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## ICT developments and utilization in the Omani banking sector

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*Abstract:* While adopting information and communication technologies (ICT) has become inevitable, the next-level challenge to organizations is how well they are utilizing this technology asset. Almost two decades earlier, which is not a noticeable span of time of the human history, the research focus was on how beneficial adopting technology by organizations was. Nowadays, the focus of the research is shifted primarily to how well the technology should be managed and tuned to achieve the business strategic goals and attain its competitive advantage or secure survival at minimum. This study takes the commercial banking sector in Oman as a sample of a highly ICT-infused sector in the service industry. Its aims to assess the efficiency and effectiveness of managing the information systems run by a sector closely linked to its performance. The performance is the determinant of the competitiveness/surviving level of any organization; banks are no exception. The research methodology comprises of a self-administered questionnaire and an interview. The study was conducted over 6 months. The exploratory nature of this research and the relevant type of data collected (categorical and ordinal) has led to use the descriptive statistics including central-tendency measures. The interviews have triangulated and confirmed the quantitative data collected. The study finds that the selected sector has adopted latest ICT infrastructure in conducting both back-office and front-office business which are adopted by common competitors worldwide. However, the study finds that while the IT infrastructure follows the latest technologies in the field, there is still room to optimize the utilization of this infrastructure by improving its administrative as well as technical management of it.

*Key words:* ICT infrastructure, ICT management, banking sector, management IS

## 1 Introduction

ICT developments explain and justify their rapid adoption by various types of organizations to improve their competitive advantage [1]. The current trend of teamwork in an organization, or even between several ones, is characterized by the heavy ICT mediation which is considered the “bread and butter” of virtual team (VT) work [2]. Education, health, defence, manufacturing, and banking are just some of the sectors that follow this paradigm. The banking industry, in particular, is among those who have been deeply affected by the impact of ICT altering not just the way work is conducted but introducing innovative services to their customers as well. The banking sector across the globe has embraced and used ICT as part of its business strategy for expansion, revenue generation, extension of customer base and creating competitive advantage against the other organizations in the sector [3]. It remains, however, a challenge in Oman to explore optimum ways to use the ICT by the banks to achieve the organization’s strategic objectives.

## 2 Background

### 2.1 A glance at the Omani commercial banking sector (OCBS)

Omani government’s aim towards a stronger economy has led to a serious increase of the importance of investing in ICT infrastructure. Construction, telecommunications, transportation (especially airports), in addition to the financial industries all have been supported and nurtured by the Omani government to support the renaissance sought by the country. The banking sector, like the case of the other sectors, is benefiting from the strong economic performance, the economy liberalization, the diversification, the major infrastructure developments, the accelerated privatization orientation, the in-flow of foreign direct investments (FDI), and the favourable demographics with strong population growth and high percentage of youth. These are the driving forces for the growth of banks as well [4]. The FDI policy in Oman has led to increased investments. In the Business Environment Outlook, Shachmurove [5] explained that this policy has offered a set of incentives that made it attractive to foreign investors to activate free capital movement which allows foreign money to move in and out of Oman with no restrictions. Amongst these incentives are the 5-year

tax free policy (potentially) renewable for another equal period, low-interest loans from the Oman Development Bank (limited) and the Ministry of Commerce and Industry, subsidized plant facilities and utilities at industrial sites, and, lastly, exemptions from custom duties on equipment and raw material during the early ten years of the investment.

