THE VALUE OF MULTI-STRATEGY RESEARCH METHODOLOGY IN CONDUCTING FIELDWORK STUDY INTO INFORMATION TECHNOLOGY IMPLEMENTATION IN SUDANESE BANKS

By

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ABSTRACT

This paper explores the value of multi-strategy research methodology and design adopted in investigating the implementation of (Information Technology) IT in a developing country like Sudan. The paper aims to present and appreciate the value of multi-strategy research methodology (mixed methods) in conducting empirical research in Sudanese banks. Despite the fact that banking has been practiced in Sudan for more than a hundred years, little is known about the daily operations of banking and the development of IT in the Sudanese Banking Industry (SBI). Primary data were collected from fieldwork in Sudan and this was combined with secondary data that were collected from a number of conventional sources. The study design used mixed methods that comprised a combination of quantitative and qualitative techniques in order to investigate and explain how IT is introduced and implemented in the SBI so as to achieve data triangulation. This approach has generated useful data within limited time, enabled integration of key findings from both the questionnaires and the interviews, and minimized the fieldwork cost. Thus in so doing, the paper presents the value of a dual methodology to new and emerging fields of study.

الملخص:

تستعرض هذه الورقة أهمية إستراتيجية منهجية بحثية مزدوجة وتصميم البحث الذي تم تبنيه في اختبار تطبيق تقنية المعلومات في دولة نامية كالسودان. فبالرغم من أن النظام المصرفي طبق في السودان

منذ أكثر من مائة عام، إلا أن ما يعرف عن عمليات الصرافة اليومية والتطور الذي حدث في استخدام تكنولوجيا المعلومات في صناعة الصرافة السودانية ما زال محدوداً.

جمعت البيانات الأولية لهذا البحث ميدانيا من السودان وتم ربطها بأخرى ثانوية جمعت من عدة مصادر تقليدية معتادة. وقد استخدم في تصميم الدراسة منهجية ثنائية كمية ونوعية لأجل اختبار وتفسير الكيفية التي تم بها إدخال وتطبيق تقنية المعلومات في القطاع المصرفي السوداني. وتهدف هذه الورقة علي إبراز قيمة وأهمية المنهجية المزدوجة في دراسة جوانب معرفية جديدة ومستقبلية.

INTRODUCTION

The wide-ranging implementation of Information Technology (IT) is a major challenge facing business organizations seeking to sustain competitive advantage in dynamic business markets. This challenge is compounded in developing countries where business organizations have to handle problems such as lack of investment, absence of technology awareness, and poor training. The study is necessarily exploratory and descriptive, as there is paucity in research into the area of IT in banking in the developing economies. The few such studies conducted in this area (For example: Ha, 1994; McConnell, 1996; Kamhawi, 1998; Uchupalanan, 1998; Abu-Musa, 2001) seem to lack an overall comprehensive view, as well as a fundamental theoretical framework. In examining the available material, the SBI is found to be one of the most important industries that plays a crucial role in the economic development of Sudan. The SBI has been selected because it is the most regulated sector compared to other sectors in Sudan. In general, the banks operate in an information system context whereby financial institutions are critically dependent on IT activity for their daily operations. Selecting one industry sector such as SBI offers some advantages to research, since respondents in the same sector are working in similar environments and are more likely to have similar skills and back-grounds that may promote homogeneity of the data. The researcher was engaged in a discourse that the discovery of oil, which has become part of the Sudanese economy in 1997, attracted and continues to attract investors into the country. This development in turn requires the Sudanese banks to improve the financial services, that can be done through the introduction of IT in the SBI. Whilst examining the organizational context of Sudanese banks, it could be

proposed that the sector is operating in a poor environment in terms of computerization. These propositions can be summarized as follows:

- That there is a poor utilisation of computer-based information technology that can facilitate major banking services.
- That banking management underestimates the time needed for the implementation of required changes.
- That there is a gap between the introduction of IT and staff training.
- That there are differences in background interests and priorities of investment in technology between bank managers and information technology specialists, which impede the process of introduction of new technology in the SBI.

