

Analysis of Information and Communication Technology on Service Innovation and Competitive Advantage: A case of Commercial Banks in Kenya.

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Abstract

Competition in the banking sector has been heightened by the fact that, the cost of banking technology, once prohibitive, is no longer a barrier to entry into the industry. Because of developments in technology and general erosion of entry barriers into banking, it is easier for non-bank financial institutions to move into banking than banks to diversify out of financial services. The study examined how information and communication technology is adopted and managed to enhance service innovation practices and competitive advantage among commercial banks. The objectives included to ascertain whether information and communication technology adoption by commercial banks in Kenya enhances service innovation practices; establish whether service innovation practices enhances competitive advantage among commercial banks in Kenya; examine whether information and communication technology adoption is a strategic key in the attainment of comparative advantage; ascertain whether Commercial banks ICT strategic plan has supported business strategic plan in improving customer service and product offerings. The broadened understanding about service innovation as a critical organizational capability through which information and communication technology adoption can influence the competitive advantage of a firm. The study was limited to commercial banks within Kenya only and did not cover other financial institutions like investment banks, mortgage firms, and Micro-finance firms. A survey was conducted on commercial banks in Mombasa. In the context of commercial banks, the study examined the effect of Information and communication technology adoption on competitive advantage through service innovation practices. A research framework and the associated questions were proposed. An empirical survey was conducted and questionnaires mailed to ICT Managers and Marketing Managers in thirty commercial banks in Mombasa, Kenya. Partial least square technique and Statistical package for social science (SPSS) technique were used to analyze the data. The study found that, first; Information and communication technology adoption has a positive and significant effect on service innovation in process. Second; Information and communication technology adoption has a positive and significant effect on service innovation in product. Third; Service innovation in process has a positive and significant effect on external competitive advantage. Fourth; Innovation in product has a positive and significant effect on external competitive advantage. Fifth; Service innovation in process has a positive and significant effect on internal competitive advantage, and finally; Service innovation in product has a positive and significant effect on internal competitive advantage. The study also found that many commercial banks have made moderate effort to align information and communication technology strategy with business strategy to improve customer service and product offerings.

Keywords: Communication technology, Innovation, Competitive advantage.

1. Introduction

Modern firms in all sectors of the economy are making significant investments in information and communication technology to align business strategies, enable innovative functional operations and provide extended enterprise networks. A number of information systems researchers have regarded information and communication technology as an important ingredient of innovation development and business strategy alignment (Dewett & Jones, 2001). Firms implement information and communication technology to enhance and/or enlarge the scope of their products and services. As many innovation activities involve adding new services, expanding existing ones and/or improving the service delivery process, the success of an organization hinges on how well it implements its service innovation to create new markets and enhance competitive capability (Berry *et al.* 2006). The banking industry is an important sector in Kenya to analyze the effect of information and communication technology (ICT) because it is going through intense change, in particular the

retail side of the business. Information and communication technologies are having a great impact in the reshaping of the banking industry by leading to the development of new financial products and for new means of delivering them. With regards to the delivery of products, for instance, the last decades have witnessed the emergence and use of Automated Tellers Machines (ATMs) and telephone banking, and of late the spread of Internet and e-banking.

These new channels for the delivery of products have the advantage of meeting customer's needs not only in terms of longer hours of service, but are also a more efficient, cheaper means of delivering the products. In the immediate post – independence Kenya, the banking and financial industry was highly controlled. However, after 1982, the government relaxed the hitherto stringent rules in the issuance of licenses to operate non-bank financial institutions (NBFI). The low capital requirement starting from five million shillings for non – bank financial institutions brought about the mushrooming of these institutions in the country. In June 1994, the Central bank of Kenya licensed some of these institutions to operate as commercial banks by taking deposits and making short term loans. This saw some Micro- finance institutions being converted into commercial banks. The continued entry of new players has resulted to increased competition in banking industry (Macey and Ottara, 2003).

