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Services Oriented Technologies: A Focus on the Financial Services Sector in South Africa

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1. Introduction

Over the years, business and our daily lives have been bombarded with various forms on inventions and technology. The public adopted technology at an exceedingly fast rate and the world was transformed. In the 21st century, technology rules our daily lives. We assemble documents and reports on computers, use them for PowerPoint presentations, take laptops on the road and communicate via email and social networks, complete our banking transaction using cell phones and do online banking to mention just a few. The 21st century worker has the freedom to work from any place at any time, with always available access to information. Laptops, notebooks, wireless broadband, Smartphones and social networking have transformed the world into a global market. The shape of the business landscape took a different course because of the proliferation of technology.

The financial services sector in South Africa is one of the sectors, where the impact of the information and connection era is highly felt and ever changing. There is a growing recognition across financial service providers in South Africa that technology and innovation is the cornerstone for surviving in the 21st century economy. This is evident in almost all corporate messages in the banking sector. Therefore, the chapter focuses on technological innovations in the financial services sector. The chapter presents a theoretical review as well as the results of the empirical research that was conducted in South Africa. It is paramount as the a starting point to shed light on the concept of technology and innovation in detail. Understanding the concept of technology in detail is paramount as a basis from which innovation can clearly be articulated. Innovation can be in the form of product innovation (that results in new products or services) or process innovation (that involves the introduction of new ways of performing tasks in an organisation).The following section begins with an explanation of the concept of technology and technological innovations.

2. Literature review and concepts

The section will provide a concise discussion of the key concepts, key events and literature related to technological innovations with a particular focus on financial services sector. This is intended to shed light on the key issues related to technological innovations and their impact in the 21st century economy.

2.1 Technology and technological innovation

The term technology can be defined in many different ways depending on the context in which it is applied. For the purpose of this chapter, technology can be defined as, material objects or tools that are used by human beings such machines, hardware and utensils, in performing different activities (Bain, 1937). Technology furthermore, includes systems, methods of organisation and techniques used by the business. The term technology can be applied generally or to specific area, for example information technology (technologies use in obtaining, storing, retrieval and dissemination of information), medical technology (tools, machinery, utensils, etc, used by medical practitioners), state-of-art technology, etc.

In the financial sector, technologies which are mainly going to be focused on in this chapter includes Automated Tellers Machines (ATMs), computer hardware and software, telephones and mobile phones, the internet, among others. Technological innovations have been attributed to contribute to the distribution channels in the financial services sector. Electronic Banking (E-Banking) is one of the most notable channels. E-Banking merges several different technologies such electronic fund transfer point of sale technologies, internet banking, cell phone banking, etc. Each of these evolved in different ways, but in recent years different groups and industries have recognized the importance of working together. Several technologies were invented with a particular aim to improving service delivery in the business sector. Of particular influence in the financial services sector is the information technology, the following section discuses information technology.

2.1.1 Information Technology

Information technology (IT) refers to hardware and software that are used to store, retrieve and manipulate information. IT comprises computer hardware and software as well as other telecommunication equipment such as telephones, fax machines and mobile communication devices to mention just a few (Jürgen, 2002). The introduction of telecommunications into bank markets dates back to 1846 when the telegraph reduced stock price differentials between New York and regional stock markets (Garbade and Silber, 1978). According to Leslie (2000), the most important IT applications had their origins in US government-sponsored research in the first half of the twentieth century. Interactive IT applications would never have existed without a long and expensive gestation period in which computer power and telecommunication applications were devoted to help the US gain the initiative in science and technology. Indeed, the British experience with computer hardware development would tend to confirm the view of a defence-based technology push. The first stored-program computer in the world was developed in 1948 by academics (Freddie Williams and Tom Kilburn) at Manchester University (Anonymous, 1998).

In brief, early adoptions of telecommunications and computer applications had greatest impact in organised high value wholesale bank markets, that is, those activities that had traditionally been further away from volume transactions through retail bank branches (Anonymous, 1998). Banks absorbed the new technology on the back of a growing market for retail bank services, which expanded as middle income individuals became a growing proportion of the population. Information technology has enormous effects on the functioning of each and every enterprise operating in the 21st century economy. Jürgen (2002) argued that IT facilitates complementary innovation, enabling firms to increase

output via the introduction of new processes and altering the competitive environment, thereby creating pressure for firms to adjust. Meeting these challenges require changes in the organisation of firms, for instance in the form of vertical disintegration, streamlining of managerial levels and more decentralised production, and a well educated labour force able and motivated to exploit the opportunities offered by new technology.

Knowledge on the existence and importance of IT to an enterprise alone is not sufficient for the successful running and competitiveness of the enterprise in the market. The ability to develop new and unique ways of doing things is the key to success in the 21st century economy, which is characterised by rapid changes in technology. Hence, to be competitive in the market the enterprise should be innovative. The financial services sector in South Africa is bombarded with information technologies, a differentiation strategy by several banks.

2.1.2 Technological innovation

Innovation involves using new knowledge to transform organizational processes or create commercially viable products and services. The sources of new knowledge may include the latest technology, the results of experiments, creative insights or competitive information.

Innovation can be broadly defined as the process of creating new ideas and putting them into practice. It is the means by which creative ideas find their way into everyday practice in the form of new goods or services that satisfy consumers or as new systems or practices that help organisations to improve the produce of goods or services (Wood, Wallace, Zeffane, Schermerhorn, Hunt and Osborn, 2001:611).

