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## Deployment evaluation of accounting information systems in Libyan commercial banks

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# Deployment evaluation of accounting information systems in Libyan commercial banks

## Research Paper

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## Abstract

This article reports on the recent implementation and current deployment of accounting information systems in Libyan commercial banks. A case study approach is adopted that moves from an initial screening of the 14 main Libyan banks to a final in-depth study of just three banks. Business process modeling and systems profiling are used to assess the status of the banks in terms of systems use, process change and information systems strategy development. Libyan banks are well advanced in their installation of modern packaged software but could be used to greater effect to optimize business processes and improve efficiencies. Training and up skilling of staff in the use of these systems and infrastructure remain key issues. The study illustrates how models formulated for application in the developed world can be adapted and applied to assess information systems in a developing world commercial environment; this can be re-used and adapted to assess systems strategy and status in other organizations in the region.

## Keywords

Libyan banks, accounting information systems, AIS, process change, IS strategy

## INTRODUCTION

Libya, with a population of over 6.5 million people, covers an area of 678,000 square miles, being slightly larger than Alaska. Most of the country is desert. The bulk of the population lives in a coastal strip of over 1,000 miles in length, mainly in the two main cities of Tripoli and Benghazi. The country is located between Egypt and Tunisia, bordering the Mediterranean Sea, but also has borders in the south with Chad, Niger and Sudan, and in the west with Algeria. Life expectancy for the total population is 76 years, for males 74 and for females 79. Arabs and

Berbers represent 97% of the overall population and others 3%. In addition, 97% of the population is Sunni Muslim and other religions represent 3%. Libyan people speak Arabic as a first language, but English and Italian are widely understood in the main cities. 82% of the total population is literate, 92% of males, 72% of females.

Over the past two decades, the banking industry in Libya has experienced very significant development, which was the direct result of various factors, one of the most important being the implementation of new accounting information systems (AIS) and associated technologies. Most banks consider information technology (IT) as a route for service quality improvement, while others perceive it as a cost-effective expansion strategy (Kim and Davidson, 2004). There is a general consensus regarding the importance of understanding the patterns of IT adopted by bank customers (Pikkarainen, Pikkarainen, Karjaluo and Pahlila, 2004), and several studies (Applegate, McFarlan and McKenney, 1999; Kim and Davidson, 2004) emphasize that financial institutions such as banks are distinguished from other businesses in their reliance on IT. As early as the 1980s, Porter and Millar (1985) found that banking was one of the most information-intensive sectors. Banks tend to use IT to improve the quality of their services, increase efficiency and customer satisfaction, and offer wider choices with lower costs to the customer. In other words, banks are using IT for competitive advantage.

AIS provide valuable information to a range of external users and internal users of accounting data (Romney and Steinbart, 2003). One function of AIS is to produce financial statements such as the Statement of Comprehensive Income, the Statement of Financial Position and other reports used by managers, creditors, current and potential investors and others. The data produced by AIS is considered an essential source of key information for the organization. It plays a major role in informing financial decisions either operational or regarding investment or funding. These decisions contribute to improving the bank's position and give competitive advantage, reflected in the market value of the organization, and therefore its sustainability in the marketplace. The banking sector is among the different economic sectors where the use of AIS has increased significantly in recent years, as it has contributed to banking operations, reducing cost and time and improving the quality of services delivered to the customers.

The implementation of AIS can be a costly process, which requires significant effort, time and money at every stage of the systems life cycle. Several studies have shown that the fit between accounting and contextual factors, or between IT and contextual factors, have significant impact on performance (Bharadwaj, Bharadwaj and Konsynski, 1999; Holden and El-Bannany, 2004; Ismail and King, 2005; Melinda and Stephen, 2001). Such investment contributes to the organization's subsequent long-term productivity and profitability, and effective project management in systems implementations and proper training and skills enhancement for the systems users are key factors in achieving this (Wynn and Maldonado, 2007). It is also dependent on the knowledge of how to use these systems in an effective manner, to support the information requirements of the decision makers and strategic planners. This will often entail change and improvements in the basic business processes of the organization. This article thus attempts to answer three questions:

1. What is the extent and nature of AIS investment in the Libyan commercial banks?

2. Has investment in AIS been accompanied by significant change in business processes? If so, what role has this played in improving business performance in the Libyan commercial banks?
3. What information systems strategies are being pursued by the Libyan commercial banks, and are there any common themes in this respect in the banks that are studied?

## RELATED WORKS

An accounting system can be conceptualized as an organized set of documents, records, reports and procedures for the preparation and delivery of basic and financial data in a timely manner, with the required accuracy for effective decision-making and identification of whether an organization's objectives have been achieved. Bagranoff, Simkin and Norman (2010) assert that "accounting is itself an IS that is a communicative process that collects, stores, processes, and distributes information to those who need it". A system is composed of interrelated sub-systems; all of them aim to achieve a set of objectives. An accounting information system (AIS) may be seen as one of these components within a set of information systems within a larger corporation. Equally, within an organization such as a bank, where financial transactions are the lifeblood of the business, the AIS may be considered as the main system, which itself comprises a range of sub-systems or components.