This kind of environment requires that banks should have an IT strategy in order to help in the planning and controlling of daily banking operations to provide better banking services. The historical development of SBI in the period from 1903 to 1980 did not involve any major strategic outlook. This lack of strategic planning in the Sudanese banks has caused delays in the implementation of IT and resulted in under-development of the SBI that has lagged behind the banking industries in neighbouring countries, especially in terms of banking technology (Mahdi and Dawson, 2006). As a result, there is a need for a more comprehensive research that promotes IT strategies in the future development of the banking sector. The aim of this paper is to present and appreciate the value of multi-strategy research methodology (mixed methods) in conducting empirical research in a developing country. First, the paper begins with outlining the research strategy, discusses the value of multi-strategy research methodology, and then presents and discusses the findings and concludes by highlighting the importance of multi-strategy research methodology in conducting fieldwork research in Sudan.

RESEARCH STRATEGY

This paper explores the value of multi-strategy research methodology and design adopted in investigating the implementation of new technology in the banking sector of a developing country like Sudan. The design for the study used mixed methodology which included quantitative and qualitative techniques. Questionnaires data were used to describe aspects of the changing

management process and qualitative data from interviews were employed to develop, explain and support questionnaire findings. This paper is about the research design and methodology, as the title suggests, it is an exploratory paper, which aims to present an evaluation of research design and methodology adopted in examining the introduction of global electronic banking technology in the Sudanese banks.

Prior to the development of a research design, and before embarking on the fieldwork literature on research methodology was explored. In reading and assessing a large body of material, the literature indicates how mixed methods research, utilizes the data gathering techniques associated with both quantitative and qualitative research in a single study (see Brannen, 1992; Creswell, 2003; Bryman, 2001, 2004). The fieldwork was conducted in Sudan for a six-month period during 2003. To achieve data triangulation the study used both quantitative and qualitative methods in order to provide greater insight into how IT is introduced and implemented in SBI. Data were collected through questionnaires, which were given to Bank Managers and IT managers in SBI at their head offices in Khartoum. The questions sought opinions on issues such as:

- The change processes involved in introducing IT.
- Strategies adopted for managing change of IT in the SBI.
- Organizational barriers and reasons for resistance to change.

Data were also collected through interviews. Five types of respondents were interviewed in the SBI comprising Top/Senior Officials, General/Bank Managers, IT Consultants, IT Managers and at least one to five randomly selected Employees in each bank. These respondents were targeted because they were the people involved in issues related to the introduction and implementation of IT in the SBI. A series of semi-structured interviews were designed to complement the questionnaire, generating data that could not be collected by the questionnaire. A number of key documents were also collated and analysed during the course of the study. Saunders, *et al.,* (1997) indicates that documentary secondary data can be employed in research designs, which also employ primary data collection methods. This study represents a combination of theoretical and empirical work based on primary and secondary data collection. Secondary data were collected from the documentary sources such as

annual reports published by the Bank of Sudan (BOS) and internal documentation from Sudanese banks; Secondary data were also collected from the literature on corporate strategies and organizational change, IT and the banking industry; while the primary data were collected from the fieldwork carried out in Sudan using multi-strategy research methodology.

RESEARCH METHODOLOGY

Mixed Methods: The framework for collection and analysis of data was based both on deductive approach to test hypothesis and to generate quantitative data; and on a more inductive examination to complement the questionnaire and provide qualitative data. Dual methods research employs the data collection approaches related to both quantitative and qualitative research in a single study (Creswell, 2003). Bryman (1988) indicates a number of different instances in which quantitative and qualitative methods have been combined in published research, thereby achieving, as Brannen (1992) summarises, the logic of 'triangulation': The findings from one type of study can be checked against the findings deriving from the other type. For example, the results of a qualitative investigation might be checked against a quantitative study. The aim is generally to enhance the validity of findings (Brannen, 1992: 59).