In the recent past, the banking sector has witnessed rapid growth resulting in a scramble for the available customers and their ever-changing needs. Commercial banks have been experiencing declining customer bases due to the increased competition in the industry especially from micro-finance institutions, investment banks, and cooperative societies. The growing competition has necessitated the development of new competitive strategies by embracing and using information and communication technology as an ingredient of innovation and business strategy alignment. ICT is considered as a value creation tool in service innovation practices and as a strategic key in the attainment of the comparative advantage. The commercial banks in Kenya of late have been affected by issues such as changing customer needs leading to mergers and reorganization, changes in the regulatory framework where liberalization exists but the market still continue to be restrictive, increased demand for non-traditional services including the automation of a larger number of services, shift in working hours, and a move towards emphasis on the customer rather than the product, and entry of non-traditional players who now offer financial service product (Financial post, July 2008)

Some past studies carried out on commercial banks in Kenya by Mullins *et al* (2006) Boaz *et al* (2008), Gathoga, (2000), Kamau, (2004), Fridah (2007), and Ouko (2006) focused on, Use of information technology in commercial Bank of Africa, Financial liberalization and bank efficiency in commercial Banks, Response of declining quality loan in commercial bank, Use of information technology in training, Strategic response of commercial banks, and E-banking in commercial banks respectively. However, there is scarce evidence of systematic empirical investigations or studies based on the effect of information and communication technology adoption on competitive advantage through service innovation practices among commercial banks in Kenya. To address the gap and advance understanding of information and communication technology adoption in enhancing service innovation practices, the study explored and analyzed the effects of information and communication technology adoption as an ingredient in service innovation practices and as a strategic key in the attainment of comparative advantage.

2. Literature review

Firms are making significant investments in information and communication technology to align business strategies, enable innovative functional operations and provide extended enterprise networks. These firms have adopted information technology to foster changes in managing customer relationships, manufacturing, procurement, the supply chain and all other key activities (Barua & Mukhopadhyay, 2000) and to enhance their competitive capabilities (Sambamurthy *et al.* 2003). A number of information systems researchers have posited information technology as an important ingredient of innovation development (Corso & Paolucci, 2001; Dewett & Jones, 2001). Firms implement information technology to enhance and/or enlarge the scope of their products and services. As many innovation activities involve adding new services, expanding existing ones and/or improving the service delivery process, the success of an organization hinges on how well it implements its service innovation to create new markets (Berry *et al.* 2006).

2.1 The banking system in Kenya

The Banking industry in Kenya is governed by the Companies Act, the Banking Act and the Central Bank Act and other prudential guidelines, which are normally issued by the Central Bank of Kenya. The Central Bank is the main regulator of banks in Kenya. It is the regulating and supervising agency and the manager of monetary policy operations in Kenya. The Central Bank Act, Chapter 492 laws of Kenya, empowers it to formulate and implement monetary policy and foster the liquidity, solvency and proper functioning of the financial system. Central Bank of Kenya promotes a sound and stable banking system in Kenya by enforcing the requirements of the Banking Act and prudential regulations, fostering liquidity and solvency of banking institutions, ensuring efficiency in banking operations and encouraging high standards of customer service. The Capital Markets

Authority regulates all companies, including banks that are listed in the Nairobi stock exchange.

Kenya features a commercial banking system dominated by numerous commercial banks and a small number of non-bank financial institutions, which concentrate mainly on mortgage finance, insurance, lease hire and related financial services. Over the years the sector has grown into a more complex scene of banking institutions of different types and ownership. According to statistics by the Central Bank of Kenya, by the end of the year 2008, there were forty seven banking institutions. The commercial banks and the non-banking financial institutions offer corporate and retail banking services but a small number, offer other services, which include investment banking. In addition there are eleven specialized establishments set by the government to assist the specific sectors of the economy. These include Agricultural Finance Corporation, Industrial and Commercial Development Corporation, Kenya Industrial Estate, Industrial Development Bank, among others.