Beynon-Davies (2002) has divided up AIS into three major subsystems as follows: accounts receivable (or sales ledger) records all financial transactions and amounts that are owed by clients to the organization; accounts payable (or purchase ledger) stores financial transaction details and amounts owed to suppliers by the organization; and the general ledger records details of all financial transactions across the organization. The accounts receivable system and the accounts payable system are fundamental to manage the organization's cash flow. Harrison and Horngren (1992) defined AIS as "the combination of personnel, records, and procedures that a business uses to meet its routine needs for financial data. Because each business has different information demands, each uses a different accounting information system tailored to specific needs". The primary purpose of an AIS, then, is to produce the financial statements and other reports used by internal users such managers, and external users such as creditors and interested people. It also generates useful information to non-accountants such as individuals working in finance, marketing and human relations.

Although the AIS may be the primary information system in a bank, there are often a number of significant supporting technologies that enhance or supplement the business impact of the AIS. For example, the use of ATMs can affect the profitability of a bank in terms of cost saving and better services. Holden and Bannany (2004) conclude that investment in ATMs leads to a reduction in banking transaction costs, and the number of staff and branches. The electronic transfer of funds is also widely used by banks in the developed world, to process a large number of financial transactions, including withdrawing funds, and transferring and receiving deposits. Turner, Turner and Voysey (1996) suggest that electronic systems of transferring money and accounting information result in fewer mistakes, better control, a reduction of managerial costs to the minimum, and the achievement of efficiency in accounting and rapid modernization of accounting records. Moreover, Wigand (1997) views the electronic transfer of money and information as the full implementation of technology of information and communications, from start to finish in business and financial processes, to achieve an organization's objectives. These

processes include not only the processes between the organization and other organizations, but also between the organization and its customers. Hence, the AIS in its wider sense may be considered to include not only the information systems software *per se*, but also to encompass the supplementary network and communications infrastructure that can enhance the benefit of the AIS to the customer and the organization. This also encompasses the internet which plays a major role in electronic commerce. Gradually, it has become a rapid and reliable mechanism for the completion of business transactions. It also facilitates negotiations, sales, purchases, marketing, research, feasibility studies, and exchange of securities and allows the transfer of funds between organizations.

Trewin (1988) suggested that future research should include investigations of how the changes in the accounting-related use of computers and computer technology affect organizations. As organizations change, the ways in which they interact with information systems already in place may also change. Technology advancements will continue and it will remain important for those who make design and implementation decisions to understand how existing systems can be adapted to changing environments, how those adaptations affect the organization, and how new systems impact on the lives and working practices of systems users. He states that field-based studies are central to understanding these changes and their effects. Information systems and organizations influence one another. Beynon-Davies (2002) argues that the impact of an information system can be considered on a number of levels: individual, on groups and on the organization as a whole. The effects may be positive or negative. In addition, the adoption of an information system in an organization may cause both intended and unintended effects. Laudon and Laudon (2005) note that "information systems must be aligned with the organization to provide information that important groups within the organization need. At the same time, the organization must be aware of and be open to the influences of information systems in order to benefit from new technology".

One major area of impact in the introduction of information systems is in the improvement or re-design of main business processes. There are many definitions of the term business process. Davenport (1993) defined business process as "a specific ordering of work activities across time and space, with a beginning, an end and clearly identified inputs and outputs: a structure for action". Gladwin and Tumay (1994) describe a business process as a "group of logically related tasks that use resources of the organization to provide defined results in support of the organization's objectives". Even though IT is acknowledged as one of the main enablers of business process change, when it comes to capturing the impact that a new information system will have on current or proposed business processes, existing modeling techniques are often unable to capture the full extent of the impact. This can lead to the expected benefits not being achieved leading in turn to the disappointments that have been reported (Eatock, 2003). Earl (1988) outlined three alternative approaches to IS strategy development and examined how new systems deployment can impact on core business processes. It is not always easy to embrace process management especially if the organization is dominated by traditional functional structures. The implications of process management are often neither fully understood nor thought through. To organize a company around business processes, it is necessary to focus on external customers because business processes usually start and end with them. Processes are a series of activities which begins with an exact understanding of what the external customer wishes and finishes with the external customer gaining what he/she needs and requests. The

customer is always central within organizations structured by process and the final objective of these companies is to offer to the customer more value in less time and with less cost.

To define processes is a difficult task, which involves many complex factors like customers, human behavior and organizational structure. Ramaswamy (1996) suggests that companies that provide services normally think that process is a sequence of activities needed to perform transactions that help to provide their services. Process modeling can provide a less detailed way to define process. "Modeling, in general, aims to provide, an abstract description of one slice of reality by omitting details and thus reducing complexity which is usually inherent in real world situations" (Tsalgatidou and Junginger, 1995). In practice, functional areas do not disappear when companies organize themselves around processes. When process owners assume their responsibilities for specific projects, the functional area heads can focus on core competencies and related staff training and resource planning and management.