The challenges that dual methods research pose include the need for a wider range of data collection, the intensive time required for analysing both transcript and numeric data, and the requirement to be familiar with both methods of research (Creswell, 2003). (Hammersley 1992: 48) indicates that all research using both deduction and induction methods, need to 'move from ideas to data as well as from data to ideas'. (Huberman and Miles, 1994: 430) suggest that loose inductive designs 'work well where the terrain is unfamiliar and/or excessively complex or where the intent of the research is exploratory and descriptive'. They argue that, beginning deductively with a pre-determined pattern of relationships or moving gradually towards them, inductively, are both legitimate and effective routes for research. (Miles and Huberman, 1994) note that a great deal of research falls between these two extremes. They argue that 'it is impossible to embark upon research without some idea of what one is looking for and foolish not to make that quest explicit' (Miles and Huberman, 1994:17). In addition, (Yin, 1994: 28) states that where 'the existing knowledge

base is poor, the available literature will provide no conceptual framework or hypotheses of note', but as he indicates even an exploratory study must have an explicit research design. Consequently, the position taken in this study is to use mixed methodology (multi-strategy) comprising quantitative and qualitative data collection techniques to explore and examine the introduction of IT in a developing country. This methodology is adopted because examination of the management of technology and change in the SBI is a new and a complex area. It is an attempt to choose the most suitable method(s) that can generate data needed to answer the research question(s). The importance of quantitative and qualitative analysis is recognized; and the two approaches were used in parallel to address the same research question(s) or hypotheses in order to understand the process of technology and change in SBI, given the uncert-ainty and complexity of research environment in Sudan; and that the study is constrained by time and limited financial resources (Hammersley, 1992). Glaser and Strauss (1994:17) also argue that there is no 'fundamental clash' between the objectives of quantitative and qualitative research but that there has historically been disagreement on 'the primacy of emphasis on confirmation or generation of theory'; but Miles and Huberman (1994: 43) state that, having little theoretical understanding of a phenomenon is not enough to 'house a theory'. (Bryman, 2001) also indicates that there are examples of cases in which qualitative research has been used to test rather than to generate theories (Adler and Adler, 1985). This is relevant to what has been done in this study, as the study tests hypotheses, and develops a picture of change in the Sudanese banks by cross-checking the findings generated from quantitative and qualitative approaches against each other. The intention of this paper was not to compare between objective and subjective methods, but the researcher's interest was to achieve data triangulation - i.e. to enhance the validity of findings by cross-checking the results derived from quantitative and qualitative approaches against each other- (Brannen, 1992; Deacon, *et al.*, 1998).

Assessment of the Research Design and Methodology:

The limitation of quantitative approach–which is generally limited to answering 'what' aspect of a phenomenon–is compensated for by qualitative research that allows us to explore meanings in helping to answer the 'why' and 'how'

questions (Bryman, 1988; Brannen, 1992, Creswell, 2003, Bryman, 2004). The field-work for this research centred on the collection of data that would inform a critical analysis of the adoption of IT in the SBI.

In the design of the data collection instruments a number of research questions were identified that shaped the design of the questionnaire and the interview schedules. These were as follows:

1- To what extent has a lack of IT managerial knowledge and skill influenced change?
2- What has been the degree of general manager and IT manager involvement in steering the change process?
3- What has been the degree of general manager and IT manager involvement in setting IT strategies?
4- What are the main differences in interests/priorities between bank mangers and IT managers and how far have these differences constrain-ed change?

From identifying these general areas of interest and concern, four general hypotheses were formulated that could be tested through the survey questionnaire. These are as follows:

1- That a lack of IT knowledge and skills among the general managers in SBI act as a barrier to change and as a result inhibit the process of IT change.
2- That General Managers do not view IT change as a key element of their work and this limited involvement constrains the process of change.
3- That General Managers are not directly involved in planning for IT strategies due to lack of IT knowledge, and therefore, they do not play important role in planning IT strategies in the SBI.
4- That differences in interests and priorities between the General/Bank Managers and the IT Managers act as barrier to change in the SBI.

These four hypotheses were addressed by a number of specific questions in both the questionnaire and the interview schedule; that is:

1- What are the reasons for adoption, introduction and implementation of IT in SBI?
2- Who initiated the introduction and implementation of IT in the SBI?
3- Do managers have the necessary knowledge and understanding of IT?
4- What are the types of IT introduced and implemented in SBI?
5- Why is IT being adopted, introduced and implemented in SBI now?