The increasingly advanced levels of information technology embraced by banks have also had a positive impact in the sector. The new and dynamic information systems adapted by most banks have enabled them to process data faster and efficiently. This has enabled them to downsize their branch operations, thereby cutting on cost and improving service delivery to their customers.

The above changes have contributed to the increasing competition in the banking industry, especially with regards to the number of financial products available in the market that is comprised of an increasingly more sophisticated clientele.

2.2 ICT and banking industry

2.2.1 Electronic Money

During the 1990s, and taking advantage of new information technologies two different groups of electronic money were developed and introduced around the world: pre-paid cards and digital money through internet. These two kinds of products are often classified under the generic label of electronic money or new payment systems. In certain cases they are labeled as digital cash or electronic cash. By using the word “cash” one common feature is underlined: the goal is to be the equivalent of paper cash. Ideally, two main characteristics of the paper cash should be maintained: anonymity and liquidity. Digital money is an electronic replacement for cash. It is storable, transferable and unforgeable. The main advantages of digital money are increased security, anonymity and preservation of privacy, reduction of transactions costs, easier international payments, consumers have access to much larger markets and therefore overall efficiency improves, better means of control of personal finances by users directly instead of financial institutions.

Pre-paid Smart cards consist of a plastic card with an embedded chip and represent a technological advance in comparison with cards with magnetic bands. Pre-paid cards can serve as a payment mechanism by loading and storing monetary value in the chip embedded in the card. The value loaded in the card can later be disbursed when paying for the provision of goods and services (Chaum, 1992).

2.2.2 Products delivery

With regards to the delivery of products, for instance, the last decades have seen the appearance of Automated Tellers Machines (ATMs) and telephone banking, and are now seeing the spread of Internet banking. These new channels for the delivery of products have the advantage for customers of longer hours of service, but are also a more efficient, cheaper means of delivering the products. Many banks already report a majority of transactions being conducted electronically with personal contact between client and bank employee. Finally, it should be noticed that while the rapid development of information technology has made some banking tasks more efficient and cheaper, technological investments are taking a larger share of banks resources. Currently, apart from personnel costs, technology is usually the biggest item in the budget of a bank, and the fastest growing one (White, 1999).

3. Research Methodology

3.1 Research design

Churchill (1991) wrote that exploratory studies are important in increasing the researcher's familiarity with the problem, in gathering information about practical problems, in clarifying concepts, in formulating a problem for more precise investigation and in establishing priority for further research. A component-based structure equation model that links information and communication technology adoption, service innovation practices, and competitive advantage constructs was devised. The different sub-constructs in each construct were used to capture dimensions of each of the three construct and the linkages between them. Since banking services are similar, the line of service and product differential is quite thin. It is because of this that, an exploratory survey-based study of commercial banks was conducted to evaluate the validity of the linkages. A descriptive study was also used to collect both qualitative and quantitative data.

3.2 Sample size and Sampling strategy

From the population a two-stage stratified random sampling technique was employed to select the banks for the study. This study was limited to sixty five percent of the total banks in Kenya. This means that thirty commercial

banks were selected. This was appropriate because statistically this sample size is acceptable as it conforms to the widely held rule that a sample size should not be less than thirty for large population i.e. $n > 30$. (Antony & Michael, 1999). Also the larger the sample, the more likely its mean and standard deviation are representative of the population mean and standard deviation (Kothari, C. 1990). Table 3.1 shows the sample size and sampling strategy adopted.

Item	Commercial bank Category	Size of population	Sample size
1	Listed in Nairobi Stock Exchange (NSE)	9	8
2	Not Listed in Nairobi Stock Exchange (NSE)	38	22
	TOTAL	47	30

Table 3.1: Sample size and Sampling Strategy

Source: Banking Supervisory Report (2008) & Nairobi Stock exchange report (2008)

The study was conducted at the main branches of the banks in Mombasa that are sampled. To collect data, two questionnaires were administered in each bank. One questionnaire collected technical data, and the second collected banks bio-data and general performance in the market and were filled by the ICT manager and marketing manager respectively.