Rogers (1998:2) defined innovation as a process of introducing new ideas to the firm which result in improved performance of the firm. He identified five types of innovation which are:

- Introduction of new products/services or a qualitative change in the existing product,
- Process innovation new to the industry,
- Opening of a new market,
- Development of new sources for raw materials and other inputs, and
- Changes in industrial organisation.

Innovation can be thought of in two contexts: product innovation and process innovation.

a. Product Innovation

Product innovation results in the creation of new or improved goods or services. Product innovation encompasses development of new products, changes in design of established products, or use of new materials or components in manufacture of established products (Wood et al., 2001). Product innovation can take one of the following ways:

i. a modified version of an existing product range,
ii. a new model in the existing product range,
iii. a new product outside the existing range but in a similar field of technology,
iv. a totally new product in a new field of technology

b. Process Innovation

Innovation that results in better ways of doing things, which is new efficient and effective processes and structures, is called process innovation (Wood et al., 2001). Process innovation

is aimed at improving the operations of the organisations. This includes increasing productivity, efficiency, safety at work and waste reduction to mention just but a few. Process innovation culminates in the production of high quality products at lower costs, thus process innovation can be viewed as instrumental to product innovation.

Both product and process innovation are important in creating, communicating and delivering superior value to consumers. Technological innovations, which encompass both product innovation and process innovation, should be part of the organisation's culture to survive the competitive pressures of the 21st century economy.

Technological innovation comprise of product or process, continuous or discontinuous, radical or incremental innovations in the financial services sector leading to improved or new products. 'Radical' innovations refer to new products that result from advances in knowledge/technology. 'Incremental' innovations include improvement of process or product designs, with or without up gradation of machinery/acquisition of new machinery.

Two main aspects form the core of innovation namely invention and application. Invention is the process of discovery, while application is the act of use (Wood et al, 2001). Thus;

Innovation = Invention + Application

Innovation should be viewed as a continuous process in an organisation if the organisation is to continue operating successfully.

Having laid out the major aspect of technology and innovation, the meaning of technological innovations becomes apparent. In this case technological innovations can be viewed in terms of the creation of new tools, machines and processes that are used by human beings in the quest to develop better goods or services, and better ways of doing things. According to Subrahmanya (2005) technological innovation is the transformation of an idea into a new or improved saleable product or operational process in industry or commerce. It is therefore important to examined technological innovations in relation to their deferential impact on the business landscape. The following section provides an overview of a few selected services oriented technologies that impact the financial services sector and business in South Africa.

2.2 An overview of services oriented technologies in the financial services sector

Technological innovations in the financial services sector appeared in the form of the introductions of automated tellers machines, the rise of internet banking, electronic cards, cell phone banking and various other customers tracking and accounts management software to mention just a few. In the financial services industry at large, the banking sector was one of the first to embrace rapid globalization and benefit significantly from Information Technology (IT) developments. Technological developments in the banking sector started in the 1950s with the installation of the first automated bookkeeping machine at banks. Automation in the banking sector became widespread over the next few decades as bankers quickly realized that much of the labour intensive information handling processes could be automated with the use of computers. The first Automated Tellers Machine (ATM) is purported to have been introduced in the USA in 1968 and it was only a cash dispenser (Jayamaha, 2008). The emergence of the ATM marked the beginning of self-

service banking as services provided by the bank teller could be performed on a 24-hour schedule and at the customers' convenience rather than during banking hours.

The following case study illustrates the way technology is shaping the financial services sector, in particular banking.

Partnering around technology to tackle poverty

The mobile money transfer service M-Pesa (M stands for "mobile", Pesa means "money" in Swahili) is one of the best examples of transformative power of partnerships. With the initial support of the UK Department for International Development (DfID) through matching a fund, the Kenyan mobile phone service provider Safaricom has created a service which allows users to make and receive payments, transfer money to other users and non-users, and deposit and withdraw money without needing to visit a bank.

By relying solely on the ubiquitous mobile phone, M-Pesa has significantly expanded financial access among Kenya's poor. By bringing the unbanked into the market, it has also created new markets for goods and services tailored to mobile banking. Already serving more than 14 million users in Kenya, this service is being replicated in other African countries including Rwanda, South Africa, Tanzania and Uganda.

Source: Adapted from: African Business, 45th year, No. 377. July 2011

These new technologies in the financial services sector introduced new ways of doing financial transactions and also, had made possible the introduction of other financial products or services. For example, in South Africa, technological innovations made it possible for Standard Bank to introduce the E-Plan (Electronic Plan – a card based transaction product that was introduced in 1994). Also a result of technological innovation is FNB's Smartsave suite of products – card-only account access, often with some savings or other features (such as funeral insurance) built in (Porteous and Hazelhurst 2004). ABSA also offers a Business Essentials package that includes QuickBooks Pro Bookkeeping which also assists in financial management.

Various transformations took place in the banking sector which resulted in new banking products, services and processes. Of notable importance is the introduction of online banking, card based banking and ATMs which played a significant role in increasing convenience to banking services by customers. A number of ATMs can be found in most of rural towns and townships as well as in major towns in South Africa.

Also notable in the South African banking sector is the increasing use of electronic commerce (e-commerce). E-commerce is the sharing of business information, maintaining business relationships and conducting business transactions by means of telecommunication networks (Chaffey 2002). The increasing use of the internet and mobile phones has made possible the implementation of e-commerce.

