"Cash Is Just A Glance Away": The Implementation Of Iris Recognition Technology In The Banking Industry

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"CASH IS JUST A GLANCE AWAY": THE IMPLEMENTATION OF IRIS RECOGNITION TECHNOLOGY IN THE BANKING INDUSTRY

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Abstract

This research aims at exploring the critical success factors in addition to the captured benefits and value with regard to the use and deployment of Iris Recognition Technology (IRT) in the banking industry. We discuss the traditional practices of information security models in the banking sector and how these models have been significantly improved by the use of biometrics and more specifically by the use of IRT. The advantages associated with the use of IRT amongst other biometric technologies are analyzed and justified. A case study is presented, based on in-depth semi-structured interviews with key decision makers of Cairo Amman Bank (CAB) in Jordan; the first bank in the world that has implemented a full roll-out of IRT-enabled services, through which issues and challenges associated with the adoption of IRT in the banking industry are thoroughly analyzed and examined. Based on the findings, the critical success factors for implementing iris scanning technologies in the banking sector are identified and discussed. Finally, analysis of business value and benefits captured as a result of adopting IRT by banks are discussed.

Keywords: Iris Recognition, Iris Scanning, Biometrics, Banking, Security, Technology Differentiation, Visionary Leadership, Business Value.
1 Introduction

Banks all over the world usually offer similar service packages with marginal variations existing across corporate loans, personal loans, and financial planning packages; just to mention few examples. Therefore, it is essential for the success of a bank to look forward for innovative ways by which it can distinguish itself in the services it provides. This is most likely to be realized in this new world of digital business through a positive utilization of information and communication technologies given the recent rapid advances in this domain. If a bank is able to successfully utilize technology to enhance the quality and innovativeness of its services, then the bank can set itself apart from its competitors. From another perspective and given that banking is considered a high-risk business; banks all over the world are striving to achieve the utmost level of security in their banking operations. This indeed would benefit banks in having higher levels of control by alleviating risks related to fraud, identity theft, and human error.

For the above reasons and in a true testament of IT-enabled innovative banking services, Cairo Amman Bank (CAB) has implemented in 2008 a full roll-out of Iris Recognition Technology (IRT) enabled services provided via Automated Teller Machines (ATMs) and teller desks. We aim in this paper to shed lights on this innovative case by examining the factors that helped Cairo Amman Bank to reap the benefits of this technology. We also aim to investigate the business value created and captured by Cairo Amman Bank as a result of this innovation.

The rest of this paper is structured as follows. Next, a background of the case study is presented in which we provide a background about the banking industry in Jordan, the iris recognition technology along with its features and characteristics, and the use of iris recognition technology in Cairo Amman Bank. Thereafter, the research methodology is explained and justified. In section 4, a discussion of the case study findings is offered. In this discussion, the critical success factors and the business value of iris recognition technology are the two major aspects which are deliberated. Finally, the research conclusions are presented.

2 Case Background

2.1 Banking Sector in Jordan: An Overview

The Hashemite Kingdom of Jordan (or simply Jordan) has witnessed a rapid growth and development in the banking sector in the past twenty years mainly due to the unique geographic location of Jordan in the Middle East region, the political and economic stability of the country in a turbulent surrounding environment, and the country’s continuous commitment to developing and providing a very competitive information technology infrastructure to its banking industry (Abu-Shanab et al., 2010; Jordan Securities Commission, 2010; Al-alak & Tarabieh, 2011). These developments in the banking industry have put Jordan along those of developed countries and motivated the progress of banking operations and service banking in such a way that had interested direct investments in the country from several international banks, such as HSBC, Citibank, Standard Chartered, and Societe Generale de Banque (Association of Banks in Jordan, 2011; Sawalha et al., 2011). Currently, there are 26 banks and financial services institutes operating in Jordan consisting of a number of local, foreign, and Islamic banks (Central bank of Jordan, 2012). As of October 2010, these banks operated more than 650 branches with about 1025 ATMs spreading across Jordan with typically less number in rural and remote areas (Association of Banks in Jordan, 2011; Central bank of Jordan, 2012).
2.2 An Overview of Iris Recognition Technology