3.3 Data collection instrument

Primary data was collected by the use of structured and semi structured questionnaires, one for ICT manager and the other for marketing manager. Information was gathered by employing both closed and open ended, and a five point scale assigned number questionnaires. The data was secured by means of a self-administered questionnaire as part of a wider examination of the information technology adoption, service innovation practices and competitive advantage in Commercial banks.

3.4 Data analysis

Partial least square method was used to show causal-predictive analysis and to explain complex relationships of the three constructs by following a component-based strategy. Structural equation modeling procedures implemented in PLS was used to perform a simultaneous evaluation of both the quality of measurement (the measurement model) and construct interrelationship (the structural model). Also Statistical Package for Social Sciences (SPSS) was used to give means, standard deviations, and average variances as a way of describing the location of a distribution, measuring the spread or variability, and capturing its scale or degree of being spread out respectively.

4. Findings

4.1 Introduction

This chapter presents data analysis and research findings of the study. Partial least squares regression was primarily used to evaluate the research questions and to explain the relationship between the three constructs. Also Statistical Package for Social Sciences (SPSS) was used to give means, standard deviations, and average variances. The study aimed at analyzing the effect of ICT on service innovation and competitive advantage. The results obtained are shown in the following sections.

4.2 Sample demographics

A summary of the demographics of the commercial banks surveyed in terms of years since establishment, banking services offered, whether listed in NSE, bank ownership, number of branches country wide, client base, range of market share, total ATM points country wide, and volume of transaction conducted using E-banking. Out of the eighteen commercial banks surveyed, 44.44% had been established for more than fifteen years at the time of the survey, an indication that majority of the banks that responded are banks that have been operating for more than fifteen years. Also 50% were offering both retail and corporate banking services thus diversifying their products offering to fit customer needs and keep pace with the shifting desires of customers and help improve brand image. Out of the surveyed commercial banks 44.44% were locally owned and this shows that locally owned banks were more willing to give data for needed for study. 55.56% were not listed in Nairobi Stock Exchange and this shows that majority of commercial banks are privately owned. 33.33% had more than sixty branches country wide showing effort made by many commercial banks to open braches in major towns. 55.56% had more than nine hundred thousand clients showing a high clientele base. 66.66% had more than one twenty ATM points country wide and more over 77.78% had above sixty percent transactions being conducted using electronic banking systems an indication that majority of the banks have adopted ICT systems to enhance response to customer demands to satisfy them with quality, delivery times and to enable customers to monitor their deliveries.

4.3 ICT infrastructure

The study attempted to find out the extent of budget allocation for purchasing ICT hardware and software as well as the emphasis given on ICT staffing and training, and sophisticated internal applications. The data was analyzed using mean scores and standard deviation to determine the extent of ICT adoption in terms of

acquisition of ICT hardware and software, ICT staffing and training, and usage of internet applications. Allocation of general budget for purchasing ICT hardware was the most ICT infrastructure carried out and had a mean score of 4.33, with 50% of the respondents rating it as very great extent. This shows that this variable is very important. The low standard deviation (0.75) is indicative of a high consensus among the respondents.

Allocation of budget for purchasing ICT software had a mean source of 4.22, with 44% of the respondents rating it as very great extent. These findings show that many of the banks had actively moved towards having a shared database to enhance response to customer's demands. This is in agreement with Jackson (1990), who contends that shared database facilities shortening of delivery times and enable customers to monitor their deliveries. Emphasis on ICT staffing and training had a mean score of 4.22, with 50% of the respondent rating it as very great extent. This is an indication of the significance of this variable in the successful adoption and functioning of ICT and in enabling the bank to reap greater benefits. Embracing sophisticated Internet application had a mean score of 4.05, with 39% of the respondents rating it as very great extent.

4.4 Process and Product Innovation

This objective aimed at establishing whether ICT adoption enhances service innovation practices. The two types of service innovation identified were process innovation and product innovation. The findings on process innovation were analyzed using mean scores and standard deviation to determine the extent of service process innovation in sampled commercial banks.