The arrival and wide use of credit cards in the South African economy is also a notable consequence of technological innovations in the South African Banking Sector. Credit card alliances with non financial institutions have been common practices in South Africa. For example credit card alliances were noted in 2006 between Edgars and Standard Bank, Metropolitan and Mercantile Bank, Kulula and FNB and Virgin and ABSA and Voyager and Nedbank among others (Hawkins 2006). These alliances allow customers to do their trading

transactions with these companies anywhere without having to go to the bank or the bank's ATM to make withdrawals, thus increasing easy access to funds for customer whenever on demand.

Apart from consumer intended technologies, technologies such as smart phones, notebooks, broadband access and social networking sites and applications among others, found a place in the day to day operations of businesses. For example, smart phones have increased productivity by enabling employees to work outside the confines of their offices by creating a new phenomenon in business that I would like to term, '*the mobile workforce*". Besides being an integral part of our daily lives, smart phones play a critical role in businesses and smart phones are fast becoming a replacement for laptops and notebooks.

Furthermore, the use of social networking sites as marketing tools as well as connecting with customers is fast becoming common practice among several businesses in South Africa and elsewhere around the world. According to Intergr8 co-founder, Rob Sussman, an estimate of about 10% of the world population is on Facebook, with 50% active every second day. From a business perspective, Facebook allows you to build a substantially larger social network than one can build in an isolated non-networked geographically restricted environment. *"I use Facebook to connect to the Intergr8 employees and customers for more direct personal communication"* said Rob. The majority of companies in South Africa have Facebook pages where they can connect with customers anytime. Almost all banks in South Africa have Facebook pages where customers can "like" and express their views, raise their concerns and ask questions. Furthermore, banks also use this platform to communicate their corporate messages to their customers and potential customers.

The introduction and use of different technologies in the banking sector is mainly to create, communicate and deliver superior value to consumers with the major objective of being competitive in the market. A question will arise as to how consumers are viewing such a technology wave and whether it is beneficial to them. The next section will account for consumers' use of technology and their reactions to technological changes.

2.3 The use of technology in the services sector

Technological innovations play an important role in increasing the competitiveness of the firm, particularly in the 21st century economy where advances in technology are a common phenomenon. Simple technologies in the financial services sector came in terms of the widespread issuing of magnetic stripe ATM cards and the phasing out of high cost manual methods of banking such as transacting at counters with savings books (Porteous and Hazelhurst 2004). A study by the research company, Gartner (2011), estimated that by 2014 more than three billion of the world's adult population will be able to transact electronically via mobile and internet technology. Gartner (2011) revealed that two trends are emerging that will drastically change the future of the world's trading economy, viz; (i) the rapid rise of the adoption of mobile and internet technology in emerging economies; and (ii) advance in mobile payment, commerce and banking. These trends exhibit the shape of our technological era. Also contributory to the banking sector is the increasing use of cell phones. World Bank analysts have suggested that mobile commerce, (the use cell phone in doing trading transactions) and electronic finance are apparent in developing countries as connectivity levels and reliability increases. They predicted that this trend will allow developing countries to leapfrog in the

development of their financial systems. For South Africa, 2006 was projected as the take off year for online banking (Porteous and Hazelhurst, 2004).

Herferman (2001) asserted that the retail banking sector has witnessed rapid process technology, where new technology has altered the way key tasks are performed. In his study in the UK, the number of ATMs in services has risen from 568 in 1975 to 15208 in 1995, a trend he said was also observed in all industrialized countries.

In another study, Berger (2003:143) identified the changes in the use of selected banking technologies, indicating a significant growth in the use of new information technologies (IT) and financial technology. To this extent, the role of technology in the banking sector and financial services sector at large need to be examined critically, as the information and communication technologies (ICT) is changing the banking sector operations and efficiency

The benefits accruing from the introduction of new technologies in the banking sector determines greatly the reactions of consumers to these technologies. In that light this chapter highlight some of the perceptions about new technologies by both consumers and the corporate.

3. Research methodology and design

The empirical study was approached from the perspective of a formal research design through the definition of the study population, the incorporation of suitable measuring instrument and reliable techniques for data analysis as stipulated in Cooper and Schindler (2008). The empirical research for the study was conducted in two ways; a pilot study and the main survey. The measuring instrument was designed to measure the influence to technological innovations in the financial services sector. Following the design of the initial questionnaire, a pilot study on 20 respondents was conducted. The result of the pilot study and a discussion with a panel of experts led to the initial questionnaire being revised accordingly taking into consideration all the flaws identified in the process. The questionnaire was later administered to 613 respondents which consisted of financial services sector customers as well as members of the general public in the Eastern Cape province of South Africa. Following rigorous follow-ups on respondent a response rate of 65.7% was achieved.

Figure 3.1 below illustrated the percentage respondents by age who participated in the survey.

The majority of the respondents (27%) were between the ages 26-35 and the least number of respondents was from the ages of more 65.

Furthermore, to supplement the results of the questionnaire survey, interviews were conducted with banking sector officials. Fifteen employees from banks were interviewed and they were from Standard Bank, First National Bank, ABSA, NedBank and Capitec Bank.

4. Results and discussions

This section presents the results of the study that was conducted in the Eastern Cape Province of South Africa. A discussion of the results, linking them to previous studies was also incorporated in this section.