Iris recognition is one of the biometric technologies that can be used for authentication purposes. Authentication is the process by which the identity of a person is identified and verified. Biometrics, in general, can be defined as the measurable characteristics of individuals based on their physiological features or behavioral patterns that can be used to recognize or verify their identity (Bennett, 2000). In other words, biometrics is an authentication mechanism that relies on the automated identification and verification of an individual based on unique physiological or behavioral characteristics. Down and Sands (2004) explained that physiological characteristics refer to inherited traits that are formed in the early embryonic stages of human development and that physiological features which are typically measured include an individual’s fingerprints, face, retina, iris and hand. On the other hand, they argued that behavioral characteristics are not inherited, but learned and behavioral features that can be measured include voice patterns, handwriting, and keystroke dynamics.

Iris recognition technology is based on the unique and measurable iris characteristics of individuals. Iris, in fact, is the coloured part in the middle of the eye just in front the lens and it is the only internal organ of the human body that is externally visible. The iris main function is to control the amount of light going into the eye. The involuntary muscles making up the iris have distinctive patterns that allow for very accurate person identification; far more accurate than other biometric technologies such as fingerprint scans and facial recognition (Venkatraman & Delpachitra, 2008). Moreover, iris recognition is a contactless technology. To be authenticated, an individual only needs to look at the video imager - that takes a high-resolution grayscale picture of the eyes- from a distance of about 30 centimetres for few seconds. Due to the contactless nature of the technology, no communicable diseases can be transmitted from one individual to another and thus the technology is considered hygiene. Another advantage of iris recognition technology is stability over time and permanence (Delac & Grgic, 2004). Unlike other biometrics such as fingerprints, iris does not wear off over time as it is physically protected by the cornea (Negin et al., 2000). Furthermore, iris remains stable from the age of 18 months throughout life and is not affected by surgeries or diseases. Also, iris recognition technology enjoys universality and uniqueness (Delac & Grgic, 2004). Universality refers to the existence of the characteristics in each individual, whereas uniqueness refers to the ability of technology to uniquely identify each individual. The iris recognition technology is also competitive compared to other biometric technologies in terms of performance as the processing time does not exceed few seconds.

Biometric authentication based on iris scanning follows the following steps (Ganorkar & Ghatol, 2007): (1) capturing the iris eye print; (2) extracting and enrolling a template after the processing of the eye print; (3) storing the template in a local repository; a central repository, or a portable token such as a smart card; (4) live-scanning the eye print; (5) processing the eye print and extracting the template; (6) storing the reference template; (7) matching the scanned eye print against stored templates; (8) providing a matching score to business applications with threshold value; (9) recording a secure audit trail.

2.3 Iris Recognition Technology and Cairo Amman Bank

Among the Jordanian banks, Cairo Amman Bank is the fastest growing bank in Jordan (O’Carroll, 2008). It was established as a public company in 1960 and today the bank runs 77 branches operating together a network of more than 200 ATMs strategically situated across the country (Cairo Amman Bank, 2012). In 2008, CAB was the first bank in the world to integrate an ocular security scan technology into its core banking system to create a fully operational solution (IrisGuard, 2009; Stier, 2011). The technology was mainly provided by IrisGuard; a UK based company that is specialized in deployment of iris recognition systems (IrisGuard, 2012). The ocular security scan technology is an iris recognition technology that utilizes iris eye patterns to authenticate and identify a client using his or her unique biometric characteristics. This means than no two persons in the world would have the same iris eye print, including identical twins (Venkatraman & Delpachitra, 2008). IRT is supposed to
be a 100 percent accurate, the most accurate amongst other biometric solutions, and the fastest amongst all available biometric security solutions in identity identification (IrisGuard, 2009).