The result shown indicates that offering new practices in customer services were rated highly in terms of new practices carried out by the banks in the past few years. This is evidenced by the high mean score (4.22) given by the respondents with a total 44 % of the respondent rating it very great extent and 33% rating it great extent. The low standard deviations (0.79) reiterate the same i.e. high consensus among the respondents. This shows that most banks have lately made effort to improve customer service delivery in order to maintain a high level of customer satisfaction.

The study sought to determine the extent to which commercial banks have fully utilized ICT in differentiating their products and providing superior services. Thus findings on the extent of revision and improvement of existing products/services, repackaging of existing products/services, extension of products/services, and creation and establishment of new lines of products/services for the past few years was analyzed and results of the percentages and mean scores. Findings show that revision and improving existing products/services was the most product innovation carried out for the past few years as evidenced by the high mean score of 4.22, with a total 44 % of the respondent rating it very great extent and 33% rating it great extent. The need of revision and improving new products/services has been a result of high competition in banking industry. As a result many commercially banks have adopted ICT applications such as information management and business intelligence, to enable employees to access past service innovation projects, thereby allowing them to learn from previous experience and update their current market strategies especially by developing new products/services that are better suited to market demand. The low standard deviation of 0.79 is an indication of the consensus among the respondents on this view.

4.5 External Advantage

The study sought to find out whether service process innovation and service product innovation have positive and significant effect on external competitive advantage. The respondents were asked whether for the past few years their respective banks have been successful in providing new service to enter new market, to gain competitive advantages, and to offer higher quality than competitors. This is reflected by the high mean score of 4.28, with a total 50 % of the respondent rating it very great extent and 28% rating it great extent. Respondents reported that of late their respective banks have provided value addition services to meet customer desires and boost customer satisfaction by improving quality and delivery times. This is an indication of management reaction to market changes and competitors strategies. The view is consistent with Day (1994) that the effect of service process innovation on external competitive advantage can be examined by evaluating customer satisfaction with quality, delivery time and installing assistance.

4.6 Internal Advantages

This section attempted to find whether service innovation practices have positive and significant effect on internal competitive advantage. The respondents were asked whether for the past few years their respective institutions have been able to provide new services that increases employee job satisfaction related skills and domain knowledge as well as enhancing innovative capabilities of employees. The findings showed that the ability to provide new services and increase employee job satisfaction for the past few years had a mean score of 3.94, with a total 33 % of the respondent rating it very great extent and 33% rating it great extent. This is a reflection of the effort made by commercial banks to eliminate repetitive tasks performed by the employees by continuously launching new services with ever-changing role. These findings concurs with the statement by Smith *et al*, (2005) that, if firms launch new services as a routine practice, employees was more able to adapt to

new roles and new practices in selling the new services and was more satisfied with their work by assuming a challenging, ever-changing role instead of selling the same services time after time.

4.8 Summary of data analysis

The research data were analyzed and the results showed that:

- i. Information and communication technology adoption has a positive and significant effect on service innovation in process, (path = 0.65, $p < .01$).
- ii. Information and communication technology adoption has a positive and significant effect on service innovation in product, (path = 0.56, $p < .01$).
- iii. Service innovation in process has a positive and significant effect on external competitive advantage, (path = 0.34, $p < .01$).
- iv. Innovation in product has a positive and significant effect on external competitive advantage, (path = 0.48, $p < .01$).
- v. Service innovation in process has a positive and significant effect on internal competitive advantage, (path = 0.52, $p < .01$).
- vi. Service innovation in product has a positive and significant effect on internal competitive advantage, (path = 0.23, $p < .05$).

5. Summary, Conclusions And Implications

5.1 Summary

This study developed a research framework and empirically investigated the effect of Information and communication technology adoption on competitive advantage through service innovation practices. The two service innovation practices highlighted were process innovation and product innovation. The implementation of these innovation activities requires the coordination of related and complementary resources across the banks business units. Based on the MIT90 model (Scott Morton 1995), the researcher used the information and communication technology adoption construct to conceptualize the relationship among information and communication technology infrastructure, strategic alignment, management processes, organizational structure and individual learning and to explain how such mechanisms can sustain and enhance service innovation practices in commercial banks.