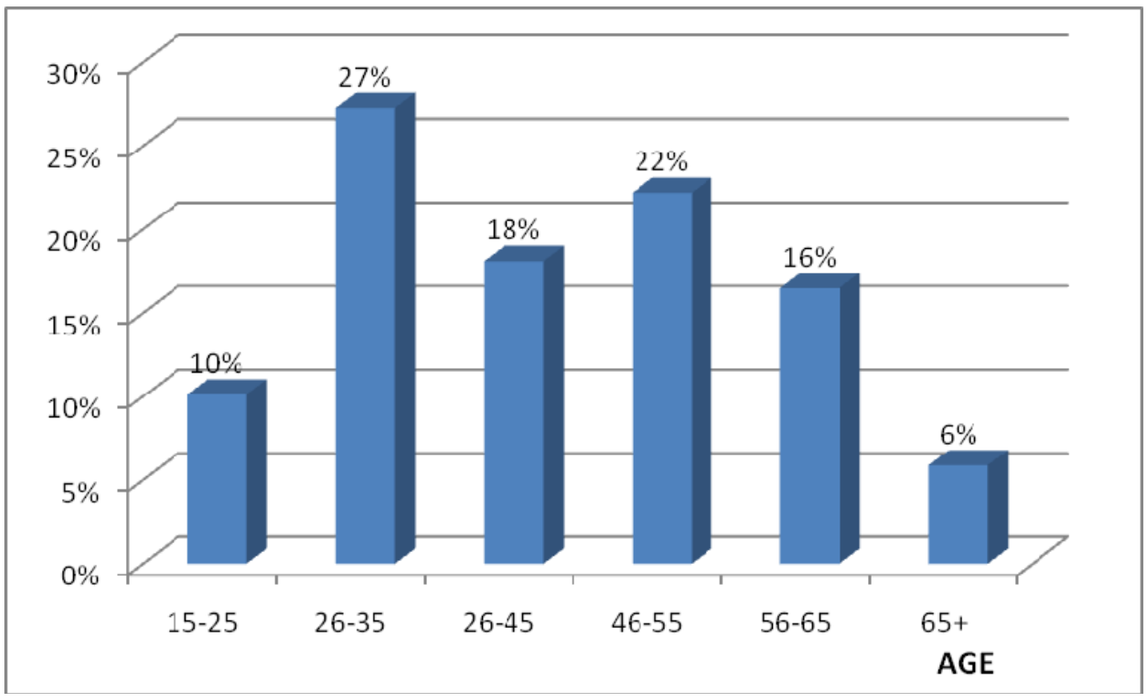

Fig. 3.1. Percentage respondents by Age

4.1 Perceptions about services oriented technology

4.1.1 Customer perceptions

There is a mixed reaction by consumers about the ever changing technological advances. In a study conducted in South Africa, the results reviewed that adult population is not so pleased by rapid changing technological advances. 86% of the adult population (65 or more years old) interviewed argued that technological advances are becoming a burden on their part and in several cases they need a technological savvy or well up individual to assist them in making certain transactions using technology. The reaction was markedly different from that of the younger population with more than 73% viewing technology as a must have necessity to function effectively. Arguments raised include the fact that the use of technology, particularly for business purposes is funny and more convenient.

While the introduction of new technology into the banking sector come with several benefits to the organisation and consumers, the reactions of different groups of people to such changes are different. Some consumers see technological changes as a threat to their old ways of doing things (they have inertia), while other groups of consumers see it as opening doors to learning new things and ways of doing things.

The results of the study further suggested that many people perceive new technologies as a "push" by banks. In this study, 63% of SA adults agreed that banks force them to use new technology due to circumstantial reasons. However a closer analysis of the results suggested that it is not technology per se that is a problem but rather how it is applied. Two thirds of

people, rich as well as poor, prefer face to face service to an ATM, a third of the elderly claim to avoid banking machines as much as possible. However 75% of poorer and 83% of the richer people say they are prepared to learn new technology. The rapid acceptance of cell phones across the population is an indication of an ability to learn new technology if the benefit are substantially enough. These results corroborates with findings presented by Porteous and Hazelhurst (2004).

The fact that businesses exist to serve consumers any action should have a customer focus in mind. Business must ensure that their new technologies are received positively by consumers or ensure a thorough market assessment before investing in some sophisticated technologies which may make the consumer worse off.

4.1.2 Corporate perceptions

The impression that we get from the business sector is that technology is a *'necessary evil'*, something that every enterprise operating in the 21st century economy must embrace in order to improve and maintain its competitiveness. An analysis of the banking sector in South Africa revealed that every bank is striving to stand out with a unique technological innovation that distinguishes it from competitors. In every corporate message, every bank is trying to convey the message that, *'We are leaders in technology and we give you the best value for money'*. This message is evident in the adverts by FNB, ABSA, NedBank, Capitec and standard Bank among others.

Furthermore, too often businesses use technology as motivating tools for their employees. Social networking sites like Facebook, Twitter, Myspace and Skype are viewed as tools to boast the employees' moral during their spare times. However, the overuse of such will reduce productivity if employees use company time and resources to pursue their social needs. Using social media can be overwhelming but employees need not be carried away. However, employees can use sites that best fit their goals, market and personality for personal branding purposes. Spending time on social networking promoting yourself online can yield powerful positive results, however you need to be consistent in both promoting your image and your efforts.