**Table 1: The Omani banking sector - History of establishment (CBO Annual Report 2015)**

<i>Local banks</i>	<i>Establishment</i>
1- National Bank of Oman (NBO)	1973
2- Oman Arab Bank (OAB)	1973
3- HSBC Bank Oman	1975
4- Bank Muscat (BM)	1981
5- Bank Dhofar (BD)	1990
6- Bank Sohar	2007
7- Ahli Bank	1997
<i>Islamic Banks</i>	
1- Bank Nizwa	2012
2- Al Izz Islamic Bank	2013
3- BM- Meethaq	2013
4- NBO- Muzn	2013
5- BD- Misara	2013
6- OAB- Al Yusr	2013
7- AHB- Al Hilal	2013
8- BS- Sohar Islamic	2013
<i>Foreign banks</i>	<i>Establishment</i>
1- Standard Chartered Bank	1968
2- Habib Bank Ltd.	1972
3- Bank Melli Iran	1974
4- National Bank of Abu Dhabi	1976
5- Bank Saderat Iran	1976
6- Bank of Baroda	1976
7- State Bank of India	2004
8- Bank of Beirut	2006
9- Qatar National Bank	2007
<i>Specialized banks</i>	
1- Oman Housing bank	1977
2- Oman Development Bank	1977

Commercial banks belong to the jurisdiction of the central bank of Oman and include the conventional commercial banks, the Islamic banks and Islamic Windows, the specialized banks, the non-bank finance and leasing companies, and the money exchange and draft issuing establishments. At the end of 2015, the number of commercial banks in Oman was 16, of which 7 are locally incorporated and 9 are branches of foreign banks with 468 further branches [6]. A list of these banks is shown in Table 1. All commercial banks are privately owned with minor stakes owned by the government in just a few of them.

## 2.2 The ICT enabling role

Recent ICT rapid developments are considered an enabling factor for the increased adoption of the virtual mode of work [7]. In fact, without the ICT revolution it would be impossible to imagine the emergence of any form of time-efficient dispersed locations organization collaboration [8]. The maturity level of the information and communication technology (ICT) advents facilitates the flexibility in terms of time and cost to back up and support the business networks [1, 9-12]. While banking sector, in general, is the veins and arteries of any economy, the ICT has become the heart of this sector [13].

For organizations, the advent of ICT has made it challenging to adopt in the new competitive economy [14]. The direct particular serious implication is that the rapidly growing ICT capabilities and enhancements lead to drastic falling of the costs of the organizations [15]. This is because of the increased inter-organizational alliances and the maturity of ICT that enable reliable computer-mediated communication [16]. In the banking sector, the selection of the appropriate technology towards virtual team work is of critical importance.

## 2.3 Utilizing ICT infrastructure

The ICT infrastructure is described in the advancement centre for information systems (CCTA) as “the hardware, software and computer related telecommunications that support the ongoing provision of the organization’s ICT services”. It is associated with the people involved in the planning, management, implementation and operation of the IT in addition to the policies and regulatory procedures [17]. Kern et al. [18] refer in more details to the ICT infrastructure as it comprises the network, data centre facilities, server rooms, connection media, desktop, databases (RDBMS), operating systems (OS), integration, applications support, processes, metrics, service level agreements, systems management tools, all computer-related hardware, special purpose software applications such as the financial applications, e-mail systems office tools, and people. Kern et al. [18] stress that the human factor is the most valuable and critical one among the IT infrastructure factors that can affect its exploitation. From the IS perspective, Turban et al. [19], using an organizational term ‘information infrastructure’ instead of the technology-oriented one, refer that an

organization’s information infrastructure “*consists of the physical facilities, services, and management that support all computing resources in an organization*”.

The above describe ‘what the information infrastructure is’. Hence, it includes five major components that are: computer hardware, general-purpose software, networks and communication facilities (intranet & Internet), databases, and information management personnel. These definitions highlight the variables that should be traced in the target sector of this study that can be put as follows: availability of computers (per person), the availability of network access (through intranet and Internet), the availability of the technical support staff and the availability of the policies and procedural documents that regulate the use of the ICT hardware and software. It is important to mention here that the technical issues concerning the ICT infrastructure such as the network architecture and standards used are beyond the scope of this research.

## 3 Research methodology and data collection

Three research questions constitute the core of this study which is of the exploratory nature:

1. What is the availability status quo of the IT infrastructure in the OCBS?
2. What is the status quo of the utilization of the IT infrastructure in the OCBS?
3. How can the utilization of the available IT infrastructure be further advanced?

