LEVEL OF INFORMATION AND COMMUNICATION TECHNOLOGY COMPETENCE AMONG SME'S IN THE SELECTED GULF COOPERATION COUNCIL COUNTRIES: BASIS FOR AN ACTION PLAN

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Abstract - With the researchers' awareness of the importance of competencies in computer applications and security in the conduct of on-line transactions, this study determined the SME supervisors' levels of competence in computer applications. Five types of computer applications were involved in the study; namely, Electronic Spreadsheet usage, Word processing, Database Management, Presentation preparation and Desktop Publishing.

The study also determined the SME supervisors' levels of competence in assuring security in the conduct of on-line transactions. The security measures involved in the study were assurance of the authenticity of data, production of proofs of transaction, and access control.

The study used the descriptive-survey method, with the questionnaire as the instrument of data collection. Data were collected from 180 SME supervisors in Muscat, Ras Al Khaima, and Manama. The researchers determined whether the levels of competence of the SME supervisors were Exemplary, Advanced, Intermediate, Developing, or Beginning.

Index Terms - Information and Communications Technology, Competence, Gulf Cooperation Council, Small and Medium Enterprises

I. INTRODUCTION

Today, governments and international organizations rely on information and communication technologies for the improvement of services to the clientele. With the competitive nature of global enterprise, the necessity for speed and immediacy in communication is felt by organizations. This situation has given rise to interest in the applications of information and communication technology among entrepreneurs who are engaged in various types of business activity.

In the GCC Countries, small and medium enterprises are expected to generate profit for their respective organisations. Knowing fully that they are responsible for the survival of the enterprises that they are handling, they have begun to realise the importance of information and communication technology. They are also aware that the new generation of customers is composed of millennials, who prefer to on-line transactions, especially when they intend to purchase imported goods. It is, then, necessary for the supervisors of small and medium enterprises to determine their level of competence in managing information and utilizing communication facilities. For this purpose, this study is conducted.

II. THEORETICAL BACKGROUND

This study was based on the theory advanced by Proctor (2011), who stated that the business value of information technology lies in the automation of business processes, provision of information for decision-making, connecting businesses with their customers, and the provision of productivity tools to increase efficiency. Information technology with its branch, communication technology, is the application of computers, to store, retrieve, analyze, and transmit data or information (Daintith, 2009). These applications are performed in the context of business or any other enterprise (FOLDOC, 2013). Information technology is taken as a subset of information and communication technology (ICT) and facilitates the transmission of information and various types of electronically mediated types of communication (Zuppo, 2016). From the business perspective, information technology involves the study, design, development, application, implementation, support or management of computer-based information systems (Proctor, 2011).

III. CONCEPTUAL FRAMEWORK

This study had for its input the level of competence of SME supervisors in the use of computer applications and in providing security for on-line transactions. The computer applications include electronic spreadsheet, word processing, database management, presentation software, and desktop publishing. The security measures for on-line transactions are data authenticity, proof of transaction, and access control.

The output consisted of an action plan for SME supervisors in the Selected GCC Countries.