If employees approach the social media with a plan and a specific focus of providing and sharing useful information while interacting with fans, friends, family and followers, it can be an effective and even fun part of your marketing mix. Overall, businesses view technological innovations as a tool that must be embraced and be kept improving to remain competitive in the ever-changing market.

4.2 Costs and benefits of technological innovations in the financial services sector

Technological innovations have had major contributions in improving the efficiency of the financial services sector. Of particular note is the fact that technological innovations have reduced significantly the cost of transacting and this will benefit both the bank and the consumer. The use of ATMs, Credit cards, internet banking, among other recent advances in technology in the South African Banking Sector, has seen substantially decreases in the cost of doing banking transactions. The new channels for delivery of banking products and services, such as through the internet, ATMs and cell phone banking, have the advantage for

customers of longer hours of service and more efficient and cheaper means of delivering the products (Reixach 2001).

Changes in ways of transacting from the recent advance of information and communications technology are not limited to improving the efficiency of traditional businesses but are also enabling the development of new instruments in specific fields. A good example is the development of a new supply channel for financial services, namely the internet, which has made it possible to establish extensive and low-cost financial networking (Hayami, 2000). To this end, information and communications technology has enabled the more diversified and convenient provision of financial services, including via the internet and ATM networks. These will significantly reduce costs compared to old ways of doing banking transactions, which require face to face-over the counter transactions associated with huge travelling costs for customers to bank branches.

Furthermore, IT innovation affects the competitive position of firms both through production efficiency and changes in the goods markets. Firms that are competitive in the modern market are those that are able to create, develop and implement new and better ways of carrying out tasks. This calls for all the firms to be innovative in order for them to be competitive in the marketplace. Technological innovations enable firms to increase output via the introduction of new processes and altering the competitive environment, thereby creating pressure for firms to adjust (Jürgen et al 2002).

Technological innovations have undoubtedly introduced enormous benefits to banks, particularly in terms of productivity increases, cost reduction through labour saving and increased profitability. The use of new technology has increased outputs and reduced costs as both technological capital investments and technology human resources have a positive relationship to productivity (Jayamaha 2008). Consumers should be awarded the chance to enjoy the full benefits derived from the use of latest technological advances. This would increase banks' competitiveness through differentiation and customer service improvement, reduced transaction costs, better risk avoidance, and maintaining a stable customer base and market share (Jayamaha 2008).

Despite the wide spectrum of benefits identified from the introduction and use of technological innovations in the banking sector, there are some social and economic problems associated with technological innovations some of which have enormous consequences to the society and the nation at large if left unattended.

One of the problems brought in by technological innovations is their strain on the budgets of the banks. Most of the banks' resources are being channelled towards advancing and coping with rapid changes in technology. Apart from personal costs, technology is the biggest item in the budget of the bank, and is the fastest growing one (Reixach 2001). If not managed with caution, emphasis may be put on pursuing technological advancement while compromising other activities which are important to the success of the enterprise.

Technological innovations, particularly in information and communication technology (ICT) have resulted in globalisation of businesses and business operations. Under such conditions, competitive pressures are likely to intensify in many parts of the economy and increasingly affect previously sheltered sectors such as energy, transport, communication and

distribution. The result is an increased pressure to adjust and could lead to transition problems in economies which are insufficiently able to change, a common problem of most African economies (Reixach 2001).

To the society, technological innovations, if not managed properly may result in such problems as pollution and unethical behaviours. For example the use of short message services (SMS) had been an instrument in conveying malicious information and images among teenagers which lead to moral decay.

Furthermore, the advances in technology also mean that consumers must learn how to use such technologies. Such learning should furthermore be fast to be up to date with the fast changing technologies. Slow learners and the elders who have inertia may be frustrated with such demands leading to psychological problems on consumers. More importantly, technological innovations have significant effects on service quality, efficiency and profitability.

4.3 Technological innovations vs services quality

Studies have shown that among consumers, service quality and experience is the most spoken about topic, followed by a great product or service which is closely related to something "astonishing". Customer service should focus on understanding and meeting the needs of customers effectively. According to Accenture (2007) the customer service levels in South Africa leaves a lot to be desired. South Africa is rated as one of the worst countries globally in terms of customer service, with a service maturity rating of 6%. Compared to the leader, Singapore with a rating of 89%, there is a need for improvement in customer service in South Africa. This outstandingly poor customer service in the country, however provide a fantastic opportunity for all business owners who want to gain a competitive advantage by tapping into exceptional customer service offering. Providing the best customer service is the best, if not the only solution to gain customer satisfaction, customer retention and creating customer value. Technological innovations plays a significant role is delivering quality customer service. Effective and prompt modes of communication, instant feedback and customer tracking solutions are all ingredients of an excellent customer service package. This has been enabled by the advent of the latest information and communication technologies.

A study into on the banking sector in South Africa revealed that consumers (88.5%) are satisfied with the level of communication they get from banks about their accounts information and in terms of how quick their complaints are addressed due to advanced technologies. Consumer however indicated their displeasure with some bad systems in a few banks. The study revealed that an estimated 80% of the aggrieved customers' problems with technology are caused by bad systems. It became apparent that most of the service problems customers' encounter in trying to do business occurs as a result bad delivery systems, which are out of date, too complex or just customer unfriendly.

