technological and economic drivers of digitisation and liberalisation thus drive convergence. At the heart of convergence is the discovery that all information – sound, pictures and raw data - can be converted into digital format and reassembled intact somewhere else. Radio programs broadcasted over airwaves are now converted into digital form and streamed over the Internet and Internet users play movie clips over the Internet whilst television sets have become computers.

While convergence most commonly refers to the integration of the previously distinct industries of Broadcasting, Telecommunications and Information Technology, it is also evident within industries themselves such as the convergence between mobile and fixed telecommunication services. Institutions such as the World Trade Organisation (WTO), the International Telecommunications Union (ITU) and the International Commission on Names and Numbers (ICANN) are determining, with different degrees of formality, the rules for global convergence and participation.

Today networks carry three types of information, namely voice, data and video. The telephone network delivered voice, the Internet, VANS and private corporate networks provide data services and the broadcasters' video services. The telephone network used copper wires to reach subscribers and broadcasting used airwaves, with advances in technology these formerly distinct content types can now be carried by any delivery platform (Finnie *et al.*, 2003:2). Internet protocols are sufficiently flexible to overcome the boundaries between voice and data and other services.

Convergence is most evident at the level of content, for example provision of news content across newspapers and, or television and on a website and services such as Internet offered over telecommunications networks. The effect of the convergence of services and content means that there is likely to be greater competition, providing consumers with greater choice on price and quality between services offered across different platforms.

Convergence will create new markets and new efficiencies because services are no longer locked into specific forms of infrastructure. Global regulatory and technological trends are demanding a rapid migration towards open markets. Technological convergence has outpaced regulatory changes.

3.6.2 Broadcasting and telecommunications

Convergence between broadcasting and telecommunications has been driven by technology, and by the digitalisation of content. Most importantly, a variety of new technologies have made it much easier to deliver digital entertainment (video, audio and games) via the Internet (Finnie *et al.*, 2003:2). These technologies include new digital compression schemes, video and audio streaming, and broadband access networks. Emerging technologies, such as wireless home networking, will strengthen the trend. These technologies have in turn enabled service providers to create and offer residential broadband services, one of the most striking success stories of the past two years in telecommunications. In high-income countries, average penetration of broadband is already over 10 percent of households, and will reach 25 percent or more by 2007 (Finnie *et al.*, 2003:2). This major change is the main driver for convergence between broadcasting and telecommunications.

3.6.3 Fixed and wireless

Technology advances are also driving convergence between fixed and wireless communications (Finnie *et al.*, 2003:3). This will be driven less by technology convergence and more by convergence of commercial business models and the content itself. Fuelled by more commercial success, we will see many established and influential content players become serious about their mobile content offerings. In the long-term, convergence between broadcast services and mobile communications will also impact the way people consume content. It is possible to envisage a time when almost all broadcast services will have an interactive element. The real source of convergence is between the wireless industry and other parallel industries like entertainment, news, imaging, Internet services, and a wide range of content businesses.

3.6.4 Voice and data

Convergence between voice and data networks is perhaps the major driver for change in the global fixed telecommunications market (Finnie *et al.*, 2003:4). By integrating voice and data into a single corporate backbone, enterprises are, like operators, achieving operational efficiencies. New services arising from convergence are expected to be profitable for operators due to internal operational cost savings, but also their greater sophistication. In the consumer market, uptake of interactive content depends on a transport infrastructure that supports differentiated, high fidelity delivery. In the business market, future profit margins are linked to operators' ability to prioritise network traffic by type, time of day and also by individual user. The ability to allocate different classes of service according to different business activities is highly prized.

3.7 Telecommunications technology changes

Technology is also bringing dramatic change to the industry (Burgelman *et al.*, 2004:311). The three main trends currently driving the telecommunications industry are wireless, broadband, and as discussed, the convergence of voice, video and data.

These technological developments, together with the liberalisation of markets are critical to the development of effective modern economies.

3.7.1 Internet Protocol (IP) and Internet communications

The fact is that no regulations have had such a significant impact as the Internet, which has transformed the communications world - something lawmakers didn't anticipate in 1996. The Internet also is poised to drive down long-distance prices as more voice conversations are converted into digital Internet protocol packets and transmitted at a fraction of today's cost (Holstein, 1999). The information superhighway is transforming today's broadcast media and communications into a range of interactive audiovisual shopping, entertainment and information services for business and consumers.

All the world's communications, data, video and voice are inexorably moving to software driven packet-switched and in particular Internet Protocol-based networks (Joslin & Goldstuck, 2005:48). The Internet stands on the brink of making the entire functionality of the telephone company obsolete. The Mobile operators have migrated to 3G (third generation), the result is an all IP network. Handsets will receive and send IP communications including VoIP.

The Internet architecture can support all types of applications, data, voice, music, video, movies, instant messaging, e-commerce and so on. This is why the Internet architecture is much better suited to support the digital economy and the Information Society. According to the Economist (October 9th 2003) Internet traffic has roughly doubled every year.

IP enables video to be delivered over the Internet in various formats, such as multicast video, streaming video, video on demand and related music or audio services. More and more video is now delivered to consumers in digital format, and content delivered over the Internet via legitimate and illegitimate (peer to peer) networks are all helping to increase rapidly the proportion of content that is delivered in digital format (Finnie *et al.*, 2003: 15).

Growth in the South Africa Internet market exceeded 10 percent during 2004, and growth forecasts indicate that the uptake will surpass the 20 percent mark in 2007, as shown in table 3.2.

Table 3.2 – Internet user forecast

	2001	2002	2003	2004e	2005f	2006f	2007f	2008f
Internet Users ('000)	2,550	2,800	3,800	5,200	7,400	9,000	11,100	13,000
Internet Users/100 Inhabitants	5.7	6.2	8.4	11.4	16.1	19.5	24.0	28.0
Broadband Internet Subscribers ('000)	0	0	5	50	400	900	1,450	1,800
Broadband Internet Subscribers/100 Inhabitants	0.0	0.0	0.0	0.1	0.9	1.9	3.1	3.9

Source: BMI's South Africa Telecommunications Quarter 1, 2005 report

The anticipated opportunities to gain from interactive services have stimulated the communications, computer, entertainment, retail and other industries to invest and restructure in order to capitalise on the demand for the services (Kangis & Rankin, 1996:44).

Multimedia services have also received international attention from regulators because they can stimulate an industry to build the communications infrastructure, which many believe is needed to become or remain economically competitive in the information age.

There is widespread agreement as to the importance of interactive media (Cohen, 1995). There is a belief that incremental revenues will be derived as a result of selling the entertainment and information content and in transporting and transforming data to and from customer and provider, as outlined in table 3.3.

Table 3.3 – Multimedia

	2001	2002	2003	2004e	2005f	2006f	2007f	2008f
PCs ('000)	3,000	3,400	3,900	4,650	5,500	6,300	6,960	7,600
PCs/100 Inhabitants	6.7	7.5	8.6	10.2	12.0	13.6	15.0	16.3
TV households ('000s)	6,400	6,500	6,600	6,650	6,700	6,725	6,800	6,860
Pay-TV subscribers ('000s)	1,057	1,045	1,040	1,042	1,049	1,060	1,090	1,110
Pay-TV subscribers/100 inhabitants	2.4	2.3	2.3	2.3	2.3	2.3	2.4	2.4

Source: BMI's South Africa Telecommunications Quarter 1, 2005 report

One of the primary motivations for market development is the wish to increase revenues derived from the various communications networks, which are already in consumers' homes and in offices and set for further growth.

It is also believed that the new interactive media will provide retailers with alternative communication methods with their potential customers in audiovisual form (Kangis & Rankin, 1996:44). The availability of new broadcast media opens up the possibility for new forms of advertising, which would target specific segments and even individual consumers. There is no reason why, in time, the advertisements received in each home will not be

determined individually by choice or by some combination of characteristics of the occupant. The proposed home shopping services might eliminate the need for a trip to the shop and thus reduce the costs associated with the retail operation. These electronic media will also allow the retailer to record browsing, casual interest and buying patterns of customers, providing further insights for future marketing communications, pricing and product requirements.

The major suppliers have recognised that service development will stimulate a closer integration between traditional telecommunications industries, entertainment providers and computer markets since the interactive nature of the new services will be made easier through this link.

3.7.2 Wireless

Once wireless technology is capable of transmitting data at broadband speeds, wireless will be the quickest way to blanket neighbourhoods, cities and countries with broadband access (Economist, 2003). In South Africa there is already a big drive to equip gated communities with wireless access networks. The mania for WiFi, which provides Internet access within a short distance of a base-station, offers a glimpse of this future. But it will be new wide-area wireless-broadband technologies that will form the basis of the new wireless local loops.

For smaller operators wireless provides an opportunity to reduce and even do away with the excessive network access fees they must pay to access the local loop of incumbents. Small operators in the US like Teligent, Nextlink and a few other local carriers have had much success with fixed wireless, mostly in linking office buildings (Woolley, 2000:135). The need for consumer mobility is another key driver why wireless access technology will get so much attention in years to come. Newly licenced wireless access providers are driving the improved performance of notebooks to make it an attractive alternative to desktops.

Wireless GSM technology has also changed the face of telecommunications in SA and the country has become one of the most important cellular markets outside Europe. Once the pre-paid model was established, the previously disadvantaged group took to the service. The plethora of high speed wireless access technologies such as WiFi, WiMax and 3G that are cheaper to deploy, upgrade and manage than cable infrastructure is leaving a possibility of new players in the telecommunications industry.

3.7.3 Voice over Internet Protocol

A number of companies have been started to exploit the cost advantage of Internet telephony (Burgelman *et al.*, 2004:313). An Insight Research study reports that VoIP revenues are about to explode within five years, with VoIP revenues growing from $13 billion worldwide in 2002 to nearly $197 billion by 2007, a figure that would make packet-voice services one of the fastest-growing segments in telecommunications.

Since the start of 2005, all eyes in South African telecommunications are on VoIP, due partly to its deregulation on 1 February 2005, and due to the vast promise it holds for reducing communications cost. Voice communications using Internet standards will be the fastest growing technology application among South African corporations in 2005. More than half the organisations interviewed by World Wide Worx for the VoIP in SA 2005 survey intend to use VoIP for the first time this year – on top of a third that are already using the technology.

In July 2001, Cisco, a network-equipment manufacturer, announced that it had shipped its two millionth VoIP telephone. Shipping the first million took three-and-a-half years; the second million sold in less than a year (Economist, 2003). VoIP bring along a myriad of new startup communications operators, like Fastweb, Yahoo messenger, MSN messenger, Skype, Packet8, SIPphone, VoicePulse, ETphone and many others. In SA there are many ISP operators offering the service, some of the better-known names are Orion Telecoms, Storm, Internet Solutions, MTNNS, MyTel and Bytes.

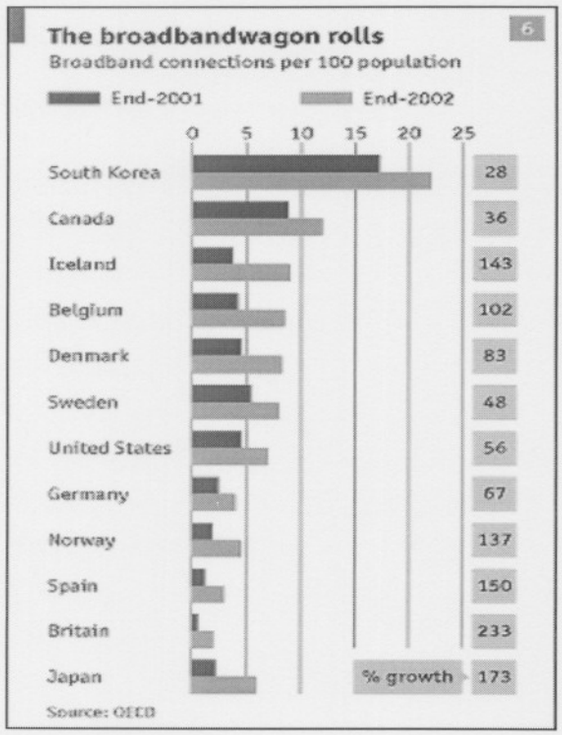
3.7.4 Broadband

The draft Convergence bill defines broadband as 'a high capacity link between end user and access network suppliers, capable of supporting full motion, interactive video applications, based on the technology available at the time'.

The dramatic growth in data traffic is driving the growing demand for broadband (Burgelman *et al.*, 2004:314). The arrival of broadband service helps ensure that video, voice, data, music, and images will be sent through the Internet.

The world is witnessing a broadband, fixed and wireless rollout on a global scale as shown in figure 3.2.