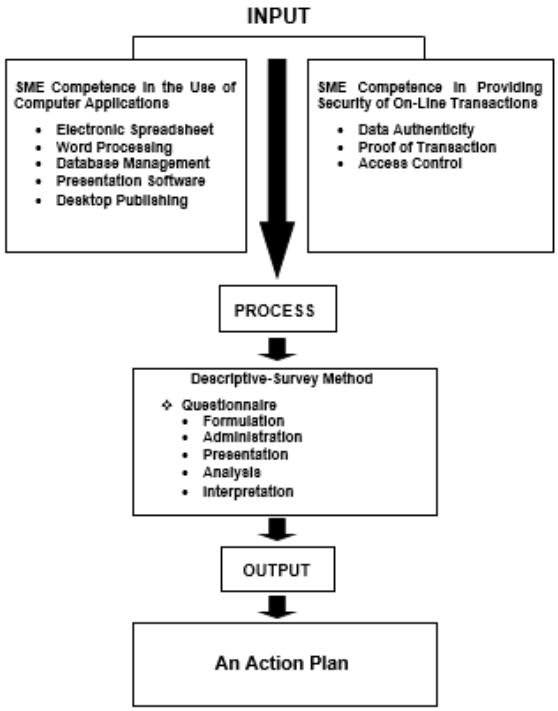

Figure 1. Conceptual Framework of the Study

IV. THE PROBLEM

Statement of the Problem

The purpose of this study was to determine the levels of competence of the small and medium enterprises in the aspects of using computer applications and in ensuring the security of on-line transactions in order to utilize the data for formulating action plans for the supervisors. The following subproblems were the guidelines for conducting this study:

1. What are the levels of competence of the supervisors of small and medium enterprises in the use of the following computer applications:
1.1. Electronic spreadsheet;
1.2. Word processing;
1.3. Database management;
1.4. Presentation software; and
1.5. Desktop publishing?
2. What are the levels of competence of the supervisors of small and medium enterprises in providing security for on-line transactions, through the following protective measures:
2.1. Data authenticity;
2.2. Proof of transaction; and
2.3. Access control?
3. How may an action plan be formulated for improving the levels of competence of the supervisors in computer applications and security?

Research Environment& Respondents of the Study

This study took place in Muscat, the capital and largest metropolitan city of the Sultanate of Oman, Ras Al Khaima, one of the seven emirates that make up the United Arab Emirates (UAE) and Manama, the capital and largest city of the Kingdom of Bahrain. These countries had its rapid development of infrastructure which has led to the expansion of its economic situation and the rise of a multi-ethnic society. Trade, petroleum, and porting are the components of the economic base of Muscat, Ras Al Khaimah and Manama.

The respondents of the study were 180 supervisors of small and medium enterprises in the selected regions in the GCC. The involvement of 180 supervisors as respondents of this study signified the involvement of 180 small and medium enterprises. Since each business organization had one representative, the researchers had to include 180 small and medium enterprises in order to obtain the desired number of respondents for this study. 60 respondents were gathered per the identified City.

SME Supervisors' Competence in the Use of Computer Applications Competence in Electronic Spreadsheet Usage

SME's Levels of Competence in Electronic Spreadsheet Processing
N = 180

Competencies	μ	Muscat Scale	μ	RAK Scale	μ	Manama Scale
Analyzing useful results depicted in graph and statistical values	3.42	Advanced	3.41	Advanced	3.50	Advanced
Using formulae for processing in the electronic spreadsheet	3.61	Advanced	2.61	Intermediate	4.00	Advanced
Saving a statistical file by giving it a meaningful name	3.45	Advanced	3.41	Advanced	3.80	Advanced
Retrieving a file through a file option	3.52	Advanced	4.00	Advanced	4.00	Advanced
Displaying the values produced by the spreadsheet as pie, bar line, and scatter diagram	3.46	Advanced	4.00	Advanced	3.51	Advanced
Constructing spreadsheet programs to analyze numerical data	3.44	Advanced	2.45	Intermediate	3.45	Advanced
Producing multiple versions of data analysis results	3.48	Advanced	3.49	Advanced	3.50	Advanced
Saving an edited version of an old file	3.46	Advanced	3.48	Advanced	4.22	Exemplary
Factor Average	**3.48**	**Advanced**	**3.46**	**Advanced**	**3.57**	**Advanced**

Legend: Range Scale

Range	Scale
4.21-5.00	Exemplary
3.41-4.20	Advanced
2.61-3.40	Intermediate
1.81-2.60	Developing
1.00-1.80	Beginning

Table 1 presents data on the SME levels of competence in the use of the Electronic Spreadsheet.

From these findings, it could be revealed that the SME's had a high level of competence for electronic spreadsheet, with minor flaws which, nevertheless could be corrected. The supervisors were reasonably competent in the handling of electronic spreadsheets. Their competencies consisted of the storage, manipulation, and sorting of electronic data. They could perform operations such as those which Hutchinson &Coulthard (2002) described as the analysis and summary of mathematical, statistical and financial data.