The IRT solution enables CAB to register a client through scanning his or her iris eye print using a dedicated iris imager fitted next to the desk of each customer service officer in all CAB’s branches. The iris print is stored in a central iris database where it is later securely retrieved, almost instantly, for authentication purposes. The client can then enjoy a friendly and secured banking experience either at an ATM or at a teller desk with the utmost speed that eliminated the need to key a personal identification number (PIN), use a keycard, or show a personal identity card to a teller (IrisGuard, 2009). See Figure 1.

Currently, several banks in Jordan and around the world have integrated or considering the integration of IRT into their core banking systems. Examples include Jordan Commercial Bank (Jordan Commercial Bank, 2011), Bankinter of Spain (The Bankinter Group, 2012), and ANZ Bank of Australia and New Zealand (Australian Associated Press, 2012).

3 Methodology

A case study about the use of iris recognition technology in Cairo Amman Bank was conducted, between October, 2012 and December, 2012, with the persons who were principally responsible of bringing IRT into CAB. Because the goal of this research was to capture pre, early, and current sentiment of IRT usage in CAB a qualitative approach was adopted using semi-structured interviews as the main data collection tool. The use of interviews has been suggested for exploratory research when little is known about the phenomenon of interest (i.e. IRT in CAB) and when there is a need to identify unanticipated or related issues to IRT implementation in banking sector (Cecez-Kecmanovic, 2001). Data also came from secondary sources that included published work in peer reviewed academic journals, high impact business magazines and reviews, media releases, documents obtained from the official in CAB, and the websites of Cairo Amman Bank and IrisGuard.

Four full-length semi-structured interviews were conducted with key policy makers in Cairo Amman Bank. The intention was to end up with a good cross-section data from four different perspectives in a way that can give this research a holistic view about IRT in CAB. The first interview was with the General Manager of the Bank, Mr. Kamal Ghareeb Al-Bakri. Al-Bakri has served as the General Manager since January 2008, and it was at his time that IR technology firstly implemented in the bank. The second interview was with the Head of IT in CAB, Mr. Omar A. Yacoub who also witnessed the early implementation stages of IR technology in CAB. Our third interviewee was the Marketing Manager of CAB, Mr. Hani Khader who also had been in the bank during the early days of IR solution. The fourth and final interviewee was Mr. Nizar Shanaah, the IT Security and Procedures Manager. See Table 1.
Each interview was audio recorded but only after the participant approved the recording. Note taking was used to capture non-verbal signals that served as an additional source of information. The transcribed data of the four interviews went through preparation and editing processes to make it ready for the analysis. The main objective of the analysis was to transform data into findings, but more importantly was to make a sense out of it. During the analysis, recurring ideas, patterns of beliefs, and salient themes were extracted with relevant quotations that demonstrated support for these themes. The emerging themes were then examined based on their intensity, depth, and specificity with the phenomenon of interest, with additional emphasis given to comments that were frequently repeated or refuted by the interviewees (Marshall & Rossman, 1999).

### 4 Discussion of the Case Study Findings

#### 4.1 Critical Success Factors of Iris Recognition Technology

##### 4.1.1 The Role of Visionary Leadership

Decision makers in CAB realized early that with the existence of Internet and globalization competition will not be limited to local banks, but to regional and international banks as well. Therefore, the bank adopted a vision of becoming IT-driven leading bank to be able to compete effectively. The GM affirmed this fact by stating: “in 2006, our bank [Cairo Amman Bank] started its quest to solutions that can transform its services and lead the bank to better competitive advantage and organizational performance through technology innovation”. The GM added however that competition was not the main reason for introducing IRT into CAB’s banking operations; he explained: “I was in a position that allowed me to think ‘out of the box’ and take unanticipated decision. I did not become the General Manager through the usual and traditional series of promotions in banks. I did not start as a teller, then as a head of branch, then as a deputy manager, and then as a manager. No. My background is in law, and perhaps the fact that I came from a different background in comparison to most people in the Bank helped me to think untraditionally about CAB’s environment at that time and why we were doing things the way we were. I challenged the very axioms of the Bank”. Indeed, innovation does require a strategic management that is quite willing to take the initiative to make even ‘radical’ improvements to the existing technology and service portfolios, and/or develop new-to-the-world technologies and services for the benefit of customers, stakeholders, and society (Rainey, 2006).