Top level process maps can be used to depict the deployment of IS in different areas of an organization (Wynn, Turner, Abbas and Shen, 2009). To assess the impact of systems and technologies on different processes, a number of models can be used. The UK Government's CPIT (connect-publish-interact-transform) model (Department of Trade and Industry, 2001) seeks to determine the level of e-business adoption at individual process level, and this has been used successfully in a number of company studies in the UK to assess the level of e-business across an organization (Taylor and Murphy, 2004; Lau, Wynn and Maryszczak, 2010). However, the distinction between e-business and systems deployment in general is now very blurred; as Chaffey (2007) has suggested e-business might well now be considered as "all electronically mediated information exchanges". Zuboff's concepts of automate-informate-transformate (Zuboff, 1988) are an alternative means of assessing IS impacts in individual process areas. In this context, 'automate' signifies the basic use of computer systems to support a process; 'informate' implies that the information system is being used to generate management and operational information to advance process improvement; and 'transformate' means the deployment of the information system has had a major change on the business process leading to a degree of transformation.

In addition, Nolan's model (Nolan, 1979) of the evolution of the IT/IS function in organizations is still relevant today, particularly in developing countries where the uptake of technology has been relatively recent. The model depicts six evolutionary stages in the development of the IT/IS function, starting with end-user Initiation of computer use, through Contagion to Control, when an IS/IT department is established, to Systems Integration, Data Administration and Maturity. It is a valid and relevant model that can be used to assess the role of IS and IT in an organization.

## RESEARCH METHODOLOGY

The research methodology and design was based upon an inductive approach using multiple case studies. Case studies can be used to "study a number of cases jointly in order to inquire into the phenomenon, population or general condition" (Stake, 1995), and an inductive approach can "develop theory as a result of data analysis" (Saunders, Lewis and Thornhill, 2003). Qualitative, inductive research can be carried out in a number of ways, encompassing case studies, the development of grounded theory, and ethnography. Remenyi, Williams, Money and Swartz

(1998) assert that widely accepted theories are unlikely to be available within a business context and that Glaser and Strauss's (1967) grounded theory methodology needs to be used for theoretical conjecture. Grounded theory is "an inductive, theory discovering, methodology that allows the researcher to develop a theoretical account of the general features of a topic while simultaneously grounding the account in empirical observations or evidence" (Martin and Turner, 1986).

Hartley (1994) defines case study research as a "detailed investigation ... of one or more organizations, or groups within organizations, with a view to providing an analysis of the context and processes involved in the phenomenon under study", and Remenyi, Williams, Money and Swartz (1998) conclude that case studies can be used as part of a grounded theory approach. According to Ryan, Scapens and Theobald, (2002), "descriptive case studies can describe accounting systems, techniques and procedure used in practice. A number of companies may be selected to describe different accounting practices or the similarity of practices in different companies. The research objective of these studies is to provide a description of accounting practice. Such studies may be useful in exploring the use of traditional or more modern accounting practices".

This study researched a number of case study banks, because a multiple-case design can increase the validity of generalizations developed from the research (Benbasat, Goldstein and Mead, 1987). This view is supported by Yin (2003), who suggests that single case studies are vulnerable, and that there may be substantial analytical benefits of having multiple case studies.

The Bank	Total Assets (Libyan dinars)	Ratio %	Initial study	Case Study
Gumhouria Bank	20600.1	40.9	√	
Sahara Bank	11713.5	23.3	√	
National Commercial Bank	7463.0	14.8	√	
Wahda Bank	5512.9	11.0	√	√
Commerce & Development Bank	1848.2	3.7	√	√
National Banking Corporation	1130.3	2.2	√	
Alwaha Bank	609.0	1.2	√	
Aman Bank for Commerce & Investment	484.6	1.0	√	
Alejmaa Alarabi Bank	328.4	0.7	√	√
Alwafa Bank	179.8	0.4		
United Bank for Trade and Investment	163.8	0.3		
Mediterranean Bank	102.7	0.2		
Alsaraya Trading and Development Bank	91.6	0.2		
Arab Commercial Bank	87.9	0.2		
<b>Total</b>	<b>50315.8</b>	<b>100</b>		

Table 1. The 14 commercial banks in Libya. Total assets 2008 (1 Libyan dinar = 0.8 US dollar)

Grounded theory can emerge through analysis of the evidence from the case studies. This can be analyzed in conjunction with findings from the literature review to develop theory and concepts.

This allows empirical generalizations and a series of clear statements to be developed (Remenyi, Williams, Money and Swartz, 1998).

Data collection was pursued through a combination of interview, observations and documentary evidence. Yin (2009) suggests that the utilization of multiple sources of evidence is one way of increasing the construct validity of case studies. Semi-structured interviews were used in an initial assessment of nine commercial banks, which was followed by in-depth case study research of three of these banks. AIS (be they manual or automated) were deployed in all these banks, and these systems had become a basic component of the banks' composition and are an integral part of their day to day operations. Questionnaires and first hand interviews were undertaken with key personnel in the banks, allied to a review of financial statements, systems documentation and annual reports.