Competence in Word Processing

Table 2 contains data on the SME's levels of competence in word processing. Generally, the SME had an Advanced level of competencies in Word processing.

These findings reveal that except for some minor limitations in the SME's competence in Word

processing, they could this application to their advantage especially in lending an appropriate format and mechanics to their written communications.

Table 2
SME's Level of Competence in Word Processing
N = 180

Competencies	μ	Muscat Scale	μ	RAK Scale	μ	Manama Scale
Placing a file under a specific name	3.87	Advanced	3.87	Advanced	4.0	Advanced
Conducting a search for files with the use of key words	4.10	Advanced	3.76	Advanced	3.90	Advanced
Using a "cut and paste" operations	4.00	Advanced	3.88	Advanced	3.90	Advanced
Using the thesaurus to find the exact words to use in the encoded material	3.97	Advanced	3.70	Advanced	3.86	Advanced
Using the dictionary file to check doubts about spelling	3.92	Advanced	3.90	Advanced	3.90	Advanced
Checking grammatical errors through detection of underlined phrases	3.87	Advanced	4.0	Advanced	4.0	Advanced
Using "find and replace" processes to search for appropriate words	3.59	Advanced	4.11	Advanced	3.70	Advanced
Using eight alphanumeric characters plus a three-character extension to label a file	3.72	Advanced	3.69	Advanced	4.0	Advanced
Editing an encoded document	3.85	Advanced	80	Advanced	4.0	Advanced
Factor Average	**3.88**	**Advanced**	**3.90**	**Advanced**	**4.06**	**Advanced**

Legend:

Range	Scale
4.21-5.00	Exemplary
3.41-4.20	Advanced
2.61-3.40	Intermediate
1.81-2.60	Developing
1.00-1.80	Beginning

Hutchinson &Coulthard (2002) emphasized that Word processing is useful in business organizations in the sense that it can be used for the creation of letters, memos, reports, and proposals.

Competence in Database Management

Table 3 contains data on the SME supervisors' levels of competence in database management. As indicated by the factor average, the SME supervisors generally had an Intermediate level of competencies in the use of this application.

Table 3
SME's Level of Competence in Database Management
N = 180

Competencies	μ	Muscat Scale	μ	RAK Scale	μ	Manama Scale
Storing numerous types of data in file folders	3.62	Advanced	3.00	Intermediate	4.20	Exemplary
Converting financial and numerical data into electronic digital signals	3.10	Intermediate	2.73	Intermediate	2.20	Developing
Using previously collected data for stock control	2.98	Intermediate	3.01	Intermediate	3.40	Intermediate
Using previously collected data as aids to forecasting and strategic planning	3.18	Intermediate	3.35	Intermediate	3.70	Advanced
Using data on inventory of stocks for decisions on reorder of supplies	3.73	Advanced	3.36	Intermediate	3.00	Intermediate
Processing customer orders and specifications through computer-aided design (CAD)	3.42	Advanced	3.00	Intermediate	3.48	Intermediate
Sharing information from the organization's database and exchange ideas without physical meetings	2.76	Intermediate	2.20	Developing	3.20	Intermediate
Using previously collected data as basis for instructing the purchasing unit what to buy and when	3.44	Advanced	3.40	Intermediate	3.00	Intermediate
Factor Average	**3.28**	**Intermediate**	**2.38**	**Intermediate**	**3.27**	**Intermediate**

Legend:

Range	Scale
4.21-5.00	Exemplary
3.41-4.20	Advanced
2.61-3.40	Intermediate
1.81-2.60	Developing
1.00-1.80	Beginning

These findings reveal that the SME's in the GCC had nearly perfect competencies in handling and managing voluminous amounts of information in such a manner that easy retrieval was possible. The storage was done in an organized sequence (Haag, Perry, Parker & Wells, 2002).