Taking for instance, most dysfunctional systems include telephone technology that are characterised by features like call director or voice-mail systems with frustratingly lengthy menu options, or caller holder features that attempt to entertain customers with sometimes

annoying music. In several cases some businesses even interrupt the entertainment with an occasional commercial message. Imagine an aggrieved customer on the other end of the line. To aggravate the problem, imagine when a customer finally reaches a real person, too often to find that the person is a company's newly appointed secretary with little knowledge of the company's product and no authority to solve the customer's problem. Such technologies cost companies millions in lost customers due to poor management of technology. It is therefore paramount to ensure that a smooth and efficient management system of technology is embraced in every aspects involving direct contact with customers and elsewhere in the services chain.

4.4 Technological innovations vs efficiency

Efficiency is a general term in economics that describes how well a system is performing in generating the maximum output for given inputs with the available technology. Efficiency is improved if more output is generated without changing the level of inputs, or in other words, the amount of "friction" or "waste" is reduced. The idea of efficiency broadly refers to the fact of using limited resources in the best possible way (Caruana, 2003). Qayyum and Khan (2007) defined efficiency as the ratio output per unit input in which case they suggested that efficiency is decomposed into two components namely, allocative (economic) efficiency and technical efficiency.

Efficiency relates the cost incurred compared to the product obtained. In general terms, the idea of efficiency broadly refers to the fact of using limited resources in the best possible way. In other words, an economic system is efficient if it does not waste its resources, in such a way that it minimises individuals' well-being (Caruana, 2003).

A system can be called economically efficient if no one can be made better off without making someone else worse off. The most output is obtained from a given amount of inputs and when production proceeds at the lowest possible per unit cost.

Efficiency introduces an additional factor to an enterprise, namely risk. Thus in every effort to improve efficiency, the risk factor should be taken into account. This idea factors in significant constraints and makes it necessary to focus on improved efficiency as a balanced process in which attention must be paid to a series of management elements that should not be taken for granted in cost-cutting drives. For example, no clear efficiency gain is achieved if it is done at the expense of increasing operational risk (Caruana, 2003). Operational risk refers to the risk of loss resulting from inadequate or failed internal processes, people and systems, or from external events. The definition includes legal risk, which is the risk of loss resulting from failure to comply with laws as well as prudent ethical standards and contractual obligations (Anon 2003).

These definitions of efficiency are not exactly equivalent. However, they all encompass the idea that nothing more can be achieved given the resources available. Thus efficiency is achieved through making the best use of the available resources.

Measures of technical output efficiency include estimates of banks' scale efficiency. Scale efficiency refers to banks or branches achieving an optimum size for producing financial services and thereby, ensuring operation at the minimum point of the average cost curve.

There is a negative relationship between bank branch size and branch efficiency (Oster and Antioch 1995).

Some of the strategies adopted by banks includes re-engineering its processes (through identifying key business activities that can either be streamlined or eliminated), improving the skills of its labour force through training and increasing the use of technology. Over time, the net effect of these initiatives will result in significant improvements in branch efficiency and elimination of the negative relationship between branch size and efficiency (Oster and Antioch 1995).

Furthermore, the increased competition resulting from financial deregulation may provide impetus for the achievement of further technical output efficiencies through scale economies. Economies of scale are achieved when a bank recognises that the cost of producing a range of outputs is less than the cost of producing them independently (Oster and Antioch 1995). To measure the efficiencies of the banks the major interest is in X-efficiency, which shows whether banks use their inputs efficiently or not (Schure and Wagenvoort, 1999). To customers efficiency is perceived in the sense of the bank completing transactions in the shortest possible time thus minimising the amount spent by customers to complete transactions.

In the financial services sector at large, the concept of efficiency can be thought of in terms of how well a bank employs its resources relative to the existing production possibilities frontier (or, in other words, relative to the current 'best practice') – how an institution simultaneously minimises costs and maximises revenue, based on an existing level of production technology (Oster and Antioch 1995). Investment in technology is an important mechanism for attaining greater efficiency. This is because technological development allows processes to be undertaken more easily, simultaneously eliminating certain time and labour-intensive tasks so that operating cost cuts are achieved.

In addition the capacity to process massive amounts of data efficiently in real time allows for better risk management and also for services better tailored to client needs. However, efforts to improve efficiency must be compatible with the challenges posed by new technologies (Caruana, 2003). In that light, the costs of new technologies should not outweigh the benefits associated with these technologies. Thus a thorough cost-benefit analysis is important in making decisions regarding new technologies. In other words it is imperative that when employing a new technology that the anticipated benefits should outweigh the anticipated costs. Technical efficiency correlates directly to overall company efficiency, this means if a business spends wisely on information technology it will reap the rewards in sales and customer service improvements and ultimately improved profitability.

A detailed account on the determined measurement of efficiency in the South African banking sector is the one provided by Mboweni (2004). According to him, the efficiency of the banking sector can be determined by expressing operating expenses as a percentage of total income.

"*Currently, the international benchmark for efficiency is 60 per cent. In the past, South African banks were able to keep this ratio below or close to the international benchmark. The ratio, however, has increased from 60.2 per cent in 1999 to 67 per cent in 2002. The high volatility in efficiency in*

2002 indicates that the South African banking sector was indeed experiencing problems with profitability in the first six months of 2002. This deterioration was confirmed by the return on equity of 5.4 per cent (smoothed over 12-months) and the return on assets of 0.4 per cent (smoothed over 12-months) as at the end of June 2002. Since 2002, however, the efficiency ratio has improved and, as at the end of October 2004, the efficiency of the banking sector was 65.2 per cent. By the end of October 2004, the return on equity and the return on assets of the banking sector had similarly improved" (Mboweni 2004).