Figure 3.2 - Broadband take up



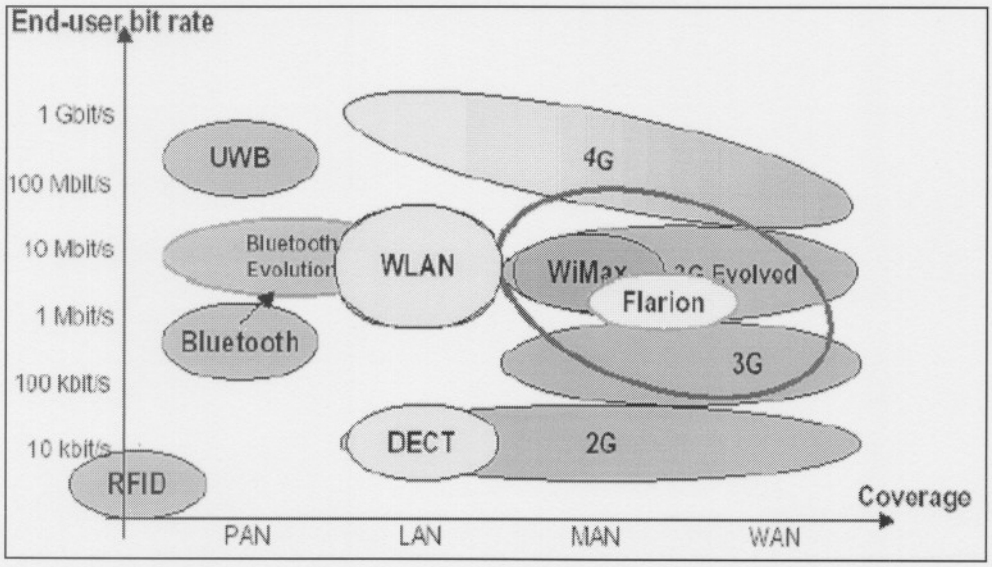
Source: Economist, 2003

With thousands of high bandwidth access networks feeding into fewer metro networks and these flowing into even fewer national wide backbones it is clear that as the traffic

increases with broadband access the national backbones need extremely high capacity. Wireless technologies have seen the most rapid expansion in capability over the last few decades. They now compete with fixed-line technologies in many areas. It is anticipated that the big story over the next few years will be the deployment of wireless broadband. The new Wireless deployment includes 3G, WiFi and WiMAX. All these are based upon IP, are always on and are packet-switched. The equipment is much less expensive, it is non line of sight, the resident can erect it, no truck lifts are needed and the kit is smaller (Joslin & Goldstuck, 2005:48).

Figure 3.3 depicts the coverage areas for wireless technologies. For personal access networks, there are Bluetooth, UWB (ultra wide band) and RFID (radio frequency identity), as well as infrared. UWB is expected to provide 100mbps to 1Gbps over 50 meters for local area networks (LANs). Wireless LAN using WiFi has shared bandwidth of 11mpbs to 54mbps. WiMAX could provide over 100mbps over a large LAN.

Figure 3.3 – Wireless technologies



Source: VoIP in South Africa 2005 IP Communications, World Wide Worx, January 2005

The world is experiencing competitive rollouts of broadband from cable, incumbent telecommunication operators, new operators like ISP's and even newer WISP's (Wireless Internet Service Providers). A new development is the recent emergence of broadband wireless and satellite Internet access.

The U.S. is experiencing the emergence of smaller data operators - startups that roll out services throughout the U.S. and partner with ISP's who bundle their broadband products with Internet Access (Burgelman *et al.*, 2004:315).

The last fifty feet also offer SMME opportunities. Once a carrier has brought broadband service to a large building, the company still needs to reach individual apartments and offices. Local area wireless technology addresses this problem. It operates without a licence, so equipment can be installed or moved without the slow process of getting regulator approval. Wireless devices will also be used within individual units to connect computers, telephones, printers, televisions, high-fidelity speakers and connections to the outside world. As a result of the shift from narrowband to broadband, Internet access revenues are forecast to grow from Rbn 2.5 to Rbn 5.8 in 2009 (BMI-T, 2005).

In South Africa demand is growing for always-on, high-speed Internet connectivity and available offerings are expanding. The promise is that it will enable greater volumes of data transfer at faster rates and therefore, better electronic communications. ISP's are entering this market to resell broadband services.

3.7.5 WiFi (Wireless fidelity) and WiMax

WiFi is a wireless LAN technology that operates on an unregulated frequency spectrum with a range measured in metres. Millions of people with laptops have realised that they were never really mobile until WiFi. WiFi 'hotspots' - the area of radio reception that provides the wireless access - are springing up in airports, hotels and restaurants across the world. Wireless notebook connectivity is based on WiFi and there is a strong push from Intel to drive the new technology into the market. WiFi and WiMax-enabled notebooks will enter the SA market in 2006 and will have Intel Centrino wireless LAN connectivity chips embedded.

Owing to the low cost of WiFi solutions and the willingness found in the regulatory environment to deregulate, WiFi could play an important role in expanding communications infrastructures (Finance Week, 2005). The mobile culture is contributing to higher

productivity, convenience, flexibility and a remaking of the workplace. The rapid spread of cellphone telephony and the inclusion of WiFi in new releases also provide the opportunity for the quick adoption of mobile broadband Internet.

The hottest new 802 protocol is WiMAX which is developing widespread support (Joslin & Goldstuck, 2005:81). One of the most significant supporters is Intel, which is manufacturing a series of chipsets. It is expected that WiMAX will offer something like shared 70Mbps over a 100 km range. WiFi and WiMAX, implies a commitment to IP communications. Users such as sales reps, field support, and mobile managers "dual-mode" phones, which can switch, possibly even seamlessly, between WiFi and cellular service will benefit from this technology. (Joslin & Goldstuck, 2005:81).

3.7.6 3G UMTS

The world's cellular mobile networks will be rolling out UMTS (3G) over the next few years. The mobiles are the dominant access networks and the deployment of 3G with its IP communications specification will make IP technology dominant. 3G offers broadband wireless connections for stationary users (Joslin & Goldstuck, 2005:11). The main attractions of a 3G network will be the higher bandwidths, high speed Internet connectivity, lower unit costs and a great many richer services (like video calling), which the operators believe will increase average subscriber revenue.

3G is a set of mobile technologies that will make use of high-tech infrastructure, networks and handsets to allow phones to deliver high speed Internet access up to 2 Mbps as well as features such as live video and CD quality music services. The introduction of 3G technologies will provide opportunities for development of a wide range of new value added services to be provided to end consumers by new players. Growth in telecommunications will come from data traffic, computer files, video, graphics and voice all translated into digital computer language.

3.7.7 Satellite communications

The relaxation of telecommunications regulations in recent years has made it possible to explore the introduction of satellite communications. The major boost to satellite communications within Southern Africa is allowing Value Added Networks to build client networks using the most cost-effective telecommunications components available on the open market. VANS can now deal directly with satellite companies, rather than having to buy the facility through Telkom (www.estrategy.co.za).

A revolutionary concept for telecommunications is having aircraft and balloons flying at twice the altitude of boeing 747 airliners to provide a telecommunications platform. In South Africa this concept is being explored by collaboration between the CSIR and the Gauteng Economic Development Agency (www.csir.co.za). These platforms can be compared to a big mirror in the sky, which sits at 21km. Signals are sent up to it and then reflected back to earth. Because it is high, its coverage area is quite large - about the size of Gauteng. One platform can provide 250 000 - 500 000 users with telephone facilities. The Indonesian Satellite Association has calculated that one platform can replace 400 cellular towers at 10 percent of the cost. These platforms are a new technology, which is gaining prominence and recognition worldwide.

3.7.8 Home networks and consumer electronics

Technical developments in the home are also becoming important. In advanced markets, customers buying broadband also typically buy a home network if they have more than one PC or use a laptop computer. These home networks are evolving, and it is beginning to become more common for home networks to enable content that is downloaded to a PC to be shown on a television set or heard via hi-fi and audio equipment. Many electronics companies (e.g., Philips and Toshiba) have commercially launched home products of this type, while telecommunications vendors such as Cisco are adapting PC home networking gear so it works with televisions and other devices (Finnie *et al.*, 2003:177).

In Japan, which has led the way with both data services and the introduction of 3G, the DoCoMo company state that they are already looking ahead for new sources of growth once 3G data services have become commonplace. The company is particularly optimistic about the potential for machine-to-machine communication over mobile networks (Economist, 2003). PCs, cars, home appliances - all could be attached to wireless capability. DoCoMo estimates that the number of devices in Japan, which might be linked in this way, exceeds the human population by a factor of five.

Home networks are rapidly becoming cheaper, easier to use, and capable of connecting any digital device. The all-digital home is rapidly becoming a reality (Joslin & Goldstuck: 2005:81).

3.8 The focus areas for big telecommunication operators

The most visible growth area is the continuing rise of mobile phones, which have overtaken fixed-line phones to become the most widespread communications devices on earth (Economist: 2003). Their number is expected to rise from 1.3 billion today to 2 billion by 2007, and they are being increasingly used to do much more than make phone calls, providing new opportunities for wireless operators and equipment makers.

The second trend is the growth of high-speed or "broadband" Internet access, which is booming in many parts of the world. This offers a valuable new market for fixed-line operators, once they have supercharged their existing telephone networks to make them broadband-capable (Joslin & Goldstuck, 2005:81).

A third promising area is in the corporate-telecommunications market. As large firms look for ways to cut costs and move operations overseas, many are adopting new Internet-based technologies that can interconnect regional offices cheaply and securely and allow voice and data to flow over the same network. Many operators are now overhauling and simplifying their tangled networks to ensure they can implement such "next-generation services" quickly and efficiently.

3.9 Summary

Today most developed countries including South Africa have introduced competition in the telecommunications market. Driven by technological developments, competition has come to dominate a market that was once a monopoly. Global regulatory and technological trends are demanding a rapid migration towards open markets as technological convergence has outpaced regulatory changes.

SA embarked on a 'managed liberalisation' process in 1994. The growing number of competitors found amongst VANS, ISP's, VoIP operators, Least cost routing operators and Wireless operators are clear signs that the industry's competitive space is changing.

Today we can listen to the radio over the Internet, send an e-mail message from a cellphone and shop on the television set; this is the era of industry convergence. Government responded to the convergence of the broadcasting, telecommunications and information technology sector by tabling a draft Convergence Act that is set to further liberalise the market. Convergence will create new markets and new efficiencies because services are no longer locked into specific forms of infrastructure.

The liberalisation of the telecommunications market holds immense promise for the VANS and ISP sector. Convergence of services on packet-switched digital networks will also culminate in effective competition enablers for VANS and ISP's wishing to provide enhanced value-add services to customers. The fact that ISP's may carry voice services such as VoIP will stimulate the demands for the development of Internet-related business and consumer applications such as e-commerce. Potential competition from a new set of operators, mobile virtual network operators (MVNO), is also imminent.

VANS interconnection with incumbent operators could allow the incumbents to sell, cede, sublet or relinquish control of spare capacity on their networks but the interconnection regime will grow more complex with additional players entering the market.

Technology is also bringing dramatic change to the industry. The three main technology

trends currently driving the telecommunications industry are wireless, broadband, and the convergence of voice, video and data. These technological developments, together with the liberalisation of markets are critical to the development of effective modern economies and smaller telecommunication startups can assist in reaching this objective.

Chapter 4
Empirical Research

4.1 Introduction

The purpose of the empirical research is to confirm and substantiate the literature findings by conducting quality research. The focus of the empirical research objective is to assess to what extent the regulatory changes together with the technology changes are creating an entrepreneur friendly environment that see new business startups successfully operating in the South African telecommunications industry.

This chapter describes the sampling process, the research survey instrument, the collection of data and the results.

The survey and interviews assess the existing prevalence of entrepreneurship in the industry and assess the impact and relation of regulations and technology on entrepreneurship.

4.2 Sample description

The population sample consisted of South African telecommunications industry stakeholders with a focus on new startups in the form of VANS, ISP's, USAL's and WASP's. The scope from a player profile and services context is limited to companies and individuals who have a licenced telecommunications operator status.

Two hundred and ten potential participants were phoned to establish willingness to participate in the survey and to filter out those who did not match the targeted sample. Ninety-four potential respondents were eventually earmarked for participation. The surveys were conducted with either the founders or team members of the original startup, regulatory and technology staff and owners of the companies, for whom we obtained e-mail and contact particulars.

The Internet was used as distribution channel and the necessary security and logical access were implemented. The Internet together with software media was chosen because of its inherence with telecommunications. The questionnaires were designed on a software program and hosted on the World Wide Web. The respondents were emailed with the link to the electronic survey.

4.3 Data collection

A personal approach to collecting the data was adopted. In this way, it was ensured that the respondent represents an individual who have access to all the researched information. Every attempt was made to optimise participation in the study, which proved to be time-consuming and costly.

The survey was distributed to ninety-four individuals, of which thirty-two or 34 percent successfully completed the survey as listed in table 4.1. The survey opened on 29 August 2005 and closed on 27 October 2005. The statistically calculated average time taken to complete the survey per respondent was 29.8 minutes.

Table 4.1 - Survey statistics report

Status	Count	Completed / Started	Completed / Viewed	Started / Viewed
Completed	32	34%	56%	
Started	57			79%
Viewed	72			

The application captures data at every point when respondents take the survey. Primarily there are three sets of numbers and it is defined as following:

1. Completed - The completed count is all respondents that have gone through the whole survey and completed it.
2. Started - This is total number of respondents that have started the survey. A response is recorded as "Started" if the "Continue" button on the first page is clicked.
3. Viewed - Every time the survey is requested the view count is incremented and updated. The respondent does not necessarily have to start the survey.