Competence in Presentation Preparation

Table 4 contains data on the SME's levels of competence in the use of presentation software. The factor average denotes that the SME's had an Advanced level of competence in the preparation of presentations.

Table 4
SME's Level of Competence in Presentation Preparation
N = 180

Competencies	μ	Muscat Scale	μ	RAK Scale	μ	Manama Scale
Choosing appropriate slide designs	3.66	Advanced	3.54	Advanced	3.90	Advanced
Deciding on the appropriateness of using animations	3.70	Advanced	3.46	Advanced	3.75	Advanced
Focusing on the key factors of a specific problem	3.48	Advanced	3.44	Advanced	3.68	Advanced
Illustrating cause and effect relationships	3.70	Advanced	3.80	Advanced	3.90	Advanced
Using simple, understandable terms	3.76	Advanced	4.02	Advanced	3.80	Advanced
Using diagrams to show the ranking of priorities	3.64	Advanced	3.09	Advanced	3.77	Advanced
Presenting evidence of accomplishments through pie charts and bar graphs	3.46	Advanced	3.60	Advanced	3.76	Advanced
Drawing a scatter diagram to show the relationships between two courses of action	3.60	Advanced	3.90	Advanced	4.60	Advanced
Factor Average	**3.55**	**Advanced**	**3.76**	**Advanced**	**3.80**	**Advanced**

Legend:

Range	Scale
4.21-5.00	Exemplary
3.41-4.20	Advanced
2.61-3.40	Intermediate
1.81-2.60	Developing
1.00-1.80	Beginning

These findings reveal that the SME' levels of competence in presentation preparation nearly approached the level of perfection, but with minor flaws in the performance of the operations involved in the program. The SME's could prepare electronic slides for informative discussion in a manner that was clear, understandable, and comprehensive. They could prepare presentation material with varied forms that could stimulate the listeners to pay attention to the facts and figures presented during the discussion.

With the knowledge that presentations should provide a learning experience to the listeners, the presenter can present facts and figures in many different forms and designs without adversely affecting the quality of information that should be conveyed to the listeners. The SME's could perform these operations with minor flaws, which they could easily correct through study and practice.

Competence in Desktop Publishing

Table 5 presents data on the SME's level of competence in Desktop Publishing. As reflected by the factor average, the SME's had an Intermediate level of competence in the use of this application.

These findings imply that the SME's generally did not excel in the formulation of design and format for documents which their respective business organisations would use for marketing purposes. Such being the case, their business organisations would need to employ technicians who could structure advertising material for them. At this time when business

establishments no longer use the services of a printing press for designing advertising material, the SME supervisors either have to study or entrust the preparation of brochure and advertisements to a subordinate employee.

Table 5
SME Supervisors' Level of Competence in Desktop Publishing
N = 180

Competencies	μ	Muscat Scale	μ	RAK Scale	μ	Manama Scale
Using the graphics capabilities of word processing to design advertising materials	2.86	Intermediate	2.06	Developing	3.06	Intermediate
Producing page layouts for flyers and brochures	2.98	Intermediate	3.98	Intermediate	2.08	Beginning
Setting texts in multiple columns in different fonts and type-face styles	3.12	Intermediate	2.28	Developing	4.32	Exemplary
Combining text and figures to produce high quality reports	3.22	Intermediate	2.80	Intermediate	2.20	Intermediate
Handling line and half-tone figures	3.36	Intermediate	2.36	Intermediate	3.60	Intermediate
Using a scanner to convert half-tones into digital forms	3.28	Intermediate	3.28	Intermediate	3.55	Intermediate
Manipulating designs to make preferred illustrations	2.68	Intermediate	1.68	Beginning	2.55	Intermediate
Factor Average	**3.07**	**Intermediate**	**2.63**	**Intermediate**	**3.11**	**Intermediate**

Legend:	Range	Scale
	4.21-5.00	Exemplary
	3.41-4.20	Advanced
	2.61-3.40	Intermediate
	1.81-2.60	Developing
	1.00-1.80	Beginning