5.2 Conclusions

The research model and the associated data analysis results add detail to the prevailing understanding of critical linkages between information and communication technology adoption and competitive advantage. The empirical results provide strong overall validation and point to the important role of information and communication technology adoption that coordinates four elements to improve the implementation of service innovation practices. Further, the R-square values of service process innovation (.42) and service product innovation (.31) indicated that information and communication technology adoption was well chosen to interpret the causal relationship with service innovation practices. The finding shows that continuous investments in information and communication technology resources is a desired approach in engaging service innovation practices and commercial banks should follow-up by re-investigating other issues in strategy alignment, structure adjustment and individual learning. Moreover, the research findings showed that service innovation practices have positive and significant effects on competitive advantage. The R-square values of external competitive advantage (.60) and internal competitive advantage (.49) indicate that service process and product innovations interpret well the effects on obtaining and retaining competitive advantage. In that end, managers must therefore pay special attention to how service innovation, in conjunction with suitable processes and products, can enable all aspects of innovation interactions between the external and internal aspects of banks to obtain superior competitive performance. Hence, the nomological relationships among information and communication technology adoption, service innovation practices and competitive advantage constructs were demonstrated in the context of commercial banks and the results suggest that service innovation practices serve as a catalyst in the information and communication technology performance relationship.

5.3 Implications for research

The goal of this research study was to develop a theoretical perspective for understanding the links among information and communication technology adoption, service innovation practices and competitive advantage. The results have three significant implications.

First, the research findings provide an organization-wide perspective about information and communication technology adoption that is valid for the enterprise, business unit and process levels in a firm. The researcher propose that the value-added role of information and communication technology adoption lies in enabling a coordination mechanism that shapes a firm's capacity to launch frequent and varied innovation practices. Based on the MIT90 model, information and communication technology adoption is coordinated and accessed by elements of information and communication technology infrastructure, strategic alignment, organizational

structure and employee learning. The researcher discussed management processes with a specific focus on service innovation practices and investigated its relationship with others. This conceptualization has significant implications on how researchers should think about the valuation of information and communication technology adoption for service innovation practices.

Second, the research findings highlight an integrated perspective to link information and communication technology adoption, service innovation practices and competitive advantage. In particular, the research highlighted two service innovation practice dimensions, namely, process innovation and product innovation. The researcher propose that service innovation practices are important because they visualize how commercial banks continually develop their capabilities and focus on their process and product to shape their strategy. Furthermore, service innovation practices capture the interactions among information and communication technology infrastructure, strategic alignment, organizational structure and employee learning in shaping competitive advantage. Attention to the information and communication technology adoption and service innovation practices in the research model was important for researchers. However, further research is needed to understand the influence of information and communication technology adoption and service innovation practices on overall business functions and how firms could direct such processes effectively.

Finally, the research conceptualizations about service innovation practices illustrate the complementarity between information and communication technology adoption and competitive advantage. Thus conclusion can be made that service process innovation and service product innovation are the key enablers to competitive advantage. The research model suggests that gaining the competitive advantage will require attention to both service process innovation (in service development, service promotion and post-sales services) and service product innovation (in service modification, line extension, repositioning and improvements to existing services). In addition, researchers should examine the nature of organization designs, governance structures and managerial skills that will foster such innovation practices and facilitate the development of product and strategic processes innovation described in the research model.

5.4 Suggestions for future research

Future research should consider information and communication technology adoption from a different perspective; to investigate how using information and communication technology applications in workflow and project management, communication and coordination and knowledge management would affect service innovation practices and performance in different service design stages (e.g., idea generation, service specification and modification and new service launch. Also, a cross-industry comparison study of information and communication technology adoption for service innovation practices to examine whether there are different influences for different industries or service sectors would also greatly contribute to the field.

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