The particulars of the respondents who completed the survey successfully are included as annexure B, and for the purpose of this research only the successfully completed surveys are taken into account.

4.4 Survey instrument

The instrument used for data collection is based on the literature study and consisted of an opinion survey and free text questions. The questionnaire were designed to both collect information and to serve as a quality control measure in reaching conclusions on whether the technology and regulatory changes is contributing to telecommunications entrepreneurship opportunities. The invitational mail gave a short description of the survey and the first page of the survey was an introduction that defined the purpose of the survey.

The opinion survey is included as annexure A and consists of the following four sections:

- Section A: Profile information from the smaller telecommunication respondents such as licensing category. The section consists of six questions.
- Section B: Entrepreneurial and opportunity-type questions, which consist of thirty questions.
- Section C: The impact of regulations on entrepreneurial activity, consisting of fourty questions.
- Section D: The impact of technology on entrepreneurial activity, consisting of twenty-two questions.

Seventy percent of the questions were scale-based (i.e. select one on a scale from 1 to 4), ten percent "either or" type, a further ten percent choice-specific type, and the balance were interview or free text type questions. The broad selection of questions and different types of answers allow for full statistical analysis, and the use of statistical modelling techniques.

The validity of the results is based on the following:

- The literature study was used as a guideline to compile the questionnaires and to conduct interviews.

- The research population is representative of the industry.
- The results were compared to trends experienced in other countries.

A structured survey design was used for data collection. The survey and open-ended questions were kept similar for all respondents. All the questions were asked in the format and sequence of the questionnaire. Where ambiguity or lack of understanding arose, the questions were explained to ensure the respondents understood the question. All questions were asked in English. The respondents were assured of the ethical commitment associated with research, such as confidentiality and their freedom of choice to respond to the questions.

The information obtained from the survey and the literature study were analysed to conclude whether there are emerging entrepreneurship opportunities in the changing telecommunications industry and what regulatory and technology changes bring them about.

4.5 Profile information

The main objective of this section is to confirm that the respondents meet the criteria to provide relevant quality opinions that are representative of the telecommunications industry and specifically smaller startups in the industry.

The profile information is necessary to interpret and analyse the responses meaningful. This analysis is necessary since the feedback and perceptions can differ depending on the licensing category, whether the company is a big or small player, and even the specific regulatory and technology considerations impacting on the services provided by the respondents.

The following section deals with the purpose, results and interpretation of each question, and provides the aggregated feedback per question.

4.5.1 Licensing and services category

The purpose of this question is to establish the aggregated licensing profile to ensure respondents represent the overall telecommunications industry; the significance of smaller licenced players will also be assessed. The results are depicted in table 4.2.

Table 4.2 - Licensing category results

Indicate your licensing category or categories:			
	Public Switched Telecommunications Networks	6	16.67%
	Land Mobile Networks	2	5.56%
	Under-serviced Area Licencee	5	13.89%
	Value Added network and/or Internet Service Provider	**17**	**47.22%**
	Private Telecommunications licence	4	11.11%
	Paging and trunking, radio licences	1	2.78%
	Signal distributor	1	2.78%
	Other	0	0.00%
Total		**36**	**100%**

The main observation is that 78 percent of the respondents represent smaller telecommunications players, those licenced other than the Telkom and the three mobile operators. The respondents represent all licensing categories, this is important to assess the industry-wide technology and regulatory changes. Certain respondents hold more than one licence and hence the count of thirty-six.

- **Services provided**

The purpose of this question is to determine the type of telecommunication products and services provided by the respondents and also to assess the use of new technology to provide products. The results are listed in table 4.3.

Table 4.3 – Services

What are the core telecommunications services provided by your company?			
	Comprehensive voice and data	13	12.38%
	Networking services	11	10.48%
	Voice over Internet Protocol	12	11.43%
	Conveying voice and data	10	9.52%
	Data communications	16	15.24%
	Wireless access operator services	7	6.67%
	Internet access services	15	14.29%
	Content provisioning, cyber trade	7	6.67%
	Services	14	13.33%
	Other	0	0.00%
Total		**105**	**100%**

These results are of specific importance and confirm that there is definitely a wide range of diverse players and a number of them are providing services on top of new technologies. The high number of VoIP and Wireless access services confirm that the industry is changing and that a new set of telecommunications players are present in South Africa. The respondents were allowed to select more than one option and hence the total is not equal to the number of completed surveys.

4.5.2 Position in company and years experience

The purpose of this question is to ensure that respondents represent the company either as an owner or in a management capacity. The results are listed in table 4.4.

Table 4.4 – Position in company

What is your position within the company?			
	Owner / Founder / Entrepreneur	**13**	**40.63%**
	Top Management	7	21.88%
	Management	6	18.75%
	Operational	3	9.38%
	Advisor or consultant	1	3.13%
	Other	2	6.25%
Total		**32**	**100%**

The combined percentage of owners, founders, entrepreneurs and management represent 81 percent of the respondents.

- **Years Experience**

This question confirms whether the respondents have sufficient experience in the industry to answer the technology and regulatory questions with insight. The results are in table 4.5.

Table 4.5 – Years experience

How many years experience do you have in the telecommunications industry?			
	20+	15	46.88%
	15-19	1	3.13%
	10-14	5	15.63%
	5-9	8	25.00%
	0-4	3	9.38%
Total		**32**	**100%**

The respondents have significant experience in the industry with 66 percent indicating that they possess over ten years industry experience.

4.5.3 Number of employees and financial turnover

The criteria used to identify telecommunications SMME's are the number of employees and the company turnover. The questions as listed in table 4.6 cover the number of employees and the company's financial turnover.

Table 4.6 – Permanent employees and financial turnover

How many people are permanently employed in your company?			
	>500	7	21.88%
	200-500	1	3.13%
	100-199	1	3.13%
	50-99	0	0.00%
	11-49	**10**	**31.25%**
	6-10	8	25.00%
	1-5	5	15.63%
Total		**32**	**100%**

What was the company's turnover for the previous financial year?			
	> R 50 million	9	28.13%
	R 20-50 million	1	3.13%
	R 10-19 million	1	3.13%
	R 6-9 million	5	15.63%
	R 2-5 million	7	21.88%
	< R 2 million	9	28.13%
Total		**32**	**100%**

The majority of the respondents represent companies with turnovers of less than R50 million and less than 50 employees.

4.5.4 Profiling summary

The respondents are representative of the telecommunications industry. They further represent the targeted smaller players, i.e. licenced telecommunications operators and the owners, founders or top management of smaller telecommunications startups.

4.6 Entrepreneurship

The focal point of this section is the entrepreneurship literature. According to Nieman and Bennet (2002:57) entrepreneurs act as business catalysts, gathering resources needed to convert business ideas into enterprises that introduce new business enterprises to the economy.

The entrepreneur has the ability to identify an opportunity where the regular man on the street would see chaos, contradictions, ambivalence and confusion. Timmons and Spinelli (2004:82) state that it is often incorrectly assumed that a marketplace dominated by large players is impenetrable by smaller, entrepreneurial companies.

This section of the survey therefore focuses on the entrepreneurial background, sources of ideas and opportunities, the startup phase and competitive strength of the companies. The section consists of twenty-four opinion-based questions and six interview or free text type questions.

4.6.1 Entrepreneurial background

The purpose of this section is to determine the entrepreneurial nature of the company by identifying important factors that are important to the startup of the company. We asked ten opinion questions and two interview questions. The survey responses are listed in table 4.7 and the consolidated interview responses are listed in table 4.8.

Table 4.7 - Entrepreneurial background survey

The business is an entrepreneurial startup.			
	Strongly Agree	**15**	**46.88%**
	Agree	6	18.75%
	Disagree	3	9.38%
	Strongly Disagree	8	25.00%
Total		**32**	**100%**
You have previous experience in the telecommunications industry.			
	Strongly Agree	12	37.50%
	Agree	**13**	**40.63%**
	Disagree	4	12.50%
	Strongly Disagree	3	9.38%
Total		**32**	**100%**
What career did you practice before this?			
	Self employed	7	21.88%
	Professional	11	34.38%
	Corporate employee	**13**	**40.63%**
	Jobless	1	3.13%
Total		**32**	**100%**
What outside help did you get when you started the company?			
	Experienced advisors	6	18.75%
	Technology experts	7	21.88%
	Professionals, lawyers, accountants	8	25.00%
	Other	11	34.38%
Total		**32**	**100%**
Who else did you know while you were growing up who had started or owned a business?			
	Parents	5	15.63%
	Friends	**11**	**34.38%**
	Family	5	15.63%
	None	10	31.25%
	Other	1	3.13%
Total		**32**	**100%**

What is the main reason for starting the business?			
	Opportunity driven	**17**	**51.85%**
	Forced circumstances	7	22.22%
	Took over family business	0	0.00%
	Other	8	25.93%
Total		**32**	**100%**
The USAL's are truly entrepreneurial.			
	Strongly Agree / Significantly important	6	18.75%
	Agree / Important	11	34.38%
	Disagree / Not important	11	34.38%
	Strongly Disagree / Not at all important	4	12.50%
Total		**32**	**100%**
VANS are truly entrepreneurial.			
	Strongly Agree / Significantly important	3	9.38%
	Agree / Important	**25**	78.13%
	Disagree / Not important	3	9.38%
	Strongly Disagree / Not at all important	1	3.13%
Total		**32**	**100%**
ISP's are truly entrepreneurial.			
	Strongly Agree / Significantly important	12	37.50%
	Agree / Important	**19**	**59.38%**
	Disagree / Not important	1	3.13%
	Strongly Disagree / Not at all important	0	0.00%
Total		**32**	**100%**

Table 4.8 – Free text questions on entrepreneurial background

Who else did you know while you were growing up who had started or owned a business? How did it influence you?
The responses are consolidated and the themes centered on the positive and motivational influence of knowing somebody else with their own business. The participants learned many of the values required for success in business, as well as being made aware of the obstacles faced by startup companies, from others that went through the same experience. The participants commented that they learned how to avoid failure by carefully managing risk and were also encouraged to take risks. Their families also drove them to be more successful and to work for themselves.

What was your most triumphant moment and your worst moment?
The respondents commented that their most triumphant moments varied from harvesting funds, the sale of their startups to big competitors, surpassing profit and share price expectations, moving out of garages to office parks, landing big contracts and even buying some sister companies who struggled with black economic empowerment policies. Their worst moments came from being pushed out of business by big incumbents, not meeting all customer expectations, total loss of years of private and business data when computers failed; many complain about legislation compliance with black economic empowerment, the times their servers have 'crashed' and dealing with the big incumbents' lawyers.

The respondents indicated that their businesses have vested entrepreneurial nature. Eighty percent of the respondents confirmed that they have previous experience in the telecommunications industry. The question regarding their previous employment reveals that most of them came from a corporate or professional background. The startups are mainly financed from personal funds or government programs and started based on the identification of an opportunity. The feedback indicates that ISP's and VANS are truly entrepreneurial, with ISP's more so than VANS and that USAL's are considered somewhat entrepreneurial.

4.6.2 Source of ideas

According to Van der Veen and Wakkee (2002:7) the opportunity recognition process starts when a motivated individual has an initial idea. Hills and Lumpkin (1997:1) define an idea as a stepping-stone that leads to an opportunity.

The purpose of this question is to determine the main drivers and sources of telecommunications entrepreneurship. The responses from table 4.9 indicate that entrepreneurial drive; innovation and technology changes are driving entrepreneurship in the telecommunications industry. The responses show that regulations and liberalisation are not drivers of entrepreneurship.

Table 4.9 – Drivers of entrepreneurship

The source of the business venture idea was based on:								
	Strongly Agree		Agree		Disagree		Strongly Disagree	
Technology changes	10	31.25%	13	40.63%	4	12.50%	5	15.63%
Regulatory changes	3	9.38%	9	28.13%	14	43.75%	6	18.75%
Niche / underserved expansion	5	15.63%	13	40.63%	11	34.38%	3	9.38%
Societal change	7	21.88%	13	40.63%	9	28.13%	3	9.38%
Value chain optimization	5	15.63%	15	46.88%	7	21.88%	5	15.63%
Innovation	14	43.75%	11	34.38%	2	6.25%	5	15.63%
Entrepreneurial drive	19	59.38%	8	25.00%	0	0.00%	5	15.63%

4.6.3 Entrepreneurship opportunities

The opportunity identification process starts from the creative ideas the entrepreneur generates by analyzing the political, economical, social and technological changes taking place in the external environment. The external environment plays a major influence on the entrepreneurial process (Thompson *et al.*, 2005:73). Timmons and Spinelli (2004:83) state that technology and regulatory changes have profoundly altered and will continue to alter the way we conceive of opportunities.

The optimism regarding entrepreneurship opportunities in telecommunications is assessed with two questions and listed in table 4.10.