## CASE STUDY FINDINGS AND ANALYSIS

### The three case study banks

At the start of the research project in 2008, there were 14 commercial banks in Libya. The original intention was to undertake an initial investigation of all 14 banks, before selecting three case studies for more in depth case study research. However, discussions with the senior

Bank Total Employees	Frequency	Percent
1. More than 1000	5	55.6 %
2. From 500 to 1000	1	11.1 %
3. From 100 to up to 500	3	33.3 %
4. Up to 100	0	0 %
Total	9	100 %

Table 2. Number of employees in the 9 Libyan banks

management in the Central Bank of Libya (CBL) suggested that research should focus on just 9 of these banks, because the other five, due to their low asset value, would shortly be merged with other financial entities. The initial investigation thus focused on 9 banks (table 1). These 9 banks were looked at from a range of perspectives, including number of employees, turnover and

Annual Revenue	Frequency	Percent
1. More than 100 M/LYD	3	33.3 %
2. From 50 to 100 M/ LYD	1	11.1 %
3. From 10 to up to 50 M/ LYD	3	33.3 %
4. Up to 10 M/ LYD	2	22.3 %
Total	9	100 %

Table 3. Annual Turnover in the 9 Libyan banks

existing systems (tables 2 and 3). The initial assessment of AIS indicated that 6 of the 9 banks considered that all processes benefited from some form of automation, with three banks showing a mix of manual and automated processes. All nine banks used packaged software to some

degree. Four banks were in private ownership, four were state owned and one was in mixed ownership.

Bank	Ownership	Date established	Annual revenue (in M. LYD)*	Total assets (in M. LYD)*	Capital (in M. LYD)*	Interview period	Number of employees
Commercial & Development Bank (CDB)	100% private	1996	80.7	2185.5	50	Oct 2009	693
Wahda Bank (WB)	54.1% public 45.9 % private	1970	258.7	8349.5	108	Oct and Nov 2009	3095
Alejmaa Alarabi Bank (AAB)	100% private	2003	15.4	326.8	35	Nov and Dec 2009	305

**Table 4. The three banks selected for in-depth case study research.**

After assessing a wide range of variables, three banks were selected for further research. The Commerce and Development Bank (CDB) was established in 1996. It has 9 branches and 19 agencies around the country. Its capital is 50m Libyan Dinars (LYD), and its total assets were more than 1.8 billion LYD in 2009. The Wahda Bank (WB) was established in 1970. It has about 68 branches and 6 agencies around the country. Its capital is 108m LYD, and its total assets were more than 5.5 billion LYD in 2009. The Wahda Bank is 54.1% in state ownership and 45.1% private sector. The Alejmaa Alarabi Bank (AAB) is privately owned and was established in 2003. It has 3 branches and 4 agencies around the country. Its capital is 30m LYD, and its total assets were 328.4m LYD in 2009 (Table 4).

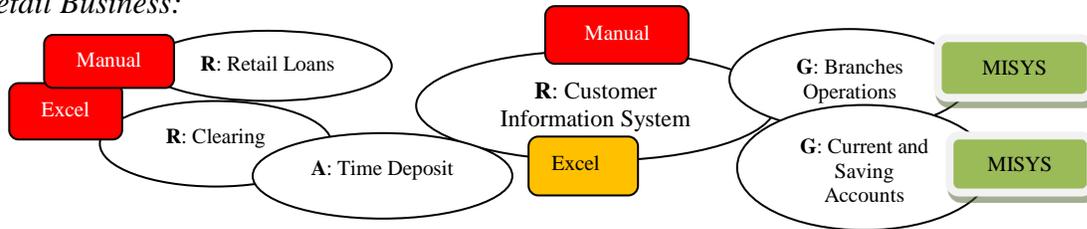
The initial analysis of the three banks recognized two main business areas in each bank – the retail business, providing services to the banks customers, mainly individuals, and the corporate business which entails the servicing and management of corporate accounts and the overall running of the bank as a corporate entity.