##### 4.1.2 Support of the Board of Directors

Another reason for success was the full support of the Bank’s Board of Directors to the General Manager in his quest to implement IRT in the Bank. Without doubt, the IRT solution in CAB would not have been possible without such kind of support. This particular finding provides evidence of the need for high level of agreement and solid business-oriented communication between Management...
and Board of Directors to deploy innovative projects despite the risk of investment and novelty of such projects. The Head of IT in the Bank, amongst other interviewees, highlighted this by stating: "the Board of Directors and the General Manager were so eager and serious to make this dream [integrating IRT into CAB's operations] come true. They did understand the risks associated with this project and had the 'risk appetite' to go on...They offered all kinds of needed support on financial, moral, and personal basis", HeIT. Other interviewees clearly concurred with the Head of IT about the importance of the support offered by the Board of Directors to the success of this innovation. The GM stated: "the most important factor in making this innovation successful was the tremendous support offered to us by the Board of Directors...The CEO of the Bank has an engineering background; so he understood the value and risks associated with innovative technologies. Besides, he is creative and always shows enthusiasm toward innovative ideas".

4.1.3 Making Decisions with Calculated-Risk

Managing change in an organization requires encouraging innovative ideas and calculated risk-taking from top management (Rainey, 2006). Risk-taking involves “the perceived possibility of receiving the rewards associated with success of a proposed situation, which is required by an individual before he will subject himself to the consequences associated with failure” (Brockhaus, 1980, p. 513). The GM affirmed “you have always to calculate the risk. This is when you should understand the subtle difference between making a rushed decision and making a risky but calculated decision. My responsibility was to make a calculated decision of introducing IRT into CAB even if there was a risk of failure around it. The captured benefits proved that I had made the right decision”. The HeIT explained the procedures taken to calculate risk: "we carried out several tests to measure the characteristics of the technology before its actual deployment. Our experiments revealed that the accuracy of the technology was extremely high; no False Accept Rate (FAR) and no False Reject Rate (FRT) were recorded". The MarketM stated "our market research at that time indicated that the benefits to customer as well as to the Bank of having this technology [IRT] would far outweigh the perceived risks associated with its implementation". The ITSec confirmed "the studies that we had conducted at that time showed that the benefits in terms of control, security, and operations' efficiency the Bank can get if the idea is implemented are huge. On the other hand, our experiments and studies in regards to the associated risks reveal the opposite". The GM also stated "our decision cannot be considered bravery, but a decision with a calculated-risk… our results showed that the associated risks with this technology are within our risk appetite, thus we went forward with the idea at the right time".

4.1.4 Powerful Value Network

Effective and powerful value networks are one of the key enablers of innovations. Indeed, innovative services are normally offered through powerful value networks; not a single organization (Al-Debei et al., 2013). The main aim of value network is to collectively create enhanced value to customers and hence maximize the value for each party involved (Al-Debei & Fitzgerald, 2010). In our case, CAB was very successful in creating its value network in a way that had created the right combination from different components for the IRT solution. CAB’s partners were IrisGuard (IrisGuard, 2012), the provider of the IRT, CR2, a leading multichannel banking software and service solutions provider (CR2, 2012), and Kindle Banking Systems, a world leader in the provision of software solutions for banking institutions (Kindle Banking Systems, 2012). The HeIT provided a picture about their value network: "IrisGuard had the same enthusiasm as us [Cairo Amman Bank] to make this project [IRT in CAB] successful. We have worked together as one team under one vision and under one unit of command". The ITSec confirmed that by saying "without the support of our brilliant partners the project would have been ended up as a failure". The HeIT confirmed "the integration of IRT into our operations mix required sophistication integration amongst many systems. The skills, experiences, and knowledge of our elite partners represent a significant driver for the success of this project".
4.1.5 IT Readiness