Table 4.10 – Presence of entrepreneurship opportunities

There are significant entrepreneur opportunities in the SA telecommunications landscape.			
	Strongly Agree	5	15.63%
	Agree	**19**	**59.38%**
	Neutral	3	9.38%
	Disagree	3	9.38%
	Strongly Disagree	2	6.25%
Total		**32**	**100%**

The typical services provided by new startups in the telecommunications industry are:			
	Hosting mail and web	**21**	**30.88%**
	Voice communications	8	11.76%
	Data communications	20	29.41%
	Internet access services	19	27.94%
	Other	0	0.00%
Total		**68**	**100%**

The respondents believe that there are definite entrepreneur opportunities in the telecommunications industry. The respondents mainly provide hosting, data and Internet access services, the fact that more and more is providing voice and data communications services is indicative of the changing industry.

4.6.3.1 Regulations and entrepreneurship opportunities

The purpose of this section is to identify to what extent entrepreneurship opportunities are created by liberalisation. The questions also identify which regulatory changes will create entrepreneurship opportunities. The results of the regulatory questions are listed in table 4.11.

Table 4.11 - Impact of regulatory changes on entrepreneurship

The following technology changes will create entrepreneurial opportunities:								
	Strongly Agree		Agree		Disagree		Strongly Disagree	
Self-provisioning of facilities	12	37.50%	17	53.13%	3	9.38%	0	0.00%
Access networks unbundled	14	43.75%	14	43.75%	4	12.50%	0	0.00%
Interconnection with VANS	10	31.25%	18	56.25%	3	9.38%	1	3.13%
Equal access to numbering resources	14	43.75%	15	46.88%	3	9.38%	0	0.00%
Facilities-based competition	6	18.75%	20	62.50%	5	15.63%	1	3.13%
Service-based competition	8	25.00%	22	68.75%	0	0.00%	2	6.25%
Convergence Act	5	15.63%	18	56.25%	9	28.13%	0	0.00%

The respondents believe that from a liberalisation viewpoint most entrepreneurial opportunities will come from service-based competition and the unbundling of access

networks. Furthermore, the respondents believe that the Convergence Act will not create entrepreneurial opportunities.

4.6.3.2 Technology and entrepreneurship opportunities

The purpose of this section is to identify to what extent entrepreneurship opportunities are created by technology changes. The questions also identify which technology will create entrepreneurship opportunities. The results are listed in table 4.12.

Table 4.12 – Impact of technology on entrepreneurship

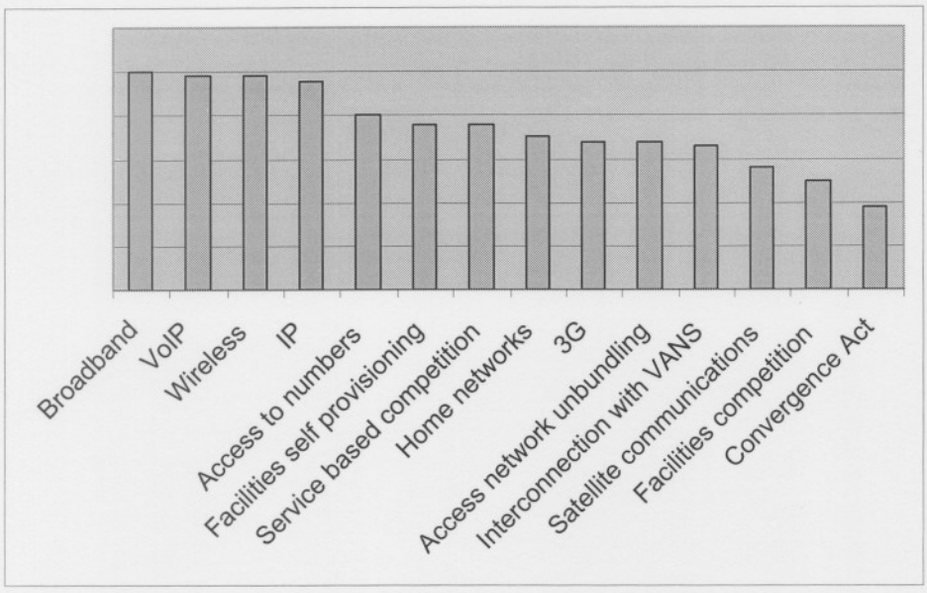
The following technology changes will create entrepreneurial opportunities:								
	Strongly Agree		Agree		Disagree		Strongly Disagree	
Broadband	18	56.25%	14	43.75%	0	0.00%	0	0.00%
Wireless	19	59.38%	12	37.50%	1	3.13%	0	0.00%
VoIP	19	59.38%	12	37.50%	1	3.13%	0	0.00%
3G	14	43.75%	12	37.50%	6	18.75%	0	0.00%
IP communication	16	50.00%	16	50.00%	0	0.00%	0	0.00%
Satellite	8	25.00%	18	56.25%	6	18.75%	0	0.00%
Home networks	11	34.38%	17	53.13%	4	12.50%	0	0.00%

The respondents indicated that VoIP, IP, wireless and broadband technologies will create most entrepreneurial opportunities.

4.6.3.3 Impact of technology and regulations on entrepreneurship

The consolidated impact of both technology and regulations on entrepreneurship is shown in figure 4.1.

Figure 4.1 – Technology and liberalisation impact on entrepreneurship



The results indicate that technology changes as opposed to regulatory changes create entrepreneurship opportunities in the telecommunications industry. VoIP, Wireless, IP and broadband technology changes will create most opportunities, whilst there is little optimism about the liberalisation impact of the draft Convergence Act.

4.6.4 Starting up

The business startup stage is the stage that usually covers the first two or three years and is characterised by the direct and exhaustive drive, energy, and entrepreneurial talent of a lead entrepreneur and a key member or two (Timmons & Spinelli, 2004:277).

4.6.4.1 Opinion survey

The purpose of this section is to identify the most difficult challenges when starting and growing a telecommunications business. The section consists of five opinion type questions and four interview questions. The results of the opinion questions are listed in table 4.13.

Table 4.13 - Startup and growth challenges

Which critical business opportunity elements did you consider for sustainable success:								
	Strongly Agree		Agree		Disagree		Strongly Disagree	
Industry	7	21.88%	14	43.75%	11	34.38%	0	0.00%
Market	14	43.75%	11	34.38%	7	21.88%	0	0.00%
Economics	7	21.88%	17	53.13%	8	25.00%	0	0.00%
Harvest potential	7	21.88%	10	31.25%	14	43.75%	1	3.13%
Competitive advantage	13	40.63%	13	40.63%	5	15.63%	1	3.13%
Differentiation	10	31.25%	15	46.88%	6	18.75%	1	3.13%
Once the business got going, the most difficult gaps to fill and problems to solve were:								
	Strongly Agree		Agree		Disagree		Strongly Disagree	
Cash flow	12	37.50%	12	37.50%	8	25.00%	0	0.00%
Staffing	9	28.13%	19	59.38%	4	12.50%	0	0.00%
Technology	6	18.75%	9	28.13%	16	50.00%	1	3.13%
Regulatory compliance	17	53.13%	8	25.00%	7	21.88%	0	0.00%
Creating demand	5	15.63%	14	43.75%	12	37.50%	1	3.13%

How was the original startup financed?			
	Personal funds	**20**	**62.50%**
	Commercial bank finance	1	3.13%
	Venture capital	1	3.13%
	Equity offerings	2	6.25%
	Government programs	8	25.00%
	Joint venture	0	0.00%
Total		**32**	**100%**
In terms of the future, do you plan to:			
	Harvest	3	9.38%
	Maintain status quo	0	0.00%
	Expand	14	43.75%
	Diversify	**15**	**46.88%**
Total		**32**	**100%**

How did you ensure compliance with the telecommunications regulatory environment?			
	Appointed / consulted a legal advisor	14	43.75%
	Self-study	**17**	**53.13%**
	Did not consider	1	3.13%
Total		**32**	**100%**
What outside help did you get when you started the company?			
	Experienced advisors	6	18.75%
	Technology experts	7	21.88%
	Professionals, lawyers, accountants	8	25.00%
	Other	**11**	**34.38%**
Total		**32**	**100%**
As you look back what do you believe are the most critical concepts, skills, attitudes, and know-how you needed to get your company started and grown to where it is today:			
Commitment and determination		**15**	**46.88%**
Intelligence		0	0.00%
Creativity and innovativeness		12	37.50%
Capacity to inspire		0	0.00%
Values		2	6.25%
Opportunity obsession		3	9.38%
Risk-taking		0	0.00%
		32	**100%**

This section indicates that the most difficult challenges for startups in the telecommunications industry is not technology or even consumer demand but rather regulatory compliance and getting the right staff. The respondents predominantly use personal funds to finance the startup and consider commitment and determination and creativity and innovation as the most important elements when hiring team members.

The respondents didn't consider the harvest potential of their companies as an important factor, but placed a lot of emphasis on analysing the market, their competitive advantage and differentiation.

4.6.4.2 Free text questions

In this section the respondents were allowed free text answers regarding the business startup stage and the consolidated responses are listed in table 4.14.

Table 4.14 – Startup free text responses

How did you get started?
The respondents' comments centered on the identification of niches in the market, recognising demand, some started as a diversification from mainstream business, some purchased a small going concern and expanded, some started as a consortium of companies, some started with own personal funds and others received start up capital from sister companies, one grew his business from an opportunity which came by means of a web content development contract. A few started their business as a result of opportunities from the Internet.
What do you consider your most valuable asset, the thing that enabled you to make it?
The respondents confirmed that success take lots of dedication, tenacity and hard work. Factors such as personal values, people skills, networks, knowledge, drive and passion, creativeness, endurance, honesty, hard work and love of the challenge were repeated.
If you had to do it over again, what would you do differently?
The replies varied from being more involved and active in working to bring about the end of incumbents monopolies, planning the business goals better, outsourcing staff selection, better funding infrastructure, building better relationships, embracing technology changes a lot sooner, taking more time to plan, acquiring more starting capital and aim bigger and starting with lots of capital and a certain business plan (as opposed to no cash and no 'sure' business plan).
When you looked for key people, were there any specific skills or know-how you were particularly seeking?
The respondents' valued high-end technical skills such as networking telecommunications and technology, programming and engineering. Skills and experience in the fields of sales, support, administrative, finance and legal were also mentioned. Most respondents sought people with the right attitude, intellectual capability, the drive to learn, proven experience and track record, commitment, dedication, reliability, drive to work hard and self-motivation.

4.6.5 Competitive strategy

A competitive strategy concerns the specifics of management's game plan for competing successfully and achieving a competitive edge over rivals (Thompson *et al.*, 2005:115).

The purpose of this question is to assess the importance of technology in a telecommunications business. The results are listed in table 4.15.

Table 4.15 - Competitive edge

Your business has a technological advantage over competitors.			
	Strongly Agree / Significantly important	10	31.25%
	Agree / Important	**16**	**50.00%**
	Disagree / Not important	5	15.63%
	Strongly Disagree / Not at all important	1	3.13%
Total		**32**	

What did you perceive to be the competitive strength of your company at startup?								
	Strongly Agree		Agree		Disagree		Strongly Disagree	
Technology	12	37.50%	14	43.75%	6	18.75%	0	0.00%
Low cost margins	9	28.13%	11	34.38%	8	25.00%	4	12.50%
Differentiation	11	34.38%	15	46.88%	5	15.63%	1	3.13%
First mover	12	37.50%	12	37.50%	7	21.88%	1	3.13%
Quality	20	62.50%	8	25.00%	4	12.50%	0	0.00%

What, in hindsight, would you say are the strengths?								
	Strongly Agree		Agree		Disagree		Strongly Disagree	
Technology	15	46.88%	15	46.88%	2	6.25%	0	0.00%
Low cost margins	7	21.88%	15	46.88%	5	15.63%	5	15.63%
Differentiation	10	31.25%	14	43.75%	7	21.88%	1	3.13%
First mover	9	28.13%	14	43.75%	8	25.00%	1	3.13%
Quality	19	59.38%	10	31.25%	2	6.25%	1	3.13%

Overall most of the companies perceived their competitive strength at startup to be superior quality services and products. The realised competitive edge shows that most of the companies found that their competitive strength is both in technology and in quality. This result of the opinion-based question further confirms that respondents predominantly believe that they do have a technological advantage over their competitors.

4.7 The impact of regulations on entrepreneurial activity

Timmons and Spinelli (2004:83) state that technology and regulatory changes have profoundly altered and will continue to alter the way we conceive of opportunities.

The impact between regulations and entrepreneurship was assessed with fourty questions that covered the following aspects:

- conduciveness of policies towards entrepreneurship;
- interpretations of regulations;
- regulatory barriers;
- opportunities from telecommunications regulatory changes; and
- changes required to regulatory regime to enable competition.

4.7.1 Entrepreneurship and regulations

The discovery of the potential for competition in telecommunications means that telecommunications can become a market like any other market, governed by the general laws that apply to all businesses, and disciplined by competition (Ryan, 2005). The purpose of this section is to determine to what extent current regulations are promoting or constraining entrepreneurship in telecommunications. The results are listed in table 4.16.

Table 4.16 – Entrepreneurship and regulations

1. The policy makers' current initiatives are sufficient to promote entrepreneurial activity in telecommunications.
2. There are significant regulatory barriers to enter the market (like a spectrum licence or the right-of-way to lay fibre).
3. The aim of regulation should be to facilitate fair competition.
4. South Africa's telecommunications legislation is the single largest factor holding back access to the Internet and/or the Information era.
5. Regulations and acts have restricted the rollout of more efficient technologies, broadband Internet access, high-speed wireless, VOIP, WiFi, and Satellite.