### **The extent and nature of AIS investment**

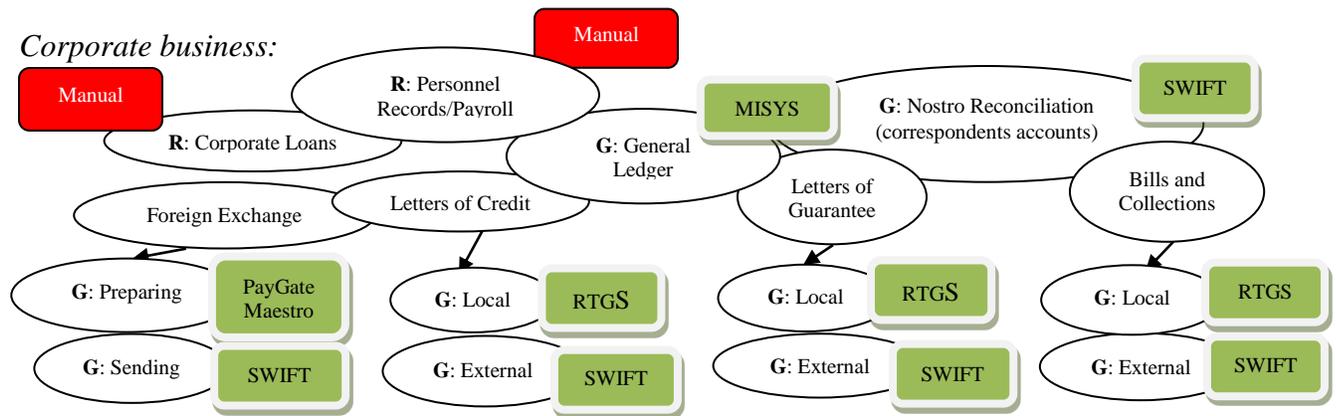
The MISYS AIS was installed in the CDB in 2004. This is a large integrated software package from the MISYS software company based in the UK. In 2008 all CDB branches and agencies were connected through a fiber optic network enabling customers to conduct their banking transactions in any branch and agency regardless of where the account was located. Nevertheless, there remains significant functionality in the MISYS system that is not currently exploited. There are also complementary systems such as an electronic banking system and a mobile banking system, which were designed by local companies. According to the bank's balance sheet in 2009, the total value of information technology assets was 4.4m LYD (\$3.5m), which represents more than 10% of the fixed assets and about 0.2% of the total assets. In 2008, it had 1.9m LYD (\$1.5m), which represented about 5.5% of the fixed assets and about 0.1% of the total assets.

This increase reflected the new investment in networking linkage in the branches, secondary or associated systems and Microsoft programs.

*Retail Business:*



*Corporate business:*



**Figure 1. Existing systems mapped to business activities at the CDB.**

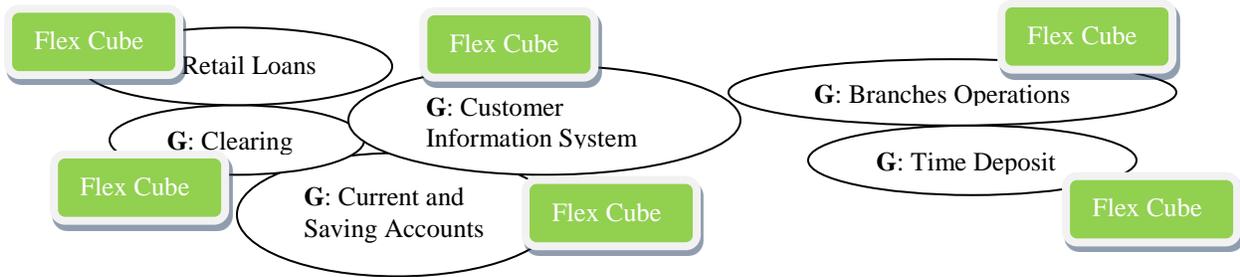
G (Green) = indicates a system that is sound and does not need replacing. A (amber) = indicates a system that may need replacement. R (red) = indicates a system is defective and in need replacing. A ‘Nostro’ account is an account owned by the host bank and maintained with another bank (usually) overseas

The CDB management view information technology as a critical and essential investment area. Because competitor banks in Libya have greater capital and more banking experience, the management of the CDB keeps pace with new developments in the area of IS/IT and tries to apply them in their bank network. In 2004, the CDB was the first bank in Libya to issue the Visa card, and use ATMs, point of sale technologies, electronic banks and mobile banks. In addition, as noted above, all branches and agencies became connected through a fiber optic network in 2008. The MISYS system is now supporting the major business activities in both the retail and the corporate business, with the notable exception of customer information and personnel records management and payroll which are still either manual or done on simple spreadsheets (Figure 1). Nevertheless, questionnaire and interview responses suggest that the MISYS system provides sound and timely information to both internal and external users, including management and operational reports on business transactions for operatives and controllers in an easy and accessible way. Moreover, Board members receive daily reports on the financial situation and daily activities of the bank and its branches.