6- To what extent has the SBI complied with the directives of the BOS in implementation of the IT?
7- Do managers have direct involvement in IT planning for change?
8- Do banks have strategies to shift over to IT in the SBI?
9- What are the management strategies for introducing and implementing IT in SBI?
10- What problems have banks encountered when introducing and implementing IT?
11- Do differences in background, interests and priorities exist among managers and information technology specialists?
12- What are the attitudes of manager towards those that resist change?
13- To what extent is the introduction and implementation of IT affected by organizational culture?

In conducting fieldwork in Sudan a combination of a self-administered questionnaire and programme of interviews were used to collect data. Company documents were also examined and analysed. For example, annual reports published by banks, especially sections relating to the introduction and implementation of IT were explored, internal annual banking reports were also used to provide economic background of Sudan and historical development of the Sudanese banking industry.

In the design, piloting and eventual use of a questionnaire survey a series of closed multiple-choice questions were used, which provided a questionnaire design that was both easy to complete and easy to analyse. 'Closed questions' can only be employed to obtain relatively simple, straightforward, and uncomplicated information. When it comes to collecting data about differing viewpoints, and where a question requires a combination of answers, the design of multiple-choice questions are limited. To account for these limitations, the design included an 'open question' section to obtain any further information that the respondent felt was pertinent to the issue at hand. Another problem with the questionnaire survey is that it allows for little adjustments or developments to be made as a result of lessons learned in the earlier stages of the research. Consequently, it is critical to pretest and pilot-test questionnaires, not simply to validate that the questions are not vague and can be answered, but also to ensure that nothing has been left out (Moore, 1988). (Fink and Kosecoff,

1985) suggest that self-administered questionnaires require much preparation and monitoring in order to obtain a reasonable response rate, to elicit valid data and to maximise the quantity and quality of data collection. The approach adopted was hand delivered questionnaires directly to people for completion, while little assistance was available to address issues with respondent comprehension in case a respondent does not understand a question or a technical terminology. The study gathered data by using such an approach and as it turned out, the self-administered questionnaire produced a 90.7% response rate.

In the case of the interview programme, appointments were arranged with each respondent. The interview was designed to complement the questionnaire, as the researcher was aware that the major limitation with the questionnaires is the lack of qualitative depth to the answers. The interview was therefore aimed at collecting data that could not otherwise be obtained by the questionnaire. The semi-structured interviews provided qualitative data on the attitudes and perceptions of change from the respondents in the SBI. The interview provided the opportunity for more open discussions of respondents' opinions that were managed by the researcher through using a series of probes and prompts. The main fieldwork problem stemmed from the difficulties in getting the top bank officials to agree to interview appropriate staff. Simply making an appointment proved challenging, particularly with General Managers. Although the researcher drew heavily on the help of personal contacts, it remained impossible to make appointments with a number of banks in the SBI. As it turned out, 62% of the population of target managers in the SBI were interviewed during the course of the study.

Hessler (1992) indicates that the survey approach requires a specific and clearly stated analysis plan. Without a clear plan, the researcher could have collected the wrong data for the expected analysis plan. The researcher would also be engaged in a considerable amount of data due to the difficulty of sorting out what is relevant from the irrelevant (Hessler, 1992). The quantitative data collected needed a suitable statistical analysis plan in order to provide tests of relationships or of the significant variations between groups. The questionnaire was designed after an initial consultation with an academic specialist. The consultation was used to ensure formulation of appropriate questions, which

can be analysed by using Statistical Package for Social Sciences (SPSS). A technical expert was also consulted to guarantee the successful transfer of data from Snap 6 software to SPSS for Windows. Some questionnaires used in a number of previous studies were also reviewed. Based on expert advice, this study chose appropriate statistical methods, which would be sufficient to comply with the nature of the collected data and be appropriate for the analysis. Thus, the statistical analysis using SPSS for Windows package was utilised for the analysis of the data collected from the survey. Snap 6 was utilized to scan the completed questionnaire obtained from the SBI into the computer, and then data was transferred to SPSS for Windows package for statistical analysis based on the descriptive statistics, such as frequencies, crosstabulations, and a Mann-Whitney U test. The researcher attempted to use the Chi-square test, but the test results were inaccurate as more than 20% of the cells had an expected count of less than five. Nonparametric tests or distribution free tests (such as a Mann-Whitney U test) do not carry specific assumptions about population distributions and variance. A Mann-Whitney U test is therefore, useful for measuring ordinal data, and where there are two independent samples, the test can be used to compare the averages of the two groups, which is relevant to the situation in this study; whereas the equivalent assumptions underlying the use of the t-test would be extremely difficult. As a result, a Mann-Whitney U test for statistical significance was utilized to test for significant differences using $P<0.05$ as statistical level of significance (Kinnear, and Gray, 1999). Descriptive statistics (frequencies and cross tabulations) were applied to enable comparisons between respondents in the SBI; and a Mann-Whitney U test was used to check for the validity of different hypotheses.