6. Government's focus should be on socio-economic development as opposed to the deployment of technologies.
7. The state of telecommunications in 2010 depends less on technical innovation, than on policy.
8. Current regulations discourage innovation.
9. The formulated policy and regulations should be technology neutral and allow new entrants to employ any type of technology to provide a service.

	Strongly Agree		Agree		Disagree		Strongly Disagree	
Question 1	3	9.38%	7	21.88%	14	43.75%	8	25.00%
Question 2	18	56.25%	9	28.13%	4	12.50%	1	3.13%
Question 3	19	59.38%	13	40.63%	0	0.00%	0	0.00%
Question 4	16	50.00%	12	37.50%	4	12.50%	0	0.00%
Question 5	18	56.25%	12	37.50%	0	0.00%	2	6.25%
Question 6	12	37.50%	9	28.13%	10	31.25%	1	3.13%
Question 7	9	28.13%	11	34.38%	9	28.13%	3	9.38%
Question 8	13	40.63%	8	25.00%	9	28.13%	2	6.25%
Question 9	16	50.00%	12	37.50%	2	6.25%	2	6.25%

The respondents consistently reported on all questions that regulations and policy makers' initiatives are insufficient to promote entrepreneurial activity in telecommunications. They further state that legislation is the single largest factor holding back access to the Internet and/or the Information era. Regulations and acts have restricted the rollout of more efficient technologies. They believe the regulations are not conducive to entrepreneurial activity and acts as a significant barrier to entry.

4.7.2 Regulations and new entrants

A prediction about the evolution of telecommunications startups over this next decade depends largely on the decisions of government policy makers. The extent of competition often depends on how hard it is for smaller and newer ventures to enter the market and survive in it. These startups need connections with the networks that are already in place, which process is governed by the policy makers.

The purpose of this section is to assess the conduciveness of specific regulatory aspects in relation towards the entry of new entrants in the telecommunications industry. The results are listed in table 4.17.

Table 4.17 – Regulations and new entrants

10. In the current regulatory regime there are no real small players in the industry.
11. Current regulations promote small, medium and micro-enterprises within the industry.
12. In the current regulatory environment small players can compete against incumbents with niche offerings.
13. In the long run, the extent of competition depends on whether there is enough demand to support multiple companies.
14. The SA market has sufficient demand to open it for SMME-type communication competition.
15. The USAL licences offer an opportunity for SMME's or a co-operative to gain a foothold in the market.
16. USALs require a more supportive regulatory and licensing regime to be successful.
17. Self-provisioning of facilities will stimulate the entrance of new SMME's.
18. Resale of bandwidth will stimulate the entrance of new SMME's.
19. The licensing of the SNO will create spin-off business opportunities for SMME's.
20. Competition from mobile virtual network operators (MVNO), should be encouraged.

	Strongly Agree		Agree		Disagree		Strongly Disagree	
Question 10	8	25.00%	9	28.13%	8	25.00%	7	21.88%
Question 11	4	12.50%	3	9.38%	13	40.63%	12	37.50%
Question 12	2	6.25%	11	34.38%	6	18.75%	13	40.63%
Question 13	11	34.38%	14	43.75%	5	15.63%	2	6.25%
Question 14	14	43.75%	15	46.88%	3	9.38%	0	0.00%
Question 15	7	21.88%	9	28.13%	12	37.50%	4	12.50%
Question 16	11	34.38%	16	50.00%	4	12.50%	1	3.13%
Question 17	13	40.63%	18	56.25%	1	3.13%	0	0.00%
Question 18	12	37.50%	16	50.00%	4	12.50%	0	0.00%
Question 19	12	37.50%	14	43.75%	6	18.75%	0	0.00%
Question 20	13	40.63%	16	50.00%	3	9.38%	0	0.00%

The respondents are divided on the presence of small players in the telecommunications sector. Barriers for these smaller players are restrictive regulations and policies, whilst they state that there is sufficient demand to open the market for startups.

The survey feedback indicates that the USAL's require a more supportive regulatory and licensing regime to be successful. Self-provisioning of facilities and resale of bandwidth are the most prominent liberalisation measures to foster entrance of new SMME's.

4.7.3 Specific regulatory issues

South Africa's prohibition of facilities-based competition is severely undermining the viability of a thriving service-based VANS market (Gillwald & Esselaar, 2004).

The purpose of this section is to identify, in order of significance, the regulations that will promote entrepreneurship and a fair competitive environment. The findings are listed in table 4.18 and the top twelve regulatory aspects to be addressed in order of priority are shown in figure 4.2.

Figure 4.2 – Regulations to address

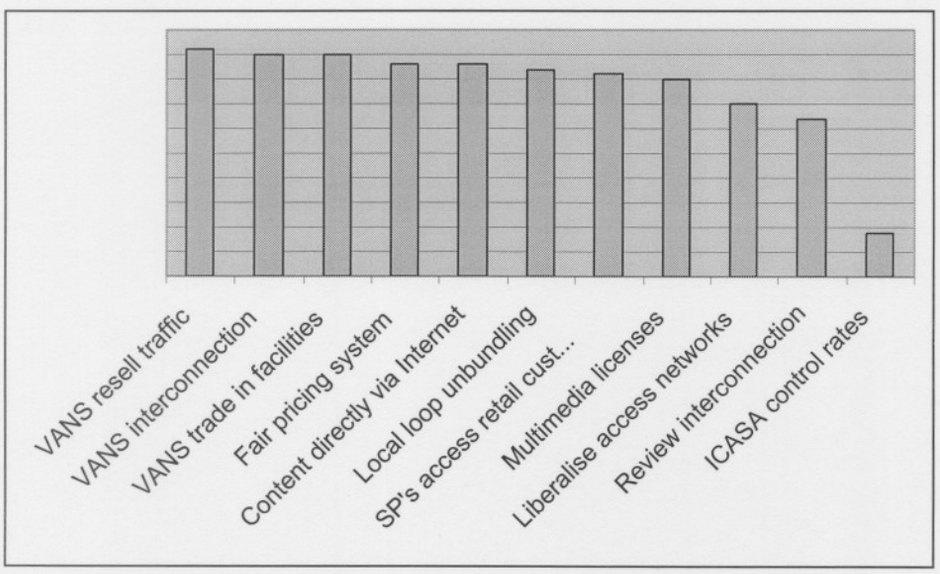


Table 4.18 – Opinion questions on regulations to address

21. More multimedia licences should be awarded.
22. Smaller entrants will mostly benefit from the decision to liberalise access to the incumbent's local networks.
23. Startups need connections with the networks that are already in place to operate a feasible business.
24. The smaller carriers rely on the backbone of established carriers' networks and hence a fair pricing/costing system should be provided for by regulations.
25. VANS must be allowed to trade in telecommunication facilities to stimulate greater data and voice communications competition.
26. VANS must be allowed to interconnect with incumbent operators.
27. VANS should be allowed to buy wholesale traffic from the incumbent operators and resell it onto consumers.
28. Service providers must be allowed to engage directly with retail customers.
29. The interconnection regime will grow more complex with additional players entering the market.
30. Interconnection rates should be governed by ICASA.
31. In order to provide choice to customers, the regulation should stipulate mandatory unbundling of the local loop in the SMME areas.
32. Content providers should be allowed to provide directly to customers via the Internet.
33. Service providers and ISPs are legally allowed to provide voice over the Internet services.
34. All ISP's may carry voice services such as VOIP currently.

	Strongly Agree		Agree		Disagree		Strongly Disagree	
Question 21	12	37.50%	18	56.25%	2	6.25%	0	0.00%
Question 22	11	34.62%	17	53.85%	4	11.54%	0	0.00%
Question 23	19	59.38%	10	31.25%	2	6.25%	1	3.13%
Question 24	18	56.25%	11	34.38%	2	6.25%	1	3.13%
Question 25	15	46.88%	16	50.00%	1	3.13%	0	0.00%
Question 26	16	50.00%	15	46.88%	0	0.00%	1	3.13%
Question 27	17	53.13%	14	43.75%	0	0.00%	1	3.13%
Question 28	15	46.88%	14	43.75%	3	9.38%	0	0.00%

Question 29	11	34.38%	17	53.13%	4	12.50%	0	0.00%
Question 30	8	25.00%	11	34.38%	8	25.00%	5	15.63%
Question 31	16	50.00%	13	40.63%	3	9.38%	0	0.00%
Question 32	13	40.00%	18	56.00%	1	4.00%	0	0.00%
Question 33	14	42.86%	10	32.14%	6	17.86%	2	7.14%
Question 34	10	31.25%	17	53.13%	5	15.63%	0	0.00%

The results indicate that VANS reselling of traffic, interconnection and trading in facilities should be at the top of the agenda when revisiting regulations.

The respondents confirm that new startups need interconnection with incumbents to operate a feasible business but at the same time a large number feel that these rates should not be governed by ICASA. The Ministerial policy directives in September 2004 permitting VANS from February 2005 to offer voice services have been recognised by stakeholders.

4.7.4 Convergence Act

Government responded to the convergence of the broadcasting, telecommunications and information technology sector by hosting a colloquium on convergence policy. This culminated in the draft Convergence bill. Once promulgated, the legislation will reflect the integration of Telecommunications with Information Technology and Broadcasting.

The purpose of the following questions is to determine the level of optimism regarding the potential of the Convergence Act to further liberalise the telecommunications market. The results are listed in table 4.19.

The feedback from the respondents suggests that there is not much optimism about the Convergence Act in so far as the creation of a free market and fair competition is concerned but it does hold potential for increasing SMME type competition. The respondents all agree that technological convergence has far outpaced the current regulations. The playing field for the future market is spread across all four sectors.

Table 4.19 – Convergence Act

35. The Convergence Act will succeed in drawing the unemployed into the workforce.								
36. The Convergence Act holds potential for increasing the number of small, micro and medium-sized entrepreneurs.								
37. Technological convergence has outpaced regulatory changes.								
38. Convergence of services on packet-switched digital networks will culminate in effective competition enablers for SMME's.								
	Strongly Agree		Agree		Disagree		Strongly Disagree	
Question 35	4	12.50%	8	25.00%	16	50.00%	4	12.50%
Question 36	8	25.00%	18	56.25%	6	18.75%	0	0.00%
Question 37	22	68.75%	10	31.25%	0	0.00%	0	0.00%
Question 38	14	43.75%	13	40.63%	5	15.63%	0	0.00%

39. Considering the Convergence Act, your future licence category will most likely be:			
	Communication Network Services - Individual	6	18.18%
	Communication Network Services - Class	8	31.82%
	Communication Network Services - Exempt	1	0.00%
	Communication Services - Individual	1	0.00%
	Communication Services – Class	9	22.73%
	Communication Services – Exempt	1	4.55%
	Unknown	6	9.09%
Total		**32**	**100%**

40. Indicate your future market.			
	Network facilities	14	23.33%
	Applications services	14	23.33%
	Content services	13	21.67%
	Network services	19	31.67%
	Other	0	0.00%
Total		**60**	**100%**

4.8 Technology and entrepreneurship

While the effects of the Telecommunications Act on competition are being played out, technology is also bringing dramatic change to the industry (Burgelman *et al.*, 2004:311). In telecommunications, regulators are struggling to take account of new technologies that are changing the balance of power between incumbents and attackers.

The advent of new services and technology will facilitate broader entry of competitors. Today the technology is here and nations across the globe are taking advantage of the likes of broadband Internet access, high-speed wireless, VoIP, and Satellite to realise unprecedented e-business growth.

This section consists of twenty-two questions and all the questions were scale based (i.e. select one on a scale from 1 to 5). The impact between technology changes and entrepreneurship was assessed, by focusing on the following aspects:

- determining the most significant technology changes;
- identification of opportunity spin-offs from technology; and
- the conduciveness of technology to entrepreneurship.

4.8.1 Technology and new entrants

The purpose of this section is to determine whether technology changes allow new telecommunication startups to compete in the market. The section also identifies the potential growth of new smaller entrants. The results are listed in table 4.20.

Table 4.20 – Technology and new entrants

1. Demand for interactive services will promote SMME entry.
2. Technological progress will eventually overthrow the local loopmonopolies.
3. Wireless Internet Service Providers will grow dramatically.
4. Technical innovations allow new telecommunication startups to compete for a piece of the market.
5. Virtual Network Operators (VNO) will bring about true technology convergence and is best suited to provide value added service offerings to consumers.
6. The introduction of 3G technologies will provide opportunities for development of a wide range of new value added services to be provided to end-consumers by new players.