The historical account of the efficiency of the South African Banking sector above shows a growing trend. This is an indication of various new approaches to service delivery which improve efficiency, most notably advance in new technologies. Looking at the efficiency trend in the South African banking sector, a possibility for further improvements is there if new approaches to improving efficiency are sought.

In a study of the banking sector in South Africa on the view of consumers regarding the improvement of efficiency of the banking sector in the past ten years, 92% of the respondents agreed that the efficiency of the banking sector has improved in the past ten years due to improvement in technology. Only 2% disagree of the fact that the efficiency of the banking sector has improved while 6% neither agree nor disagree.

The perceived improvement was attributed to continued improvements in technologies used in banks. The perceptions of respondents on ATMs, online banking and cell phone banking on their contributions to efficiency and cost reductions were also sought. These also receive a positive response with 53% of the respondents indicating that ATMs are cost effective, 77% of the respondents agreeing that online banking and cell phone banking are cost effective.

4.5 Technological innovations vs profitability

Approaches to increasing efficiency in every venture are aimed at ultimately increasing profitability. This objective is tantamount to that of the firm namely wealth creation for the owners. Thus it is critical to address the link between technological innovations, efficiency improvement and ultimately profitability.

Several studies revealed a positive relationship between efficiency and profitability, that is, the higher the efficiency, the greater the profitability. However in a study carried out by Abbasoˇglu, Aysan and Gunes, (2007) it appears that there is no clear relationship between efficiency and profitability. In their study of the Turkish banking sector, the results indicated that there is no significant evidence from the data that efficiency affects profitability. In the study which took the return on assets into account, foreign banks were found to be significantly more profitable than domestic banks. While the least efficient banks turned out to be foreign with the exception of a few, being foreign increases banks' profitability. This result shows us that foreign banks are less efficient but more profitable compared to the domestic banks. Hence, there is no clear evidence that there is a positive relationship between efficiency and profitability (Abbasoˇglu, Aysan and Gunes, 2007).

Increasing profitability is one of the fundamental objectives of any business operating as a going concern. To achieve increased profitability, the business should aim at reducing

costs in the best way possible. The use of advanced and up to date technological innovations is instrumental in this regard. The major focus on improving efficiency is to reduce the costs of producing a desired level of output. Strategies and actions to minimise costs are paramount in the bid to reduce the firm's expenses and this leads to increased profitability of the venture. In the banking sector it is important that the bank be able to employ the most cost effective approaches to complete every transaction. A study on the banking sector in South Africa revealed that 75% of the respondents agree that technological innovations resulted in cost savings. Sixty five percent (65%) of the respondents agreed that cell phone banking is helping in reducing costs of banking. Among the reasons cited included cheapness of cell phone banking, no costs of travelling to the bank and the convenience of cell phone banking (customers can do their transaction anywhere, anytime). 35% of the respondents were of the opinion that cell phone banking does not help in reducing banking costs for customers. The reason for their argument ranged from the need for airtime, the need for cell phones with access to internet (that is, a phone with GPRS) which are expensive and the fact that some transaction are simply not feasible using cell phone banking.

4.6 Linking efficiency to profitability

Approaches to increasing efficiency in every venture are aimed at ultimately increasing profitability. This objective is tantamount to that of the firm namely wealth creation for the owners. Thus it is critical to address the link between efficiency improvement and profitability. Soteriou and Zenios, (1997) suggested a joint analysis of operational efficiency and profitability as shown in Fig 1. In the analysis bank branches were categorised into four categories similar to the (Boston Consultants Group (BCG) matrix, namely stars, dogs, sleepers and cows.

Sleepers are those branches that are highly profitable, while they are inefficient. Hence, their profitability can be further increased if they are awakened and improve their operational efficiency. Stars are the branches that match their superior operational efficiency with profitability, while cows are lagging in profits and a major reason for this is their operational inefficiency. Finally, for the dogs it was concluded from the analysis that enhancement of their profitability can not come from improvements in operations, since they are already efficient on the operational side (Soteriou and Zenios, 1999). The analysis revealed a positive relationship between efficiency and profitability, that is, the higher the efficiency of a bank branch the greater the profitability. However in a study carried out by Abbasoˇglu, Aysan and Gunes, (2007) it appears that there is no clear relationship between efficiency and profitability. In their study of the Turkish banking sector, the results indicated that there is no significant evidence from the data that efficiency affects profitability.

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Increasing profitability is one of the fundamental objectives of any business operating as a going concern. To achieve increased profitability, the business should aim at reducing costs in the best way possible. Thus the use of advanced technologies to improve efficiency and cut costs should the focal strategy to remain competitive in the 21st century economy.

5. Conclusion

Overall, the analysis leads to the conclusion that technological innovations have changed the business landscape of the 21st century. The majority of the respondents interviewed showed positive responses with respect to the improvement of efficiency and cost reductions as a result of the use of advanced technological innovations in the financial services sector.

From the above discussion, it can be noted that the importance of technological innovations in the financial services sector reign supreme for the success of banks operating in the 21st century economy. It is important to lay a foundation to understanding the concept of technology and technological innovations. Understanding the concept of technology in detail is paramount as a basis for which innovation (the creation, introduction and use of new ideas and tools) can take root. Innovation can be in the form of product innovation (that results in new products or services) or process innovation (that involves the introduction of new ways of performing tasks in an organisation).