In the case of interview data, a manual method was utilised for data analysis. Essentially thematic analysis was conducted of interview transcripts and the findings were compared and contrasted with the quantitative survey data (Bryman, 1988; Brannen, 1992, Creswell, 2003). Interviews were originally conducted and tape-recorded in Arabic Language. All taped interviews were arranged according to bank names in alphabetical order for transcription. Each interview took between 4 to 6hours to transcribe because it required translation from Arabic into English. Interviews were categorized as public, private, foreign banks, and the top officials/policy makers from the EBS and the BOS.

A pedal transcription machine was utilized in transcribing the interviews. The transcribed interviews were restructured, coded, and classified. The transcriptions were analysed by respondent type, namely: General Managers, IT Mangers, Employees, IT consultants and the Senior Officials/Policy Makers. In the first instance, data were analysed in sequence by grouping all answers related to one question together. Answers were then classified by each of the five respondent types. Responses were then analysed searching for common responses, shared beliefs, and opinions. Thematic analysis was conducted within all responses to particular questions and then these were classified into broad themes. Some of the respondents' comments were used for illustration and cross-checking against the quantitative findings. Interview data requires a thorough analysis and 'work through all material searching out examples, which do not fit into the original suppositions', as well as to identify themes which fit the research questions posed (Silverman, 2005). The next section presents the findings and discussion.

RESULTS AND DISCUSSION

Acquisition of Banking Systems: The survey indicates that more than half (12) of banks surveyed acquired their banking IT systems from external vendors (foreign/overseas companies). During technology transfer, these external vendors are likely to play an influential role in shaping practices in the Sudanese banks purchasing the technology. As (Orlikowski, 1992) technology transfer among organisations is influenced by the developing organization, which plays a key role in shaping the social practices of the organizations using the technology. About one-third (7) of banks had their systems built in-house, and less than a quarter (4) were custom-designed (see Table 1).

Table (1): Respondents' Opinions about Acquisition of Banking Systems

Some Aspects of Banking Systems	% of Responses	No. of Banks
Acquisition of Banking Systems		
External Vendors	52.2	12.0
Built in-house	30.4	7.0
Custom-designed	17.4	4.0
Off-the shelf (not selected)	0.0	0.0
Total	**100.0**	**23.0**

Note: 3 missing cases in Acquisition of Banking Systems.

Interview findings reveal that Sudanese banks had two options: either to develop a system from scratch, or to import a system with international standards and modify in-house. IT consultants reveal how a number of Sudanese banking experts were sent abroad to look for suitable systems. As a consultant states:

The Electronic Banking Services Company (EBS) had two options either to develop a system from scratch, which is costly and a lengthy process or import a system with some international standards and do some localization here, and this is what we have done. 14 Sudanese banking experts with at least 20 years of experience seconded from their banks were sent to India and saw the system, then a team of Indian experts came here, and we carried out customer requirements specification or gap-analysis (IT Consultant).

This suggests a process where foreign companies displayed their systems to Sudanese purchasers, who in return specified their requirements. Foreign companies then executed the necessary requirements or carried out the gap-analysis to match local need in order to satisfy the Sudanese banks.

Countries Providing Systems:

The questionnaire findings show that Sudanese banks bought their systems from ten countries: Egypt, India, UK, Japan, USA, Malaysia, and China, Other (Jordan, Dubai, and Pakistan), while a few banks bought systems from the local market (i.e. from EBS), (see Table 2).