	Strongly Agree		Agree		Disagree		Strongly Disagree	
Question 1	9	28.13%	18	56.25%	5	15.63%	0	0.00%
Question 2	10	31.25%	14	43.75%	8	25.00%	0	0.00%
Question 3	10	31.25%	16	50.00%	6	18.75%	0	0.00%
Question 4	10	31.25%	20	62.50%	2	6.25%	0	0.00%
Question 5	1	3.13%	26	81.25%	5	15.63%	0	0.00%
Question 6	8	25.00%	16	50.00%	8	25.00%	0	0.00%

The respondents strongly affirmed that technical and technology innovations allow new telecommunication startups to compete for a piece of the market. They also believe that technological progress will overthrow regulations and entry barriers. They indicate that Virtual Network Operators (VNO) and Wireless Internet Service Providers will enter the market and grow dramatically.

4.8.2 Technology opportunities

The purpose of the questions on technology opportunities is to identify the technologies that will attract the most attention and create the most business opportunities. The results are shown in figure 4.3 and table 4.21.

Figure 4.3 – Technology opportunities

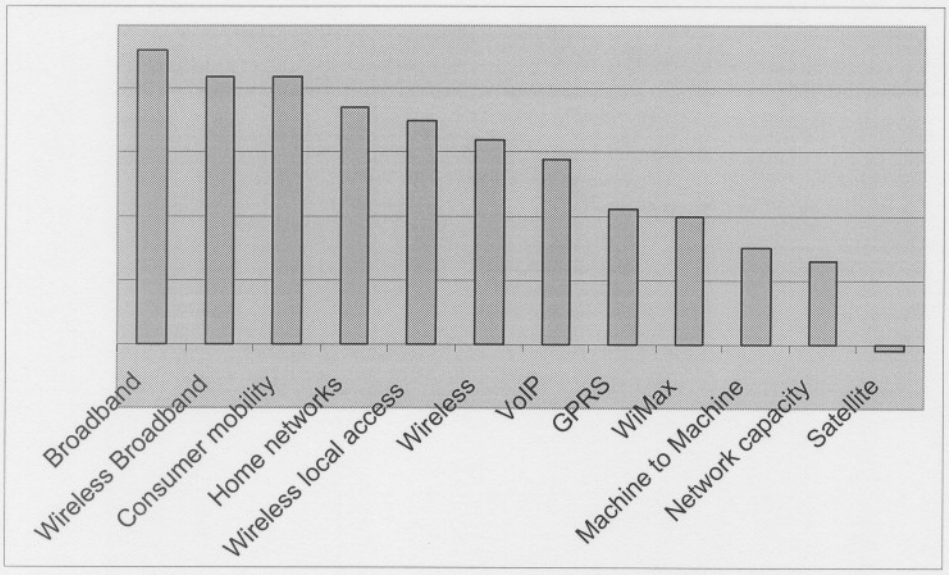


Table 4.21 – Technology opportunities

7. Voice communications using Internet standards will be the fastest growing technology application in 2006.
8. The most significant technology driving the telecommunications industry is wireless.
9. The most significant technology driving the telecommunications industry is broadband.
10. The demand for data-network backbone capacity outstrips the supply.
11. Wireless is the quickest way to provide broadband access.
12. Wireless offers a far cheaper way to get around the last mile.
13. The need for consumer mobility is another key driver why wireless access technology will get so much attention in years to come.
14. Satellite technology is set for takeoff.
15. Technical developments in the home will lead to home networks to enable content that is downloaded to a PC to be shown on a TV or heard via hi-fi and audio equipment.
16. Because of broadband, unlimited calls for a fixed monthly subscription rate is just months away.
17. WiMAX will take over from satellite.
18. Machine-to-machine (PC's, cars, home appliances) communication over mobile networks will be the next big revenue generator.
19. The Internet subscription charge will overthrow distance and time based charging.

20. We will soon use our mobile devices to pay for a Coke or buy theatre tickets.								
21. GPRS Internet access will become commonplace.								
22. Wireless access technologies will be a dominant local loop access mechanism.								
	Strongly Agree		Agree		Disagree		Strongly Disagree	
Question 7	9	28.13%	17	53.13%	6	18.75%	0	0.00%
Question 8	12	37.50%	14	43.75%	6	18.75%	0	0.00%
Question 9	14	43.75%	18	56.25%	0	0.00%	0	0.00%
Question 10	6	18.75%	14	43.75%	11	34.38%	1	3.13%
Question 11	14	43.75%	16	50.00%	2	6.25%	0	0.00%
Question 12	13	40.63%	14	43.75%	5	15.63%	0	0.00%
Question 13	14	43.75%	16	50.00%	2	6.25%	0	0.00%
Question 14	5	15.63%	9	28.13%	16	50.00%	2	6.25%
Question 15	9	28.13%	21	65.63%	2	6.25%	0	0.00%
Question 16	5	15.63%	17	53.13%	10	31.25%	0	0.00%
Question 17	9	28.13%	13	40.63%	9	28.13%	1	3.13%
Question 18	5	15.63%	16	50.00%	11	34.38%	0	0.00%
Question 19	9	28.13%	17	53.13%	6	18.75%	0	0.00%
Question 20	10	31.25%	17	53.13%	4	12.50%	1	3.13%
Question 21	4	12.50%	21	65.63%	6	18.75%	1	3.13%
Question 22	12	37.50%	13	40.63%	7	21.88%	0	0.00%

The respondents indicated that according to them the most significant technologies and opportunities is in broadband, wireless, and Internet communications.

4.9 Summary

A significant portion – 74 percent of the respondents - represent smaller telecommunications players and this confirms that there is a wide range of diverse smaller players and a number of them are providing services based on new technologies. The responses indicate that entrepreneurial drive; innovation and technology changes are driving entrepreneurship in the telecommunications industry. The respondents further believe that there are definite entrepreneurial opportunities in the telecommunications industry.

The most difficult challenges for startups in the telecommunications industry are not technology or even consumer demand but rather regulatory compliance and getting the right staff. The respondents predominantly use personal funds to finance the startup and consider commitment and determination and creativity and innovation as the most important elements when hiring team members.

The respondents confirmed that technology is a much stronger opportunity creator than regulations and that VoIP, broadband and wireless technologies will create most entrepreneurial opportunities. Liberalisation of service-based competition and the unbundling of access networks will also create significant business opportunities.

Furthermore it is interesting to note that the respondents believe that the Convergence Act will not create entrepreneurial opportunities.

Most of the companies found that their competitive strength is both in technology and in quality. They further state that legislation is the single largest factor holding back access to the Internet and/or the Information era. Regulations and acts have restricted the rollout of more efficient technologies. They believe the regulations are not conducive to entrepreneurial activity and acts as a significant barrier to entry, whilst there is sufficient demand to open the market for startups.

Chapter 5
Conclusions and Recommendations

5.1 Introduction

This chapter provides the discussion and conclusion with respect to the findings of the literature review and empirical study. It also summarises the study, and offers recommendations based on the empirical findings. The recommendations are focused on the potential contribution of telecommunications liberalisation and technology changes to the area of entrepreneurship.

The conclusions identify the current existence of entrepreneurship in the South African telecommunications industry as well as the liberalisation and technology factors that promote or constrain entrepreneurship opportunities.

This study therefore determined whether the two major factors essential to the entry of smaller to medium-sized telecommunication startups, liberalisation and technology changes result in entrepreneurship opportunities.

5.2 Conclusions

The conclusions are based on the factors included in the empirical research and cover the following:

- company and individual profile information;
- entrepreneurship in telecommunications;
- the impact of regulations and liberalisation on entrepreneurship; and
- the impact of technology changes on entrepreneurship.

5.2.1 Conclusions from profile information

The main objective of this section is to confirm that the respondents meet the criteria to provide quality opinions that are representative of the telecommunications industry and specifically smaller startups in the industry.

The feedback and perceptions can differ depending on the licensing category, whether the company is a big or small player, and even the specific regulatory and technology considerations impacting on the type of services provided by the respondent. The main conclusions drawn from the profile information are:

- The main observation is that 74 percent of the respondents represent smaller telecommunications players, those licenced other than the Telkom and the three mobile operators.

- The respondents also represent all licensing categories, which is important to assess the industry-wide technology and regulatory changes.

- There is a wide range of diverse players and a number of them are providing services on top of new technologies. The results indicate that opportunities are created from technology changes. The high number of VoIP and Wireless access services confirm that the industry is changing and that a new set of telecommunications players are present in South Africa.

- There is a direct relation between the years of experience and entrepreneurship. The higher the experience in the industry the more profound is entrepreneurship.

- SMME's in telecommunications have financial turnovers of less than R50 million and employ less than 50 employees.

Overall we can conclude that there is a presence of smaller telecommunications players and they provide services based on new technologies. The respondents are representative of the telecommunications industry and represent smaller players.

5.2.2 Conclusions from entrepreneurship

This section focused on the entrepreneurship literature reviewed. Therefore specific focus is attended to the entrepreneurial background, sources of ideas and opportunities, the startup phase and the competitive strength of the companies. The main conclusions drawn from the entrepreneurship empirical results are:

- The smaller telecommunications startups are entrepreneurial in nature and most of the founders have significant telecommunications experience, mostly gained from their previous corporate career. The startups are mainly financed from personal funds and started based on the identification of an opportunity. The feedback indicates that ISP's and VANS are considered most entrepreneurial, amongst the smaller telecommunications players and they provide hosting, data and Internet access services.

- Entrepreneurs are likely to be more successful if they are closely associated with others that own their own business. Entrepreneurs measure their success by the growth of the company such as moving from a garage to an office park and selling the company to big competitors.

- Telecommunications startups struggle for survival against the big incumbents and face a myriad of challenges that vary from technology failures through to compliance with black economic empowerment.

- Telecommunications entrepreneurship is driven from entrepreneurial drive and innovation. Entrepreneurship opportunities are created by technology changes as opposed to regulatory changes. The main opportunities will be derived from VoIP, IP, wireless and broadband technologies.

- Current regulations constrain entrepreneurship but in terms of liberalisation most entrepreneurial opportunities will come from service-based competition and the unbundling of access networks.

- The most difficult challenge for startups in the telecommunications industry is not technology or even consumer demand but rather regulatory compliance and getting the right staff.

- Entrepreneurial success takes lots of dedication, tenacity, commitment and hard work. Factors such as personal values, people skills, networks, knowledge, drive and passion, creativeness, endurance and honesty are key ingredients for success as highlighted by the smaller startups.

- Successful telecommunication entrepreneurs plan their business goals, embrace technology changes soon, aim bigger and start with lots of capital and a certain business plan and build their competitive strengths around technology and in quality.

The main conclusions drawn from the entrepreneurship information are that there are definite entrepreneurship opportunities in the South African telecommunications industry created by entrepreneurial drive, innovation and technology changes. ISP's and VANS are considered most entrepreneurial, amongst the smaller telecommunications players. From a liberalisation view, most entrepreneurship opportunities will be derived from service-based competition and the unbundling of access networks and from a technology view opportunities will be derived from VoIP and wireless technologies. The most difficult challenge for startups in the telecommunications industry is regulatory compliance.

5.2.3 Conclusions on the impact of regulations on entrepreneurship

This section focused on the impact between regulations and entrepreneurship. Therefore specific focus is attended to the conduciveness of regulatory policies towards entrepreneurship. The aspects included are the interpretation of regulations, regulatory barriers, the opportunities from telecommunications regulatory changes and changes

required to the regulatory regime to enable competition.

The main conclusions drawn from this research are as follows:

- Regulations and policy makers' initiatives are insufficient to promote entrepreneurial activity in telecommunications. Legislation is the single largest factor holding back access to the Internet and/or the Information era. Regulations and acts have restricted the rollout of more efficient technologies and regulations are not conducive to entrepreneurial activity and acts as a significant barrier to entry.

- The current regulatory environment makes it difficult for small players to compete against incumbents with niche offerings although there is sufficient demand to open the industry for broader SMME-type competition.

- The significant aspects to address from a regulatory view are:
  - the creation of a level playing field and fair competition;
  - allowing VANS to trade in facilities and allow VANS interconnection;
  - allowing VANS to buy and resell traffic;
  - providing fair interconnection for startups; and
  - allowing self-provisioning of facilities.

- The Ministerial policy directives in September 2004 permitting VANS from February 2005 to offer voice services have been recognized by stakeholders. The benefits from these opportunities are however moderated because the current Telecommunication regulations do not allow interconnection between incumbent telecommunications operators and the new generation of ISP/VAN providers.

- There is little optimism about the potential of the Convergence Act to enable a free market with fair competition.

- Technological convergence and progress have far outpaced the current regulations.

The overall conclusion is that regulations and the current liberalisation measures are not sufficient to promote broad-based entry of entrepreneurship in the telecommunications industry. Regulations are not in line with technological progress and prevent South Africa from becoming a true information-centric society. Although sufficient consumer demand exists for services, regulations act as a barrier to enter the market. The draft Convergence Act is not addressing concerns about a free market with fair competition.

5.2.4 Conclusions on the impact of technology on entrepreneurship

This section focused on the impact between technology changes and entrepreneurship. Therefore specific focus is attended to determining the most significant technology changes, the opportunity spin offs from technology and conduciveness of technology to entrepreneurship.

The main conclusions drawn from this research are as follows:

- Technical and technology innovations allow new telecommunication startups to successfully compete in the telecommunications industry.

- Technological progress overthrows regulations and entry barriers.

- Demand for interactive services will promote SMME entry and most new entrants will be in the form of Virtual Network Operators (VNO) and Wireless Internet Service Providers.