Objectivism is adopted as the philosophical stand of this study with limited use of subjectivism in some areas. For this, two data collection mechanisms were used, i.e. the self-administered questionnaire and the interview. The variables identified for this study were developed from [20] and based on the purpose of this study [21]. The questionnaire was validated also by having the opinion of a panel of 4 experts. It was validated next by using a pilot study [21] where it was distributed to 21 respondents from two different banks of the five contributed in this study. The respondents of the pilot study gave a valuable feedback and led to a few but important modifications. Reliability of the scale was measured using the Cronbach’s Coefficient Alpha. The value of the test was (.745) which indicates accepted level of reliability of a scale [22].

The data collected was based on the following: first, the supply side which explores the availability

of computer systems to each employee/have access to computer device, the availability of network and the Internet access and the availability of work computer applications. Second, the demand side that is how comfortable employees are working on computers, and the level of work dependency on computer and network applications, the type of network applications, and the type of communication media used for work purposes. Third, the facilitating side which relates to the availability and reliability of the technical assistance to reduce the system failures as well as the speed of responding to a system failure system in case it is down.

**Table 2: Personal and organizational characteristics**

Personal data	Answer options	Results (%)
<b>Gender</b>	(1) Male	54.9
	(2) Female	45.1
<b>Job title</b>	(3) Top management	2.1
	(4) Middle management	15.5
	(5) Supervisors	36.4
	(6) Operational staff	46
<b>Department</b>	(1) Cash	14.9
	(2) Customer service	31.8
	(3) Operation	40.8
	(4) Loans	9.7
	(5) Other	2.8
<b>Work experience</b>	(1) Less than 3 years	28
	(2) 3 to 6 years	40.4
	(3) 7 to 10 years	11.3
	(4) 10 to less than 15 years	12.1
	(5) More than 15 years	8.2
<b>Organization data</b>		
<b>Name</b>	(1) OCB1	8.6
	(2) OCB2	67.7
	(3) OCB3	4.8
	(4) OCB4	10
	(5) OCB5	8.9
<b>Branch level</b>	(1) Main branch	47.2
	(2) Local branch	52.8
	(3) Other	0

More than a thousand copies of the questionnaire were distributed using traditional method by hand submission (300 hardcopies) directly to the participating banks and more than 700 copies were distributed through emails with the help of banks' representatives for this purpose. Three hundred and seventy-three (373) copies were returned with two hundred and ninety-one (291) of them decided to be good for further for analysis. This means a response rate of 37.3% of the total distributed copies and

29.1% for the eligible copies for analysis. It is, also, be worth mentioning that only 7% of the total received copies were through email.

The data gathered was analyzed by SPSS version 16. Table 2 details the personal and organizational attributes of the sample. Male and female percentiles show the inclusion and empowerment of women labor in the Sultanate especially in the service sector. Job title reflects the administrative levels in the OCBS and shows its hierarchical structure adopted in the banking sector. The "Department" question shows the distribution of the various functions in the sample with the majority falling into the operation and customer service given the nature of the service. The majority of the respondents have work experience spanning between 3 to 6 years. As for the organization demographic data, the contribution of the five participating banks in the study varied ranging from 4.7% to 67.7%. The variation is noted and justified as to be corresponding to the variation of each bank market share in the Omani banking services market. However, matching between the two, i.e. bank marketing share and its percentage in the sample, is done as best as possible.

## 4 Findings

Table 3 summarizes the availability of the IT infrastructure to the OCBS employees. It demonstrates the sector's deep commitment to fully utilize ICT capabilities. This is evident by the availability of computers for the 95.9% of the respondents spreading all over the organizational structures and sector's functions. The results also prove the availability of computer networks in all participating banks. Access to the Internet is available for the vast majority (73.7%) of the respondents with the remaining being justified as not being necessary for their work and likewise with the access to the intranet (84.9%) and the availability of computer network applications (90.7%). This was clearly stated by some of the interviewees as *"the bank provides access to the Internet only to middle and top management with exception of employees of the customer service department where supervisors have this access"* and further as *"the bank deals with sensitive data in addition to the fact that money in our days is digitized. Therefore, the bank sees that limiting access to the Internet will limit various kinds of threats to the banks digital assets as well as protecting the confidentiality. It is not that the first-level managers (or supervisor) and non-administrative employees are not trusted rather this*

just a precautionary measure to reduce risk level". Network response time seems to be satisfactory for almost all respondents except 4.1% who reported long waiting time before application response takes place.