Interview findings explain why Sudanese banks purchased their required banking IT systems from a variety of different countries. IT consultants suggest that the BOS is responsible for automation and setting standards for the introduction of the automated systems in the SBI. They argue the BOS issued a directive, which specified that no one banking system could be installed in more than 25% of the Sudanese banks. Regarding this matter, one consultant expressed his views as follows:

I think the directive issued by the BOS, which indicated that no one banking system can be installed in more than 25% of the banks was wrong. To me this directive is a surprise, because this means that the BOS is setting different standards for the Sudanese banking sector. It would have been better to try one system in few banks for at least one or two or even three years and then let it be an open competition among installing companies (IT Consultant).

Table (2): Respondents' Opinions about Countries Providing Banking Systems

Some Aspects of Banking Systems	% of Responses	No. of Banks
Countries Providing Systems		
Locally (i.e. EBS)	19.0	4.0
Egypt	19.0	4.0
India	17.2	4.0
UK	12.1	3.0
Japan	6.9	2.0
USA	5.2	1.0
Malaysia	3.4	1.0
China	1.7	0.0
Other	15.5	4.0
Total	**100.0**	**23.0**

Note: 3 missing cases in Countries Providing Systems.

Bank managers explain that the 25% directive refers to the core banking system purchased from abroad by the EBS. They suggest that the BOS did not want to have many banks depending on one package. This would avoid problems with supplying companies that may affect the whole banking sector. A bank manager uttered the following opinion:

The BOS does not have direct intervention to impose a particular system on any bank. Each bank chooses the system that is suitable to its requirements. BOS is keen to see each bank has a different system, but one system could be shared by a number of banks not exceeding 4 to 5banks, in order to avoid any break down in the system, which could be disastrous (General Manager).

Apart from the BOS directive, which restricted the installation of core banking system by 25%, both senior officials and IT consultants discuss how the BOS did not originally want the EBS to go for core banking software. They wanted the EBS to work on common and main services, such as, payment systems, card management systems and the improvement of telecommunications infrastructure. They argue that, owing to insufficient systems in the market, EBS was obliged to shop around for banking systems and then deploy them in some banks; otherwise, EBS would not be able to render services to Sudanese banks without having an adequate core banking system. Senior officials emphasize that the 25% approach is applicable to the core banking system only. For the other services, EBS can provide for the whole banking sector. Moreover, if any bank did not want to work with the EBS, the BOS do not have a problem with

this, but they will ensure that the bank is able to provide banking customers with the same standard and quality of service as other banks in the system. As an IT consultant explains:

If any bank does not want to participate in the clearing system, it is free to do so, but of course, it will be very difficult for it to deal with other banks without the clearinghouse. And even for the ATMs, if any bank wants to put its own network, card management systems and switch, it is up to that bank, provided that all customers are able to deal with their ATM and the other ATMs at the same time. But, of course, this would not be feasible (IT Consultant).

Similarly Another Senior Official States:

Banks have freedom to choose their own systems, but we need them to cope with the change by choosing compatible systems able to communicate with the BOS. Our IT department can help them do this, but they have the freedom of choice. Each bank has its own flavour and we don't want them to be one copy. This plan includes all new banking services and although banks have the freedom, they are expected to meet the core banking requirements in order to be issued with certification by the BOS (Top Official).

IT Strategy and Change: The questionnaire survey results also reveal how Sudanese banks are adopting different IT strategies, which mirrors an absence of any consensus about a wider range or consistent IT strategy to implementing technological change in the SBI; perhaps different banks acting in different ways reflecting their IT strategy. Shifting traditional independent ways of working and trying to get banks to adhere to more centralized objectives, BOS issued a directive for banks to increase adoption and use of new technology and yet, banks are given considerable leeway in the purchase and further enhancement of their IT systems. The 25% rule encourages a free market IT strategy ensuring that the banks are not reliant on a single source IT supplier. Whilst this is discouraged across the banks as a whole, almost two-thirds of banks did indicate their preference for single sourcing. This mixture of approaches highlights how there is not a single comprehensive IT strategy that encompasses SBI and adheres to one of Parson's (1983) categories. Moreover, in the context of Sudan, the limitations imposed on expenditure and the problems of limited expertise do arise as critical factors shaping the uptake and use of IT in SBI. This aspect is more clearly illustrated in the qualitative research,

emphasizes the need for mixed approach to IT strategy, where the lack of finance was highlighted. During the interviews, respondents discuss how the allocation of small technology budgets or funds impeded the process of implementation of new technology in the Sudanese banks.