The readiness of IT department and IT staff to gain control over IRT and understand its alignment with CAB’s strategic goals was particularly important in determining success. This was importance as the role of the IT department normally affects the success of IT-acquisition process (Mishra et al., 2005). The GM acknowledged this point by saying “one of the first issues you would face when you introduce a change is the resistance of people to this change. The good thing about CAB’s IT department, its manager, and its staff was their apparent willingness to embrace IRT despite expected difficulties in integrating the technology with our core banking systems. They had the right attitude and the right set of skills to fulfill the required integration successfully”. The GM proudly mentioned: "the first one I had talked to regarding this idea [using IRT] was the Head of IT. He immediately showed his enthusiasm and explained the feasibility of this project. That was indeed the first positive indicator I received which I considered at that time rather important". "We understood that such a project is highly challenging, but not impossible", the ITSec expressed his opinion. He continued "we thought technically about IRT from systems integration perspective. We knew that interfaces are needed and some application would require some reconfiguration due to this new iris technology, but our confidence in our people along with their expertise and knowledge did not hold us back". On another issue that shows the readiness of IT systems in CAB, the HeIT explained: "our IT systems are flexible enjoying highly levels of compatibility and scalability. These characteristics of our IT systems helped us in being ready to adopt this new IT innovation".

4.1.6 Proactive Customer Orientation

As mentioned earlier, the intensity of competition was one of the reasons that were recognized as a consideration for introducing IRT into CAB. CAB’s integration of IRT within its services was based on customer orientation (Al-alak & Tarabieh, 2011) that aimed to lead the Bank to better competitive advantage and organizational performance through technology innovation. The GM confirmed this fact by stating: “we did seek a technology that innovates the way of doing our banking services and, at the same time, offers more control to entirely eliminate human error. In the traditional way of doing a teller transaction, for example, we always strive to offer fast service to our clients with accurate results. This would increase the satisfaction of clients about our services. However, the faster you go the more prone you are to errors. Equally, the more thoroughness you process a transaction the more time you need to finalize it, thus decreasing efficiency. The IRT provided us with the expected accurate results along with the expected speed and efficiency of doing transactions”. The MarketM explained the benefits that customers would get out of implementing this innovative technology: "we are the fastest growing retailing bank in Jordan. The aforementioned achievement did not come by condensation. It is actually our philosophy to anticipate the future needs and expectations of our customers and not only the current ones that accounts for this achievement".

4.2 Business Value of Iris Recognition Technology

Measuring the value of IT investments is significantly important to business executives and researchers. IT valuation deals with examining the economic impact of IT and its manifestations either directly or indirectly (Kohli & Grover, 2008). Indeed, the value firms can capture as a result of their investments in IT could take different forms (Santhanam & Hartono, 2003; Kohli & Grover, 2008): (1) Financial (e.g. ROI and profitability; (2) Intermediate (e.g. process-related and customer satisfaction); or (3) Affective (e.g. perception-related). We also understand that IT valuation is a complex issue given that IT adoption, implementation, acceptance, and use extend over time and thus create a “lag effect” that can be in the order of years (Farbey et al., 1993; Santhanam & Hartono, 2003).

Based on the above discussion, our examination of the value Cairo Amman Bank captures due to their investments in iris recognition technology is satisfactory. This is because our examination comes after more than five years of implementing the IR technology in the bank. This period of time seems
adequate to make the created value visible and measurable. Below we discuss four business value elements of IR technology that were identified in the case of Cairo Amman Bank. In this case, the identified business value is mainly in the form of intermediate (i.e. Enhanced Control, Enhanced Efficiency, Enhanced Customer Value, in addition to Enhanced Organizational Image).