**Table 3. ICTI (Information Communication Technology Infrastructure) (N= 291)**

No.	Variable	Answer options	Results (%)
1	Have own computer	Yes	95.9
		No	3.1
2	Availability of computer network	Yes	96.6
		No	0.0
		Missing	3.4
3	Have Internet access	Yes	73.7
		No	18.7
		Don't know	7.6
4	Have intranet access	Yes	84.9
		No	9.1
		Don't know	6.0
5	Work on computer network applications	Yes	90.7
		No	9.3
6	Frequency of network failure	Very rare	3.8
		Rarely	56.4
		Sometimes	31.6
		Frequently	8.2
		Very frequently	0.0
7	Time of retrieving data on network (network speed)	Very short	24.7
		Short	38.8
		Acceptable	32.3
		Long	4.1
		Remarkably long	0.0
8	Technical assistance on computer-related problems	Very efficient	30.6
		Efficient	49.5
		Acceptable	15.8
		Inefficient	4.1
		Very inefficient	0.0

As to the human involvement in managing and maintaining the hardware of the ITI, the resulting percentage values of the positive answers (5 and 4 in the Likert scale) are 60.2% for network failure, 63.5% for network speed and 80.1% for technical assistance to computer-related problems. Both network failure and network speed results provide modest levels of ITI infrastructure in terms of network speed and reliability. This might suggest that employees hardly feel network related problems; furthermore, they feel the speed of retrieving data through these networks is close to the average which indicates room for improvement. As for the technical assistance, 80.1% indicate reliable

ITI technical staff support to handle various issues and problems. These details are shown in Table 3.

### 4.1 ITI of the Omani commercial banking sector (OCBS)

ITI (Information Technology Infrastructure) refers to the computer-related aspect and the professional people in charge of planning, implementing, and maintaining ITI to support the various operations of the organization [17, 18]. It is concerned with three issues, i.e. the availability, the compatibility, and the competency of the ITI resource [23]. In other words, it focuses in addressing issues related to the hardware (e.g. computers, servers, connectivity, etc.), software (e.g. network applications) as well as the supporting qualified technical staff. The summarized findings are detailed in Table 4.

The values suggest a general positive stance in every issue inquired. Both mode and median values being equal to 4 and given a minimum of 2 and a maximum of 5 indicates that no extreme negative answers exist among the sample. The standard deviation ranges from .699 to .844 suggesting good variation in the range of answers. The last row in Table 4 shows the combined values of the central tendency of these indicators which indicate the overall positive level of the ITI of the sector in terms of the network failure, network speed and level of technical assistance.

**Table 4: Central tendency values of ITI scale ordinal items (N=291)**

Item	Mode	Median	Std. deviation	min.	max.
Frequency of network failure	4	4	0.699	2	5
Network speed	4	4	0.844	2	5
Level of technical assistance	4	4	0.792	2	5
Combined values	4	4	0.646	2	5

### 4.2 ICT utilization in the sector

Table 5 details the summary results of the ICT usage. Employees like to use computers at a level of 99.3% and fully depend on them to do their work (100%). This confirms, in the local context, the role of the computerized systems in modern business practices [24]. In terms of the use of various computer applications, results show that word processing (45%), spreadsheets (48.5%), databases

and presentation applications (15%) are all used but not equally. Cramer's V test point towards low correlation between the use of these tools and the various levels of employees (.177, sig .28; .176, sig .29).