- The top four technologies that will create business opportunities in the near future, in order of significance, are as follows:
  - Broadband.
  - Wireless.
  - Internet Protocol communications.
  - Content delivery and home networks.

The current presence of smaller telecommunications players is a direct function of technical and technology innovations. Demand for interactive services will promote SMME entry and most new entrants will be in the form of Virtual Network Operators and Wireless Internet Service Providers.

5.3 Main conclusion

There is a presence of smaller telecommunications players, which is mostly a function of technology change and entrepreneurial drive. These smaller players identified niches in the market and started their business as a result of opportunities from the technology and the Internet. ISP's and VANS are considered most entrepreneurial, amongst the smaller telecommunications players.

The most difficult challenge for startups in the telecommunications industry is regulatory compliance and regulations are not in line with technological progress.

Revisiting of current regulations regarding interconnection, facilities, service-based competition and the unbundling of access networks are required to promote telecommunications entrepreneurship. The draft Convergence Act is not addressing concerns about a free market with fair competition.

Demand for interactive services, wireless technologies and VoIP will promote further SMME entry and most new entrants will be in the form of Virtual Network Operators and Wireless Internet and Access Service Providers.

5.4 Recommendations

The recommendations are based on the findings and conclusions of the literature review and the empirical study. The objective of the recommendations is to provide constructive and practical considerations for future implementation.

5.4.1 New regulatory model

Information has become the defining feature of the modern world, due to the use of information in socio-political and economic spheres. The telecommunication sectors are at the heart of a competitive Southern Africa and telecommunications are both the core and infrastructure of the information economy.

Telecommunications regulation focusing on competition as a fundamental tool for achieving both industry economic growth and social objectives is therefore recommended for implementation. Rules and standards to protect consumers must be sufficient, but not so costly as to discourage innovation and halt progress.

Basic or universal services and value added enhanced services or 'fringe' services should be regulated separately. The extension of telecommunications and ICT services to all parts of the country at affordable prices and within reasonable distances from the people should be part of the basic and universal services policies. An independent telecommunications-specific regulator should govern the basic services rules. The value added services sector requires less government intervention and free market or an economy wide competition regulator is proposed. In this model national competition laws regulate all sectors, including horisontal and vertical integration, and the courts settle market related disputes.

Intensified industry convergence, driving demand for communication and information services, opens the market to various service providers and Information Communication and Technology (ICT) players. Therefore the entrance of service providers offering multimedia services, including VANS and ISP's offering VoIP and interactive services, Mobile Virtual Network Operators, Wireless ISP's, should be encouraged with friendly regulations to grow the economy and industry.

The most difficult challenge for startups in the telecommunications industry is the greyness surrounding regulatory compliance and it is proposed that these new smaller players be subjected to competition laws as opposed to regulator specific rules. Competition law supported with commercial agreements should govern interworking at a physical network

level, and the value-added services players should be allowed to provide directly to retail consumers. The aforementioned will facilitate fair interconnection and ensure that major players and incumbents provide competitive wholesale rates.

The aforementioned will result in entrepreneurship together with free market goals such as fair competition, reduced cost of communication and a thriving information-centric e-economy.

5.4.2 Regulations and entrepreneurship

The empirical research confirmed that regulations and the current liberalisation measures are not sufficient to promote broad-based entry of entrepreneurship in the telecommunications industry; hence the following recommendations are made:

- Establish a new licensing framework that support the separation of basic services and value added services, and provide clear definitions on the rights that come with it. The licensing framework should allow broad-based competitive entry in "fringe" services such as applications, content provisioning, multimedia, paging, trunking, value added services, closed user groups or private networks, satellite services, teleports and terminal equipment. The draft Convergence bill should adopt the separation of basic and value added services and move away from the current licensing system based on the nature of the technology to a system based on the nature of the service being offered.

- Regulations should be brought in line with technological progress. Voice over IP is legal but interconnection between VANS and incumbents are not provided for in the current regulations. Recognising the dynamic nature of telecommunications technology and service opportunities, it is probably more important that the barriers to entry be minimised and the door to competition be opened as wide as possible.

- Ensure that the Convergence Act establishes a free open market with fair competition. Convergence will create new markets and new efficiencies because services are no

longer locked into specific forms of infrastructure. Global regulatory and technological trends are demanding a rapid migration towards open markets.

- The regulator must be independent of other interest in the telecommunications sector and independent of political interest. The government's current interest in Telkom, Sentech and the future SNO, creates a conflict of interest.

- The changing landscape of local interconnection with multiple operators and multiple services necessitates an urgent review in terms of pricing and interconnection rules. Internet telephony will force this issue, as local operators lose the ability to determine the quantity and type of data/calls that enter their networks, break in and out of incumbents networks must become a function of a commercial agreement.

- Facilities-based competition should be encouraged. The network operators can be induced to encourage access to their networks and facilities by increasing the wholesale aspects of their business, avoiding the unnecessary duplication of infrastructure and creating strong revenue streams, thereby supporting the entrants of new smaller competitors.

- Mobile Virtual Network Operators (MVNO's) should be allowed to resell traffic by leasing infrastructure and buying minutes at wholesale rates to be resold to retail consumers. This will free the Mobiles from the pricing structure that is currently imposed on them. The MVNO concept is well proven in Europe and allows customers additional choice without incurring expensive infrastructure build investments.

- Clear competitive rules must be provided for new entrants such as Wireless Access Service Providers (WASP's). Their most pressing need is a clear legal and regulatory framework. There are now almost 200 WASP's operating in South Africa. These companies are an important link in the content provision value chain and provide bulk SMS carrier services, ring tones, picture messages and community-based services.

5.4.3 Technology and entrepreneurship

The empirical research confirmed that the presence of smaller telecommunications players is a direct function of technology innovation. The leverage of opportunities from technology changes could be optimised by means of the following recommendations:

- Technology innovation centres with a focus on technology entrepreneurship should be established. Technology knowledge and entrepreneurial training is a pre-requisite to exploiting the vast opportunities to be derived from telecommunications technology. Technology should be seen as a pillar of entrepreneurship. This is a national government responsibility.

- Telecommunication technologies should be promoted in terms of entrepreneurship to grow the information society. Technology neutral regulations must be implemented. Further regulatory liberalisation to provide and use the following technologies should be undertaken:
  - broadband;
  - consumer mobility technologies;
  - content delivery and home networks;
  - wireless local access; and
  - voice over Internet protocol.

- The South African government should seize technological and service opportunities. Most countries have recognised that if their telecommunications sectors are to be in a position to seize the new technological and service opportunities, entrepreneurship, good management, frontier technical knowledge, a detailed understanding of consumer demand, wise public policy direction and effective regulation all are essential.

- Remove entry barriers for multimedia entrants. Within the telecommunications and computer industries there is widespread agreement as to the importance of interactive media. There is a belief that incremental revenues will be derived as a result of selling the entertainment and information content and in transporting and transforming data to

and from customer and provider.

- The dramatic growth in data traffic is driving the growing demand for broadband technology, both fixed and wireless. Competitive rollouts of broadband from new operators like ISP's and even newer WISP's should be legalised. This will grow the backbone capacity necessary for an e-economy.

5.5 Review of study objectives

The main objective of this study was to assess to what extent the regulatory changes together with the technology changes are creating an entrepreneur friendly environment that could see new smaller startups successfully operating in the South African telecommunications industry.

In terms of the main objective a literature study covering entrepreneurship and emerging business opportunities in the telecommunications industry was carried out in chapter two. The literature study covering the current regulatory and technology changes and the impact on entrepreneurship were conducted in chapter three. The literature study and subsequently the empirical study confirmed the entrepreneurial presence in the telecommunications industry and identified the technology and regulatory factors that promote or constrain entrepreneurship, as concluded in this chapter.

5.5.1 Literature study

The literature study in chapter two focused on the subject disciplines of entrepreneurship and the relation between entrepreneurship and the two factors essential to competition in telecommunications; liberalisation of regulations and technology changes. The literature review has successfully highlighted the fact that entrepreneurship opportunities in telecommunications are created by technology and regulatory changes.

The literature study in chapter three focused on the South African telecommunications liberalisation measures and technology changes. The literature review identified the current

state of telecommunications liberalisation and the numerous regulatory aspects that have a direct impact on new entrants. The most significant technology changes and the potential businesses opportunities to be derived from these technologies were also discussed.

The literature study formed the basis for the design of the empirical instruments.

5.5.2 Empirical study

The empirical study consists of four sets of surveys and free text interview questions. The survey was designed to both collect information and to serve as a quality control measure in reaching conclusions on the emerging entrepreneurship opportunities in the changing telecommunications industry.

The results confirmed the presence of smaller telecommunications players, which is mostly a function of technology change and entrepreneurial drive.

The results further confirmed future entrepreneurship opportunities and identified the specific regulatory and technology changes that promote or constrain entrepreneurship.

The findings of the empirical research have been used as a basis for the development of solutions to promote entrepreneurial growth in telecommunications to establish an information centric society.

5.6 Future research opportunities

Considering the volatility of the telecommunications industry as a result of technology convergence and industry convergence between telecommunications, information technology and broadcasting it would be appropriate to conduct further research.

This study topic was as far as known the first on entrepreneurship in telecommunications in South Africa and the pioneer work established a basis and foundation to conduct future research on:

- The successfulness of the Convergence Act to alleviate the regulatory factors that constrain entrepreneurship and whether the act succeeds in creating a fair and open market that facilitate broader competition in the telecommunications industry.

- Extrapolate the entrepreneurship prevalence that exists before true technology and industry convergence versus post-convergence.

- This research identified that entrepreneurial opportunities are available as a result of technology changes. Future research could focus on how these opportunities could be exploited to the benefit of the South African economy.

- The pressures on the South African government to liberalise and open the market because of technology drivers and the need to become an information-centric society with an e-economy.

- This research further identified and acknowledged a new generation of telecommunications players; wireless access providers, mobile virtual network providers, wireless internet service providers, content and application providers, under service area licencees. Future research could analyse the evolution of these players and the impact on the industry.

5.7 Summary

This study verified the existence and presence of smaller telecommunications players in South Africa. The existence of entrepreneurship opportunities in the South African telecommunications industry is created by entrepreneurial drive, innovation and technology changes.

Regulations and the current liberalisation measures are not sufficient to promote entrepreneurship in the telecommunications industry. Regulations are not in line with technological progress and prevent South Africa from becoming a true information centric society. Although sufficient consumer demand exists for services, regulations act as a

barrier to enter the market. The draft Convergence Act is not addressing concerns about a free market with fair competition.

Liberalisation of service-based competition and the unbundling of access networks will promote entrepreneurship and most entrepreneurship opportunities will be derived from VoIP and wireless technologies. Demand for interactive services will promote SMME entry and new entrants will be in the form of Virtual Network Operators, Wireless Access Operators and Internet Service Providers.

A new model of telecommunications regulation focusing on competition as a fundamental tool for achieving both economic and social objectives should be adopted. Rules and standards to protect consumers must be sufficient, but not so costly as to discourage innovation and halt progress. New smaller players should be subjected to competition laws as opposed to regulator specific rules. The aforementioned will result in entrepreneurship together with free market goals such as fair competition, reduced cost of communication and a thriving e-economy. The licensing framework should allow broad-based competitive entry in "fringe" services.

Regulations should be brought in line with technological progress. The regulator must become independent of other interest in the telecommunications sector and independent of political interest. The changing landscape of local interconnection with multiple operators providing different combinations of the same integrated services must be revisited.

The importance of advanced technology in the new e-economy is unmistakable, and technology should be applied in an entrepreneurial context. The South African govemment should seize technological opportunities in the changing telecommunications industry. This however requires, entrepreneurship, good management, and frontier technical knowledge, a detailed understanding of consumer demand, wise public policy direction and effective regulation.

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Annexure A – Opinion survey

The attached annexure is an export of the web-based survey to a word document format. The word document provides some idea of the survey but the look and feel of the http Internet pages are friendlier and interactive.

Survey introduction as hosted on the web

The South African Telecommunications industry is entering its eleventh year of liberalisation. Looming large in the future is the new Convergence Act and together with the regulatory changes already implemented it could have a significant impact on the market structure. Coupled with technological development in the telecommunications and broader information and technology sector, the expansion of the market is set for growth and the attraction of business startups.

Cobus Mc Quirk under guidance from Dr. Stéphan van der Merwe from the Potchefstroom Business School undertake this study to assess the effect of liberalisation and technology changes on the creation of new business opportunities.

The questionnaire consists of four sections; profile information, regulatory, technology and entrepreneurship. The questionnaires were distributed to regulatory and policy-making staff, major established operators, new smaller startups, ISP's and VANS as well as to academics specializing in telecommunications.

In order to provide the industry with quality information we encourage participation to ensure a representative view. The survey takes 25 to 40 minutes to complete. Your responses will be treated as confidential and will not be made available to anyone. The final report will provide insight on opportunities that will include amongst others:

- voice communications using the Internet;
- self provisioning of facilities;
- the potential impact of the Convergence Act; and
- the impact of wireless and broadband technologies.