Summarised Data on the SME' Levels of Competence in the Handling of Computer Applications

Table 7 contains the summarised data on the SME's levels of competence in handling five different types of computer applications. From these findings, it could be inferred that the SME's could better handle the computer operations which were more associated with Word applications than those which needed conversion and designing. In the applications with simple commands, the SME's levels of competencies

Table 6
Collective Summarization of Data on the SME's Levels of Competence in the Use of Computer Applications in the GCC
N = 180

Applications	Factor Average	Scale
Electronic Spreadsheet	3.48	Advanced
Word Processing	3.88	Advanced
Database Management	3.28	Intermediate
Presentation Preparation	3.55	Advanced
Desktop Publishing	3.07	Intermediate
General Average	**3.45**	**Advanced**

Legend:	Range	Scale
	4.21-5.00	Exemplary
	3.41-4.20	Advanced
	2.61-3.40	Intermediate
	1.81-2.60	Developing
	1.00-1.80	Beginning

These findings imply that the SME supervisors had to employ technicians who could assist them with Database Management and Desktop publishing.

SME Supervisors' Levels of Competence in the Assurance of Security in On-Line Transactions

Levels of Competence in Data Authenticity Assurance

Table 7 contains data on the SME supervisors' levels of competence in the assurance of data authenticity.

Table 7
SME Supervisors' Level of Competence in Data Authenticity Assurance
N = 180

Competencies	μ	Muscat Scale	μ	RAK Scale	μ	Manama Scale
Making a complete profile of customers	3.63	Advanced	3.83	Advanced	3.56	Advanced
Checking the identity of the customer by obtaining the confirmation of the credit card company	3.56	Advanced	3.46	Advanced	3.56	Advanced
Cross-referencing the identity of customers through postal addresses and telephone directory entries	3.90	Advanced	3.90	Advanced	4.10	Advanced
Requiring personal identification numbers (PIN) from customers	4.00	Advanced	4.20	Advanced	4.00	Advanced
Maintaining files of individual customers to establish an audit trail	3.80	Advanced	3.90	Advanced	3.90	Advanced
Requiring pictures of customers	4.12	Advanced	3.26	Advanced	4.15	Advanced
Factor Average	**3.83**	Advanced	**3.76**	Advanced	**3.87**	Advanced

Legend:	Range	Scale
	4.21-5.00	Exemplary
	3.41-4.20	Advanced
	2.61-3.40	Intermediate
	1.81-2.60	Developing
	1.00-1.80	Beginning

These findings revealed that although there were minor limitations in the competencies of SME supervisors in the assurance of data authenticity, they still assured both parties of the transaction of the genuineness of the data pertaining to themselves and the customers, especially because there were customers who paid on-line for their commodities. They established the identity of the customers who placed orders on-line. To avert difficulties in establishing the true identity of their customers, they used the techniques of "something you are" (digital signatures or voice recognition methods), "something you have" (credit card), and "something you know" (card number or mobile phone number). These techniques assure the entrepreneur that the customer is what he or she claims to be (Industrie Canada, 2010).

Competence in Ensuring Proofs of Transactions

Table 8 contains data on the SME supervisors' levels of competencies in ensuring proofs of transactions.

Table 8
SME's Level of Competence in Ensuring Proof of Transactions
N = 180

Competencies	μ	Muscat Scale	μ	RAK Scale	μ	Manama Scale
Requiring customers to accomplish a purchase order form for the commodity to be purchased	3.42	Advanced	3.22	Advanced	3.77	Advanced
Issuing a purchase order number to the customer	3.50	Advanced	3.56	Advanced	3.72	Advanced
Requiring the customer to confirm the authenticity of the purchase order before sending the commodity	3.48	Advanced	3.66	Advanced	3.58	Advanced
Issuing a commodity stock number to the customer	3.44	Advanced	3.43	Advanced	4.04	Advanced
Requiring the customer to confirm the stock number of the commodity to be purchased	3.51	Advanced	3.43	Advanced	4.01	Advanced
Requiring customers without credit cards to send a screen shot of the deposit slip as proof of cash deposit in favor of the vendor	3.42	Advanced	4.20	Advanced	4.20	Advanced
Requiring customers with credit cards to indicate the credit card number and stock number of the commodity ordered	3.70	Advanced	3.82	Advanced	3.30	Advanced
Factor Average	**3.49**	**Advanced**	**3.62**	**Advanced**	**3.80**	**Advanced**