**Table 5: ICT usage**

No	Variable	Answer options	Results (%)
1	Comfortable and keen to using computer	Yes	99.3
		No	0.7
2	Dependency of employee's work on computer	Totally dependent	67.4
		Dependent	32.6
		The other options	0.0
3	Level of employee's convenience to use computer for communication purposes	Very comfortable	33.0
		Comfortable	66.0
		Indifferent	1.0
		The other options	0.0
4	Computer applications used at work	Word processing	45
		Spreadsheets	48.5
		Database	15
		Bank specific app.	89.5
5	Communication methods used	Phone	96.6
		Paper memos	77.3
		e-mail	94.2
		Com. net. messenger	12.7
		Blogs (Web logs)	21

Additionally, there are three major bank-specific applications reported applications, namely ECC, AS400 and T24. Cramer's V test (.663, sig. 000) reveals high correlation between the use of these applications and the job level. Cross tabulation further suggests this correlation (100%) for the top and middle management but gradually decreasing towards the first-level management (supervisors) and the non-managerial staff (clerks).

With regards to the communication methods used, the results show high reliance on phone with 96.6% and email with 94.2% and less on paper memos 77.3% followed by Weblogs 21% and last network messenger 12.7%. Interviewees provided almost similar justification on relying on phone calls and emails for communications. As they mentioned, they need to use phone calls, especially for urgent matters, and email for less urgent issues where documentation is important whether for disclaiming purposes or for providing reference for future need.

The values of the central tendency (i.e. standard deviation, skewness) of employee's answers (table 6) are used to explain the dependency on computers

and the level of convenience. The values of both these indicators suggest positive readiness on all issues addressed in the study. The standard deviation value is .47 which means that the dispersion of the values around the average value is low. This is clear however by the minimum and maximum values which are 4 and 5, respectively meaning that all respondents are either dependent or completely dependent on computers in their work which explains the tight positive range of options all respondents fall in. The skewness of -.739 suggests the overall tendency of the result to this indicator to the positive options. As to the convenience in using computers, the standard deviation value is .531 means that the dispersion of the values around the average value still considerably low even though the minimum and maximum values span wider from 2 to 5 which mean all options were selected except the extreme negative option. The skewness of .163 suggests an overall slight tendency of the result to this indicator to the positive options.

**Table 6: Central tendency of the ICT infrastructure & usage scale ordinal items**

Item	N	Std. deviation	Skewness	min	max
Level of work dependency on computer	290	.470	-.739	4	5
Convenience in using computers	291	.531	-.163	2	5
Frequency of network failure	291	.699	-.6	2	5
Network speed	283	.844	-.109	2	5
Level of technical assistance	291	.792	-.621	2	5
Combined values	291	.646	-.429	2	5

## 5 Conclusions

Summing up the results of the ICT usage related items, the situation of the commercial banking sector position in relation to the level of ICT usage denotes the high level of reliance on computer-related technologies in conducting the various banking tasks. This situation has an important implication as the ICT utilization has been an important research area that is concerned with how organisations utilise their IT resources in a way these resources support their competitive advantage [25, 26]. These results, therefore, reflect the sensible approach of the sector in raising the level of utilization of its ICT resources. This, in turn, will help in raising the sector's capabilities in the face of the intense competition that characterizes this sector

especially with the existence of ten foreign banks that have considerably longer experience in the field. This is also put clearly by all respondents where one of them put it this way: “Our bank relies highly on its IT resource and its utilization. For this, the bank has shifted recently to one of the recent IT bank application. The management is also provides IT training a few times a year to make sure that its employees are competent and doing their jobs at reliable level since most of the bank’s jobs and tasks rely largely on IT”

This finding fulfils answering the second research question that is concerned with how ICT is utilised in the target sector in order to establish how far it is likely to be ready in accepting VT mode of work that relies largely on the use of ICT. Therefore, in answering the question ‘the level of ICT utilization in the commercial banking sector is advanced enough in using its ICT resource in a way that supports adopting VT among the other traditional work mechanisms.

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