Data collected during interviews suggest that insufficient funding was one of the central causes for delaying the adoption of new technology in the banking sector. Financial limitations and an inability to raise the adequate levels of funds to invest in banking systems was a major obstacle to the uptake and introduction of banking technology. IT consultants report that there are problems in setting priorities, proper utilization of financial resources, underestimation of technology funds and allocation of small budgets for the introduction and implementation of IT in the SBI. Although banks require the technology, very low funds are normally assigned for this purpose. IT consultants suggest that the main problem comes from those banks, which are opposing the banking conformity programme guided by the BOS. The programme was formulated as a general directive and was then issued by the BOS to Sudanese banks to restructure, increase capital and or merger in order to meet the new technology requirements. IT managers believe that bank managers do not pay much attention to IT departments, as they tend to allocate these departments relatively small amounts of money. As one of the IT managers states: If you go to any bank you will find money spent on furniture and cars exceeds by for money spent on computers. We are now exerting all our efforts to get the right budget. I can say it is negative experience, because we are so far unable to convince the top management to set the required budget for technology. We can convince the general managers, but the budget is normally cut down into half by the Board of Directors, the majority of which are composed of traders, and businessmen who don't know the technology and have no interest in computers, and unfortunately, we are not part of that Board to discuss the budget and convince them.

This quotation highlights how the pre-existing culture and attitudes of bank managers inhibit the process of change and limit the strategic development of IT in the banking industry. It also highlights where power and decision-making rests. In Sudan, banking management is heavily centralized and there is a lack of strategic awareness and knowledge about technology

among the majority of bank managers. The two approaches-hand delivered questionnaire combined with semi-structured interviews-have generated comparative and complementary data and in so doing, highlights the value of a dual methods approach to new and complex areas of study.

CONCLUSION

As already described, the research conducted in Sudan used a mixed methodology approach and a number of adjustments to the way data were collected had to be made during the period of fieldwork in the Sudan. The need to adapt a methodological approach to contextual fieldwork contingencies are highlighted in a number of ways as the introduction and implementation of IT is a new experience in the SBI. The findings reveal how there have been a lack of infrastructure, low levels of expertise, limited investment and for many years, the absence of a comprehensive technology strategy for banking. The absence of technology awareness and IT knowledge was prevalent among Sudanese senior banking staff, which inhibited the process of IT change and contributed to problems of conducting research in the SBI. Over time however, this situation must change and yet, the implementation and uptake of technology cannot be understood outside of the context in which it takes place. In this case, the requirements of a mixed methodology approach that comprised self-admini-stered questionnaire design and semi-structured interviews schedule were vital in collecting data that were helpful in understanding the management of technology and change in Sudanese banking sector. The multi-strategy research adopted in this study enabled integration of key findings as the questionnaire results were supported and further developed and explained by the interview findings. For example, the findings from both questionnaires and interviews related to acquisition of banking systems, countries providing systems, IT strategy and change were all integrated in a dual method.

Some of the limitations of the study were that the survey findings may have been affected by missing data, and some of the interview data may have been affected by translation from Arabic into English. The researcher was also constrained by time, financial support and the nature of the fieldwork, as data collection often depended on the researcher's personal relationships and contacts. Gaining access to banking personnel was a real challenge and a major obstacle in the process of data collection in a developing country. Although the study was constrained by time and limited financial resources, and despite the questionnaire

and interview limitations and access difficulties encountered during the data collection period, the mixed methods employed in this study were effective in generating useful data. The interviews drew out issues that were not covered by the questionnaire. The mixed methodology was effective in utilizing the surveys within limited time, proved valuable in reducing the fieldwork cost, and was useful in gathering rich data that were crucial in answering the research questions and hypotheses. The researcher might not have attained significant findings or found out answers and explanations to this research questions if he used only one method, thus in so doing, the present work highlights the value of multi-strategy research methodology as a new and emerging field of study.

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