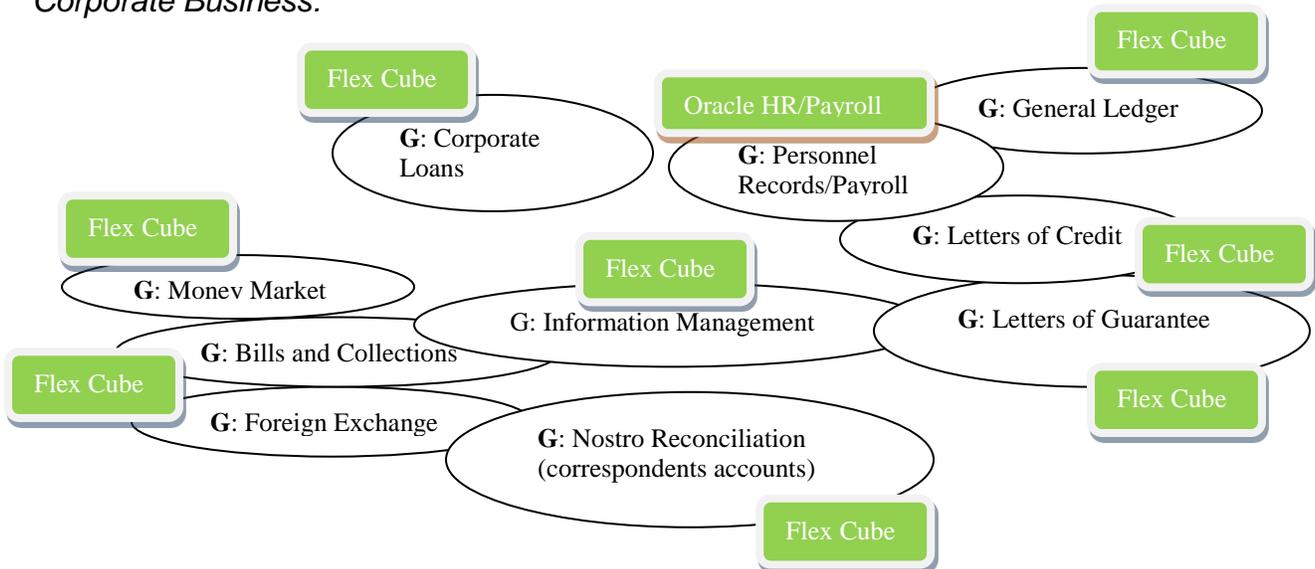
At the Wahda Bank, the FLEXCUBE AIS was introduced in 2007. FLEXCUBE is a mainstream bank management package now owned by Oracle, and is the main element of the National Payment System (NPS) for publicly owned banks supported and managed by the CBL. This is a

well-developed system with broad functionality but the WB exploits only part of its potential. In addition, network links between branches and agencies have not been completed yet. Thus, for example, customers cannot conduct their banking transactions in any branch or agency regardless of where the account is located.

**Retail Business:**



**Corporate Business:**



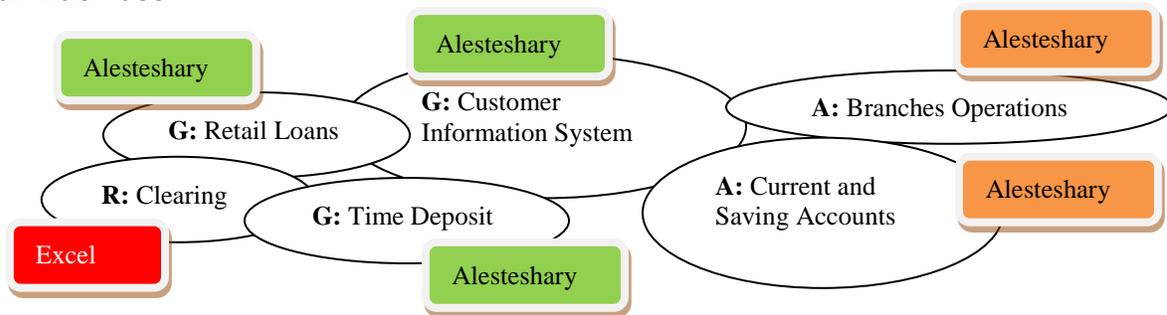
**Figure 2 Existing systems mapped to business activities at the Wahda Bank.**

G (Green) = indicates a system that is sound and does not need replacing. A (amber) = indicates a system that may need replacement. R (red) = indicates a system is defective and in need replacing

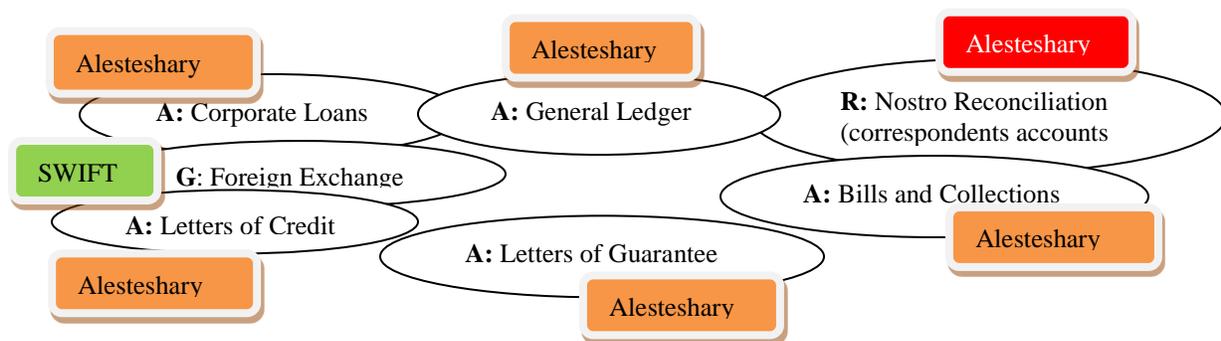
According to the bank’s documents, the total cost of the NPS project was 67m LYD (circa \$54m) up until 2008. The total cost was divided between the CBL and five other Libyan banks, including WB, whose share of the total cost was 6.8m LYD (circa \$5.5m). The most important problems and obstacles that have arisen in the operation of FLEXCUBE are shortfalls in the availability, accuracy and quality of information. These problems come from the incomplete installation of the new system in all branches and a lack of qualified and skilled staff to operate the system. Questionnaire respondents also highlighted the lack of communication infrastructure in the country as a whole.