4.2.1 Enhanced Control

In this context, control can be defined as the ability to avoid or mitigate risks associated with banking operations. The risks in banking operations include fraud, identity theft, security breaches, human mistakes, and operational errors. From the bank’s point of view and according to the conducted interviews, having the Iris Recognition technology fitted at teller desks offers greater control to tellers. This is because clients are now able to identify and verify themselves through IR imagers that are seamlessly connected with the banking software. Following the automatic authentication process, the client’s account will be popped up on the teller’s computer screen without any manual interference. This indeed would reduce the probability of human errors as the teller is no longer has to retrieve the accounts of clients by filling their account numbers. This issue has been highlighted by the CAB’s GM, “Despite the fact that tellers are required to check the name of the client after filling his/her account number and despite the availability of end-of-day auditing and control procedures, operational errors due to human mistakes in filling account numbers happen, especially during peak times … Iris Recognition technology played a great role in minimizing such risks in our [Cairo Amman Bank] Bank”.

Another advantage from using the IR technology at teller desks is the ability to avoid frauds, identity thefts, and other security breaches in regards to the authentication process. Prior the use of IRT, tellers were requested, according to operations’ procedures, to authenticate clients on the basis of their national ID cards or passports. This procedure was not that effective given the fact that (1) national ID cards and passports can be faked or cloned; (2) national ID cards and passports can be used illegitimately by others; (3) authentication mechanism is manual and problematic depends on teller’s knowledge and experience and the skills of the counterfeiter.

4.2.2 Enhanced Efficiency

We refer to efficiency here as the reduction in the amount of time and effort taken to process a client’s request. It is indeed within the bank’s interest to increase throughputs and customer turnover by decreasing the amount of time taken per transaction. The CAB’s GM indicates that, “By integrating the Iris Recognition technology into our operating mix and especially at teller desks, the period of time taken to process a transaction has gone down from an average of 10 minutes to an average of 2 minutes. In most cases, we [Cairo Amman Bank] are able to process a client’s request within 40-60 seconds … this is a tremendous achievement that shows our operational excellence nowadays; thanks to Iris Recognition technology”.

Enhancing the control of tellers over their operations and improving the efficiency of operations seem to have positive impacts on their quality of working. It was raised by the CAB’S GM that, “From tellers’ point of view and following the implementation of Iris Recognition technology, the working environment has been much improved. The efforts needed from their side to do their duties and the work-related stress that lies on their shoulders is much lesser now”.

4.2.3 Enhanced Customer Value

From the perspective of Cairo Amman Bank, integrating the Iris Recognition technology into their operating mix by fitting the IR imagers at teller desks and mounting them within ATM machines provide enhanced value for customers in two main streams: Security, and Convenience.
**Enhanced Security:** Iris Recognition as a biometric authentication technology has its own advantages over other authentication mechanisms that are based on what we know (e.g. accounts: user name and password, and PIN codes) and what we have (e.g. cards, and tokens). This is because Iris Recognition technology relies on a reading of what a person is; not what a person has or knows which can be forgotten, lost, stolen, or transferred between individuals (Klosterman & Ganger, 2000). This technology is also highly distinctive (i.e. readings cannot be duplicated); and thus uniquely identifies each person even identical twins. Another advantage of Iris Recognition technology is that the person to be authenticated needs to be physically present at the point of identification as the IR technology compares a live sample of the person with a template of previously recorded information. As such, Iris Recognition technology offers more security to customers.

**Convenience Value:** Knowledge-based authentication mechanisms used in ATM banking, such as PIN codes, depend on the information that customers need to retrieve from their memories to identify themselves and verify their legitimacy. As the number of passwords and codes people need to memorize in this digitally-enabled life is continuously increasing, retrieving the correct code for authentication reasons across different computer-based systems has become progressively difficult. Failure in providing the correct PIN code is a real problem for customers in ATM banking. This is because in Cairo Amman Bank as many other banks, if the customers tries to access his/her account with the wrong PIN code three times, the card will be hold. This, in turn, would result in the so-called a customer-driven service failure (Coventry et al., 2003; Byun & Byun, 2011). However, the ability to recall the correct PIN code would not be enough to use the ATM as the availability of your bank card are also essential in the process. In cases when cards are not available, people would need first to collect their cards prior using the ATM machines. As such, replacing PIN codes with IR scans for ATM authentication increases customer convenience by reducing the cognitive efforts of customer in regards to remembering their PIN codes, preventing the occurrence of customer-driven service failure; and reducing the number of resources needed to use the ATM machines since all what you need as a customer is just you.