Be assured that the information you provide will be treated with the strictest confidence and no individual response will be treated in isolation. The feedback will be on the total results of all the respondents. Data from this research will be reported only in the aggregate. Your information will be coded and will remain confidential. Thank you very much for your time and support.
Please start with the survey now by clicking on the Continue button below:

Section A – Profile information

Question 1

Indicate your licensing category or categories

1. Public Switched Telecommunications Networks
2. Land Mobile Networks
3. Under-serviced Area Licencee
4. Value Added network and or Internet Service Provider
5. Private Telecommunication's licence
6. Paging and trunking, radio licences
7. Signal distributor
8. Other _____

Question 2

What are the core telecommunications services provided by your company?

1. Comprehensive voice and data
2. Networking services
3. Voice over Internet Protocol
4. Conveying voice and data
5. Data communications
6. Wireless access operator services
7. Internet access services
8. Content provisioning, cyber trade
9. Services
10. Not applicable
11. Other _____

Question 3

What is your position within the company?

1. Owner / Founder / Entrepreneur
2. Top Management
3. Management
4. Operational
5. Advisor or consultant
6. Other _____

Question 4

How many years experience do have in the telecommunications industry?

1. 20+
2. 15-19
3. 10-14
4. 5-9
5. 0-4

Question 5

How many people are permanently employed in your company?

1. >500
2. 200-500
3. 100-199
4. 50-99
5. 11-49
6. 6-10
7. 1-5

Question 6

What was the company's turnover for the previous financial year?

1. > R 50 million
2. R 20-50 million
3. R 10-19 million
4. R 6-9 million
5. R 2-5 million
6. < R 2 million

Section B - Entrepreneurship

	Strongly Agree	Agree	Disagree	Strongly Disagree
The business is an entrepreneurial startup.				
The source of the business venture idea was based on:				
- Technology changes				
- Deregulation and regulatory changes				
- Niche / underserved expansion				
- Societal change				
- Value chain optimization				
- Innovation				
- Entrepreneurial drive				
You have previous experience in the telecommunications industry.				
What did you perceive to be the competitive strength of your company / venture at startup:				
- Technology				
- Low cost margins				
- Differentiation				
- First mover				
- Quality				
What, in hindsight, would you say are the strengths:				
o Technology				
o Low cost margins				
o Differentiation				
o First mover				
o Quality				
Which critical business opportunity elements did you consider for sustainable success:				
o Industry				
o Market				

o Economics				
o Harvest potential				
o Competitive advantage				
o Differentiation				
Your business has a technological advantage over competitors.				
The following regulatory changes will create entrepreneurial opportunities:				
o Self provisioning of facilities				
o Access networks unbundled				
o Interconnection with VANS				
o Equal access to numbering resources				
o Facilities based competition				
o Service based competition				
o Convergence Act				
The following technology changes will create entrepreneurial opportunities:				
o Broadband				
o Wireless				
o VoIP				
o 3G				
o Internet Protocol communication				
o Satellite communications				
o Home networks				
Once the business got going, the most difficult gaps to fill and problems to solve were:				
o Cash flow				
o Staffing				
o Technology				
o Regulatory compliance				
o Creating demand				

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
There are significant entrepreneur opportunities in the SA Telecommunications landscape.					

	Harvest	Maintain status quo	Expand	Diversify
In terms of the future, do you plan to:				

	Commitment and determination	Intelligence	Creativity and innovativeness	Capacity to inspire	Values	Opportunity obsession	Risk taking
As you look back what do you believe are the most critical concepts, skills, attitudes, and know-how you needed to get your company started and grown to where it is today:							

Section B – Entrepreneurship, free-text and choice specific questions:

Question 1

How was the original startup financed?

1. Personal funds
2. Commercial bank finance
3. Venture capital
4. Equity offerings
5. Government programs
6. Joint venture

Question 2

What career did you practice before this?

1. Self employed
2. Professional
3. Corporate employee
4. Jobless

Question 3

How did you ensure compliance with the Telecommunications regulatory environment?

1. Appointed / consulted a legal advisor
2. Self study
3. Didn't consider

Question 4

What outside help did you get when you started the company:

1. Experienced advisors
2. Technology experts
3. Professionals, lawyers, accountants
4. Other _____

Question 5

Who else did you know while you were growing up who had started or owned a business?

1. Parents
2. Friends

3. Family
4. None
5. Other _____

Question 6

How did it influence you?

Question 7

What is the main reason for starting the business?

1. Opportunity driven
2. Forced circumstances
3. Took over family business
4. Other _____

Question 8

Considering the Convergence Act – your future licence category will most likely be:

1. Communication Network Services – INDIVIDUAL
2. Communication Network Services - CLASS
3. Communication Network Services – EXEMPT / UNLICENCED
4. Communication Services – INDIVIDUAL
5. Communication Services - CLASS
6. Communication Services – EXEMPT / UNLICENCED
7. Not applicable
8. Other _____

Question 9

Indicate your future market?

1. Network facilities
2. Applications services
3. Content services
4. Network services

5. Other _____

Question 10

What was your most triumphant moment - your worst moment?

Question 11

The typical services provided by VAN's are:

1. Hosting mail and web
2. Voice communications
3. Data communications
4. Internet access services
5. Other _____

Question 12

How did you get started?

Question 13

When you looked for key people, were there any specific skills or know-how you were particularly seeking?

Question 14

What do you consider your most valuable asset, the thing that enabled you to make it?

Question 15

If you had to do it over again, what would you do differently?

Question 16

Are there any other questions you wished we asked, from which you think we could learn valuable lessons?

Section C - Regulations

	Strongly Agree / Significantly important	Agree / Important	Disagree / Not important	Strongly Disagree / Not at all important
The policy makers' current initiatives are sufficient to promote entrepreneurial activity in telecommunications.				
Service providers and ISP's are legally allowed to provide voice over the Internet services.				
The USAL's are truly entrepreneurial.				
VANS are truly entrepreneurial.				
ISP's are truly entrepreneurial.				
In the current regulatory regime there are no real small players in the industry.				
In the current regulatory environment small players can compete against incumbents with niche offerings.				
In the long run, the extent of competition depends on whether there is enough demand to support multiple companies.				
There are significant regulatory barriers to enter the market (like a spectrum licence or the right-of-way to lay fibre).				
Startups need connections with the networks that are already in place to operate a feasible business.				
The smaller carriers rely on the backbone of established carrier's networks and hence a fair pricing/costing system should be provided for by regulations.				
The aim of regulation should be to facilitate fair competition.				

South Africa's telecommunications legislation is the single largest factor holding back access to the Internet and or the Information era.				
Regulations and acts have restricted the rollout of more efficient technologies, broadband Internet access, high-speed wireless, VoIP, WiFi, and Satellite.				
Government's focus should be on socio-economic development as opposed to the deployment of technologies.				
The SA market has sufficient demand to open it for SMME type communication competition.				
Current regulations promote small, medium and micro-enterprises within the industry.				
The USAL licences offer an opportunity for SMME's or a co-operative to gain a foothold in the market.				
The state of telecommunications in 2010 depends less on technical innovation, than on policy.				
Self-provisioning of facilities will stimulate the entrance of new SMME's.				
Resale of bandwidth will stimulate the entrance of new SMME's.				
USAL's require a more supportive regulatory and licensing regime to be succefull.				
VANS must be allowed to trade in telecommunication facilities to stimulate greater data and voice communications competition.				
All ISP's may carry voice services such as VOIP currently.				
The licensing of the SNO will create spin-off business opportunities for SMME's.				
VANS must be allowed to interconnect with incumbent operators.				

VANS should be allowed to buy wholesale traffic from the incumbent operators and resell it onto consumers.				
Current regulations discourage innovation.				
Service providers must be allowed to engage directly with retail customers.				
Competition from mobile virtual network operators (MVNO), should be encouraged.				
The Convergence Act will succeed in drawing the unemployed into the workforce.				
The Convergence Act holds potential for increasing the number of small, micro and medium sized entrepreneurs.				
The interconnection regime will grow more complex with additional players entering the market.				
Interconnection rates should be governed by ICASA.				
In order to provide choice to customers, the regulation should stipulate mandatory unbundling of the local loop in the SMME areas.				
The formulated policy and regulations should be technology neutral and allow new entrants to employ any type of technology to provide a service.				
Wireless access technologies will be a dominant local loop access mechanism.				
More multimedia licences should be awarded.				
Technological convergence has outpaced regulatory changes.				
Convergence of services on packet switched digital networks will culminate in effective competition enablers for SMME's.				

Section D - Technology

	Strongly Agree / Significantly important	Agree / Important	Disagree / Not important	Strongly Disagree / Not at all important
Voice communications using Internet standards will be the fastest growing technology application in 2006.				
The most significant technology driving the telecoms industry is wireless.				
The most significant technology driving the telecoms industry is broadband.				
The demand for data-network backbone capacity outstrips the supply.				
Wireless is the quickest way to provide broadband access.				
Wireless offers a far cheaper way to get around the last mile.				
The need for consumer mobility is another key driver why wireless access technology will get so much attention in years to come.				
Demand for interactive services will promote SMME entry.				
Technological progress will eventually overthrow the local-loop monopolies.				
Wireless Internet Service Providers will grow dramatically.				
The introduction of 3G technologies will provide opportunities for development of a wide range of new value added services to be provided to end consumers by new players.				
Satellite technology is set for takeoff.				

Technical developments in the home will lead to home networks to enable content that is downloaded to a PC to be shown on a TV or heard via hi-fi and audio equipment.				
Smaller entrants will mostly benefit from the decision to liberalise access to the incumbent's local networks.				
Because of broadband, unlimited calls for a fixed monthly subscription rate is just months away.				
WiMAX will take over from satellite.				
Machine-to-machine (PC's, cars, home appliances) communication over mobile networks will be the next big revenue generator.				
The Internet subscription charge will overthrow distance and time based charging.				
Content providers should be allowed to provide directly to customers via the Internet.				
We'll soon use our mobile devices to pay for a Coke or buy theatre tickets.				
Technical innovations allow new telecommunication startups to compete for a piece of the market.				
GPRS Internet access will become commonplace.				
Virtual Network Operators (VNO) will bring about true technology convergence and is best suited to provide value added service offerings to consumers.				

Annexure B – Survey respondents

Response ID	IP Address	Timestamp	Time Taken to complete (Minutes)	Position
422776	196.25.255.210	8/31/05 6:06 AM	27.65	Management
430002	198.54.206.90	9/5/05 3:31 AM	25.13	Management
438063	198.54.206.91	9/8/05 1:47 AM	39.13	Operational
438501	198.54.206.91	9/8/05 7:34 AM	15.08	Operational
441131	168.209.98.35	9/9/05 5:55 AM	73.75	Management
441199	196.25.182.194	9/9/05 6:23 AM	37.15	Owner / Founder / Entrepreneur
444166	196.25.255.210	9/9/05 6:39 nm	41.87	Owner / Founder / Entrepreneur
444573	196.36.80.163	9/10/05 1:47 AM	39.20	Owner / Founder / Entrepreneur
450882	196.36.80.163	9/13/05 1:38 AM	25.33	Owner / Founder / Entrepreneur
451348	198.54.202.18	9/13/05 6:46 AM	15.70	Owner / Founder / Entrepreneur
457386	196.25.255.242	9/14/05 2:57 nm	28.00	Other
459255	196.29.130.223	9/15/05 3:16 AM	22.40	Owner / Founder / Entrepreneur
460815	198.54.202.234	9/15/05 12:22 nm	29.75	Other
460834	198.54.202.18	9/15/05 12:51 nm	22.33	Top Management
463628	196.25.255.210	9/16/05 9:41 AM	25.05	Top Management
469651	196.29.130.204	9/19/05 9:22 AM	42.47	Management
484983	196.15.250.254	9/23/05 5:13 AM	35.65	Top Management
489793	198.54.206.91	9/26/05 2:24 AM	40.38	Top Management
490803	196.25.32.50	9/26/05 8:25 AM	26.53	Management
493310	198.54.202.234	9/26/05 3:59 nm	40.03	Owner / Founder / Entrepreneur
494933	198.54.206.91	9/27/05 2:18 AM	27.87	Management
499331	196.25.70.38	9/27/05 4:09 nm	26.75	Owner / Founder / Entrepreneur
501882	196.34.2.187	9/28/05 2:58 AM	27.63	Advisor or consultant
502806	198.54.202.210	9/28/05 6:03 AM	21.42	Owner / Founder / Entrepreneur
519665	198.54.202.234	9/29/05 11:55 AM	28.92	Top Management
529932	198.54.206.90	9/30/05 4:38 AM	27.63	Operational
531008	196.36.80.163	9/30/05 7:07 AM	19.00	Owner / Founder / Entrepreneur
531008	196.36.80.163	9/30/05 7:07 AM	19.00	Top Management
532071	160.124.48.1	9/30/05 10:18 AM	37.03	Owner / Founder / Entrepreneur
553777	168.209.97.34	10/3/05 4:05 AM	23.30	Top Management
699025	196.25.168.1	10/4/05 5:39 AM	18.40	Owner / Founder / Entrepreneur
714142	198.54.206.91	10/7/05 8:07 AM	23.52	Owner / Founder / Entrepreneur