Nevertheless, the implementation of FLEXCUBE represents a major step forward in the exploitation of AIS and associated technologies in the WB. The system has been implemented to support all main business activities, with the exception of HR/Payroll, where the Oracle HR package has been implemented to complement the main Oracle FLEXCUBE modules (Figure 2). The CBL has encouraged Libyan banks to develop banking technology and service development through the NPS strategy to enable them to compete with foreign banks, to provide the same services at the same service level. It has enabled the bank to use new products, keep up with the competition, maintain existing customers, obtain new customers and develop its services.

**Retail Business:**



**Corporate business:**



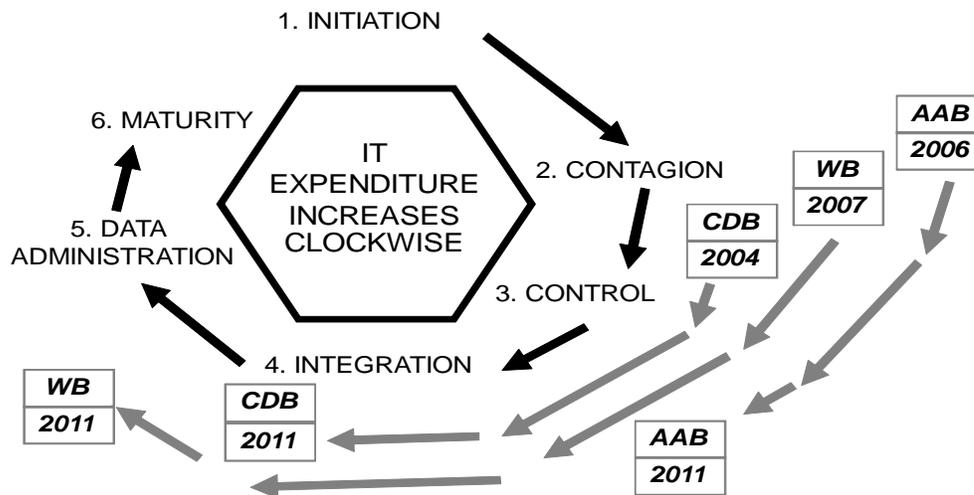
**Figure 3. Existing systems mapped to business activities at the Alejmaa Alarabi Bank.**  
 G (Green) = indicates a system that is currently sound and may not need replacing. A (amber) = indicates a system that may need replacement. R (red) = indicates a system is defective and needs replacing.

At the Alejmaa Alarabi Bank, the Alesteshary AIS was introduced in 2006. This package is designed by a local Libyan company and is relatively limited in functionality in comparison with the MISYS and FLEXCUBE systems. In addition, the bank has no network links between branches and agencies. The bank’s balance sheet in 2009 indicated that the total value of programmes, systems and equipment was 2.4m LYD (about \$1.9m), which represented more than 3% of the fixed assets of the company.

There remain some semi-manual processes in the bank; for example the branches’ budgets are collected manually and then consolidated for the bank as a whole in Excel spread sheets. Overall, the Alesteshary package is little more than adequate in supporting some business functions, particularly in the running of the bank as a commercial entity (Figure 3). Nevertheless, AAB management view IT as a critical and an essential investment area and are seeking to develop the system in the future. Despite its limited functionality, the system is relatively user

friendly and accessible for internal users, and provides financial statements for external users. However, operational reports on business transactions are manually prepared. There was no top line executive information available from the system for senior managers or board members.

These profiles suggest significant progress in recent years in the use and exploitation of AIS and related technologies in all three banks. As regards Nolan's model (Figure 4), the WB has probably made most progress, advancing from a position of having no centrally maintained information systems in 2007 to an integrated Oracle based package (FLEXCUBE and Oracle HR/Payroll) in 2011. This has been driven by the CBL and the implementation process has been similar in some regards to the installation of a standard ERP package in a large national or multi-national corporation. This should provide a sound technological platform for future growth and a key challenge will now be to utilise the software more effectively.