Another dimension that adds to customer convenience value due to integrating IR technology into CAB’s services is time saving. Iris-recognition authentication mechanisms at both ATMs and teller encounters significantly save customer’s time by increasing the speed of banking transactions and thus result in greater customer satisfaction.

**4.2.4 Enhanced Organizational Image: First-Mover Advantage**

Image of an organization can be defined as the feelings and beliefs about the company that exist in the minds of its audiences (Shee & Abratt, 1989). By being the first bank in the world to accomplish a full roll-out of IRT in the banking industry, the Bank gained an important competitive advantage known as the first-mover advantage. As such, Cairo Amman Bank now enjoys the reputation as an IT-driven bank that leads IT-based innovations in the banking sector in Jordan. Many indicators have proved that from the perspective of Cairo Amman Bank. These indicators according to the General Manager of the Bank are: First, the Bank has been targeted by global and leading IT companies concerning new innovations and for building strategic partnerships. Second, global and leading banks (e.g. Barclays and Bank of America) have visited and opened communication channels with Cairo Amman Bank to learn from their experiences with the implementation of iris recognition technology. Third, the sparkling attention of the world media (e.g. BBC News, Aljazeera, and Newsweek) in regards to the implementation of iris recognition technology. Fourth, the differential value the Cairo Amman Bank has created for itself as being the first bank in the world that has implemented a full roll-out of IRT-enabled services.

In addition to the aforementioned elements of business value that Cairo Amman Bank has captured due to the integration of iris recognition technology into operations mix, other benefits have been highlighted throughout our investigation such as attracting new customers and bringing new business opportunities. Moreover, it is also important to mention that the aforementioned elements of business
value have been translated into financial gains. The General Manager of the Bank explained that the Bank did not formally measure the business value of the iris recognition technology; mainly due to the fact that its implications on the Bank are so obvious and significant given that the operational profits of the Bank has risen from JD 8 million to JD 36 million during the last five years. He further explained that "we cannot claim that the remarkable increment in our operational profits came only from the deployment of IRT, but this technology has indeed played a great role in this".

5 Conclusions

This research was conducted to explore and provide an in-depth analysis of the critical success factors and the business value created and captured by Cairo Amman Bank as a result of integrating the iris recognition technology into their operations mix. Cairo Amman Bank (CAB) is the first bank in the world that has implemented a full roll-out of IRT-enabled services in 2008; a fact that adds to the interest and contribution of this paper since there is almost no scholarly previous research that has tackled this interesting case in the banking sector. The analysis of this case reveals that the success of this innovation (i.e. the successful utilization of iris recognition technology in banking) cannot be attributed to a single factor, but rather to a number of factors that have accounted for the success; visionary leadership, readiness of IT department, right strategic business partnerships, proactive customer orientation, and support of top management.

Our analysis also reveals the forms of value Cairo Amman Bank captures following the implementation of this technology. Benefits and value have actually been achieved on many aspects related to operations, control, customer, and organizational image. The Bank was able to enjoy significantly higher level of control by mitigating various risks related to fraud, identity theft, and human error. Further, the Bank's operations have become more efficient in terms of time and effort needed to complete customer transactions. Transaction time has dramatically dropped down from an average of 10 minutes to an average of 2 minutes. The value offered to customer has been also augmented resulting in higher levels of customer satisfaction. After the implementation of iris recognition technology, customers are offered a premium security in regards to their financial information and transactions. Convenience value has also emerged due to this innovation. As for organizational image, Cairo Amman Bank is now regarded as the IT-driven bank in Jordan that leads IT innovations in the Jordanian banking sector. These benefits and value have resulted in financial gains as the Bank operating profits has risen from JD 8 million to JD 38 million in the last five years. Finally, it is worth mentioning here that due the page scope limitation of this paper, the theoretical foundation of this research was not presented.

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