More contributory to the new developments in the banking sector is the innovation in information technology (hardware and software that are used to store, retrieve, and process and communicate information). This has been discussed in this chapter. Furthermore the acceptance, use and reactions of consumers to new technologies in the financial services sector had been discussed. Finally, the contributions of technological innovations to the banking sector as well as to consumer had been alluded to in this chapter. It can be deduced from the contributions of new technology that, technological innovations has resulted in reduced transaction costs for both the customers and banks, as well as improved efficiency in the banking sector.

6. References

Abbaso˘glu, O. F., Aysan, A. F and Gunes, A., (2007). Concentration, Competition, Efficiency and Profitability of the Turkish Banking Sector in the Post-Crises Period [Online: available http://mpra.ub.uni-muenchen.de/5494/ MPRA Paper No. 5494, posted 07. November 2007 / 04:45, Accessed April 17, 2008.

Abhiman, D., Subhash, C. R. and Ashok, N., (2007). Labour-use efficiency in Indian banking: A branch-level analysis, Omega 37 (2009) pp 411 – 425 [Online: available at www.sciencedirect.com accessed April 17, 2008)]

Anon (2003). Supervisory Guidance on Operational Risk Advanced Measurement Approaches for Regulatory Capital.

Bain, R. (1937). Technology and State Government. American Sociological review Vol. 2 No. 6 p. 860-865.

Caruana, J. (2003). Savings banks - Efficiency and an ongoing commitment to society. Efficiency of financial institutions [Online: available at www.bis.org, Accessed April 17, 2008].

Chaffey, D., (2004). E-Business and E-commerce Management 2nd Edition, Essex: Pearson Education Limited.

Halkos, G. E. and Salamouris, D. S., (1999). Efficiency measures of the Greek Banking Sector: A non-parametric approach for the period 1997-1999. University of Thessaly, Department of Economics, Discussion paper series 01/04

Hawkins, P., (2006). South African banking landscape: Introduction & Background, Greenside: FEAsibility Pty Ltd

Hayami, M., (2000). The impact of innovation in information and communications technology on financial systems [On-line]. Available: www.bis.org [accessed April 3, 2008].

Jayamaha, R, (2008). Impact of IT in the Banking Sector [On-line]. Available: www.bis.org [accessed February 7, 2008].

Jürgen, S., (2002). IT innovations and financing patterns: implications for the financial system [On-line]. Available: www.bis.org [accessed April 3, 2008].

Mboweni, T. T, (2004). The South African banking sector - an overview of the past 10 years [Online: available at www.bis.org, Accessed April 17, 2008].

Oster, A. and Antioch, L., (1995). Measuring Productivity in the Australian Banking Sector [online: available at http://www.rba.gov.au/PublicationsandResearch/Conferences/1995/OsterAntioch.pdf Accessed (May 26, 2008).

Porteous, D. and Hazelhurst, E. (2004). Banking on Change: Democratizing Finance in South Africa, 1994-2004 and beyond, Cape Town: Double Story Books

Qayyum, A. And Khan, S., (2007). X-efficiency, Scale Economies, Technological Progress and Competition: A Case of Banking Sector in Pakistan. Islamabad Pakistan Institute of Development

Reixach, A., (2001). The effect of information and Communication technologies on the Banking Sector and Payment System, University de Girona

Rogers, M., (1998). The Definition and Measurement of Innovation, Melbourne Institute Working Paper No. 10/98

Schatzberg, E. (2006). Technik Comes to America: Changing meanings of Technology before 1930. Technology and Culture, Vol. 47, No, 3 pp. 486-512.

Schure, P. and Wagenvoort, R.(1999). Economies of Scale and Efficiency in European Banking: New Evidence, European Investment Bank Economics and Financial Report, 1999.

Soteriou, A. and Zenios, S. A. (1999). Operations, Quality, and Profitability in the Provision of Banking Services. Management Science, Vol. 45, No. 9, Performance of Financial Institutions, (Sep., 1999), pp. 1221-1238

Subrahmanya, M. H., (2005). Pattern of technological innovations in small enterprises: a comparative perspective of Bangalore (India) and Northeast England (UK). Technovation 25, pp 269-280 [online]

Wallace J., Zeffane R. M., Schermerhorn, J. R., Hunt J. G., and Osborn R. N., (2001). Organisational Behaviour: A global Perspective 2nd Edition, Milton: John Wiley & Sons Inc.

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It is widely accepted that technology is one of the forces driving economic growth. Although more and more new technologies have emerged, various evidence shows that their performances were not as high as expected. In both academia and practice, there are still many questions about what technologies to adopt and how to manage these technologies. The 15 articles in this book aim to look into these questions. There are quite many features in this book. Firstly, the articles are from both developed countries and developing countries in Asia, Africa and South and Middle America. Secondly, the articles cover a wide range of industries including telecommunication, sanitation, healthcare, entertainment, education, manufacturing, and financial. Thirdly, the analytical approaches are multi-disciplinary, ranging from mathematical, economic, analytical, empirical and strategic. Finally, the articles study both public and private organizations, including the service industry, manufacturing industry, and governmental organizations. Given its wide coverage and multi-disciplines, the book may be useful for both academic research and practical management.

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