**Figure 4. Progression of the three banks against Nolan's model**  
Source of original model: Nolan (1979)

At the CDB, the MISYS AIS has been implemented effectively to support some business activities, but others remain manual or semi-automated. These areas include customer management, human resource management and loans management. In 2004, the CDB was arguably ahead of the WB, but in 2011, the bank is still struggling to achieve integration of the mix of technologies that support its key processes, although some centralised control and strategy is now in place. The AAB has moved from a position of having largely manual or semi-manual functions in 2006 to a position where at least there is control over technology utilisation, with the Alesteshary AIS providing adequate support for some functions, but with many others remaining manual or poorly supported.







bank branches has enabled significant improvement in customer service and bank efficiencies. However, the software package should now be rolled out more extensively to encompass other process areas, notably customer information, loans management and in bank human resource management. Training and up skilling of staff also emerged as a key factor for future improved use of the system

- The WB has the most broadly implemented AIS, but its potential is hampered by lack of systems skills and inadequate communications with the branches.
- The FLEXCUBE package is likely to provide a sound strategic platform for future growth, supported as it is by the CBL as part of the NPS initiative. Bank management noted the need to move on to use data warehouse and data mining capabilities that the package offers to improve information availability and develop end-user capabilities. Training and up skilling will be required. Delays in data entry and lack of communications as a result of incomplete installation of the new system in all branches and incomplete network linkage between branches were highlighted in questionnaire responses as key problems that need addressing.

The AIS used by the AAB is not mainstream (in comparison with MISYS and FLEXCUBE) and is available with an Arabic interface only. A review of information strategy should carefully consider whether this software is a sound platform for current and future operations. Improved communications and branch network linkage will also be required to take better advantage of existing software and iron out data inconsistencies in the system. The bank does not currently provide ATMs, Visa cards, or mobile banking and the business case for introducing these technologies should be reviewed.

## CONCLUDING REMARKS

This research paper provides several contributions to the knowledge of AIS investment and business performance in the Libyan commercial banks. To the best of the authors' knowledge, no previous study has been conducted in this specific area. The study provides a point of reference for subsequent studies in North Africa and the Arab world, and illustrates the benefits achieved by IS investment in Libya, thereby highlighting the opportunity for similar investment elsewhere in other commercial banks (both in Libya and elsewhere), and in other industry sectors in the region. These research findings may prove useful for the CBL as well as Libyan commercial bank managers, as case examples of what can be achieved, and what the key issues are in implementing AIS. In particular, the need for comprehensive training programmes for new technologies stands out as a critical success factor for benefits delivery. This should therefore help shape future training policies developed by the CBL. AIS investment in Libya had not been studied qualitatively before. This study was therefore unique in giving participants an opportunity to state their opinions about the importance of IS deployment in Libyan commercial banks, and to identify some of the problems that arise during the use of these packaged software systems.

In addition, the research has shown that models formulated for application in the developed world can usefully be used and adapted to assess IS in a developing world commercial context. These models could therefore be further developed, and their application adapted to other business contexts. In summary, the study contributed to the existing limited studies on AIS investment conducted on Libyan commercial banks. It clearly showed that there has been

significant investment in modern AIS, that these systems have been implemented reasonably effectively, but that there is significant scope for harnessing their potential to improve business processes and bottom-line benefits; and that investment in training and up-skilling of the workforce is a key element in achieving this.

The opportunity to further explore and study AIS investment in Libyan commercial banks remains. This study was conducted while the adoption of advanced systems is still in its relative infancy in the Libyan commercial banking sector, and there is still incomplete network linkage between most of the banks and their branches. It might be that different results would be obtained if this study were repeated after completion of such networks, with the Libyan commercial banks utilising the full capacities of their advanced systems. Despite its limitations, it is believed that these research findings provide a useful insight into the business processes and IT investment in Libyan banks and provide a starting point for future research.

Information systems have enabled companies and organisations in many parts of the World to provide services and products of a high quality, low cost and in a timely manner, sometimes through the redesign of business processes. Many organisations rely on information systems for decision-making, to improve customer service and develop appropriate reporting, monitoring and control mechanisms. To most effectively achieve this, it is generally accepted that IT/IS strategy must be closely aligned to business strategy. It has been suggested that “strategic alignment of IT exists when a business organisation’s goals, activities and processes are in harmony with the information systems that support them” (Bleistein, Cox, Verner and Phalp, 2006). In the case of the three Libyan commercial banks studied here, there is evidence to suggest a reasonable alignment between IT/IS and organisational strategy. However, in Earl’s terminology, the implementation of IS strategy has been largely ‘top-down’, and what is now required is more emphasis on a “bottom-up” approach (Earl, 1988) which focuses more on making better use of the software that is now in place, albeit with improved support technologies and communication links. What appear to be missing at present are the development and embedding of operational and management skills to fully exploit the systems that have been acquired to effect a broader organisational change and progression. As Libya emerges from the recent period of upheaval and violence, there is now cause for optimism that these banks will have the political and societal contexts in which they can build on the undoubted progress made in recent years in the installation of AIS and related technologies.

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