Legend:	Range	Scale
	4.21-5.00	Exemplary
	3.41-4.20	Advanced
	2.61-3.40	Intermediate
	1.81-2.60	Developing
	1.00-1.80	Beginning

These findings denote that with minor limitations, the SME's established measures that would show the

validity of the transactions which they entered with the customers. The cross-referencing and requirement of proofs of the transactions with the customers were assurances that not one of the parties could deny the existence of the transaction. With these precautions, no customer could deny that orders had been placed and that financial obligations were incurred. On the part of the vendor, there could be no denials of the transaction and that the order had to be filled and the commodity should be sent to the customer.

Competence in Enforcing Access Control to Computers

Table 9 presents data on the SME's levels of competence in enforcing access control to computers among their employees.

From these findings, it could be inferred, that in spite of minor limitations, the SME's controlled the access to data by unauthorised persons by using safety nets that protected the data pertaining to transactions within the business organisation.

Table 9
SME Supervisors' Levels of Competence in Enforcing Access Control to Computers
N = 180

Competencies	μ	Muscat Scale	μ	RAK Scale	μ	Manama Scale
Limiting access to a few trusted employees	3.80	Advanced	3.76	Advanced	3.90	Advanced
Requiring trusted employees to change passwords regularly	3.76	Advanced	3.87	Advanced	4.20	Advanced
Using passwords that are not easily guessed	3.55	Advanced	3.41	Advanced	3.62	Advanced
Isolating networked computers for e-business transactions in a virtual private network (VPN)	3.48	Advanced	3.41	Advanced	3.88	Advanced
Placing physical barriers to isolate VPN computers	3.92	Advanced	3.62	Advanced	3.96	Advanced
Blocking access to data in computers after three failed log-ins	4.00	Advanced	3.41	Advanced	4.10	Advanced
Using encryption to prevent unauthorized access to data	3.66	Advanced	3.52	Advanced	3.84	Advanced
Factor Average	**3.74**	**Advanced**	**3.50**	**Advanced**	**3.85**	**Advanced**

Legend:	Range	Scale
	4.21-5.00	Exemplary
	3.41-4.20	Advanced
	2.61-3.40	Intermediate
	1.81-2.60	Developing
	1.00-1.80	Beginning

The requirement to change passwords was especially important, since informal organisations within the company might make the employees familiar with each other and expose the password either intentionally or unintentionally. The creation of a virtual private network was an important measure that assured the SME's of the integrity of the data that they kept in connection with their transactions. In this digital age, physical measures were still important to prevent unauthorised access to the hardware.

An Action Plan for SME Supervisors

Action Plan Nomenclature

This action plan goes by the term **Information Technology for Market Dominance.** This term is used because the action plan is intended to improve the opportunities of SME supervisors in the Selected GCC regions to accelerate the growth of the enterprises in which they are working.

The twenty-first century is marked by the rapid growth and development of information and communication facilities. The availability of hardware and software for the acquisition and storage of information has made possible the growth of business and industry. The ability of business managers and supervisors to reach customers who reside on the other part of the globe has created for them numerous opportunities to enlarge the customer base and penetrate foreign markets even without physically expanding a business. "Click an icon to do business" has become the slogan of globalisation.

Nature of the Action Plan

The needs are addressed through action steps designed to improve the SME's competencies.

Manipulating designs to make preferred illustrations	Invite a graphic artist to demonstrate different ways of making illustrations, whether black and white, colored, and half tone. Give the SME supervisors time to produce their own designs and illustrations.
Database Management Converting financial and numerical data into electronic digital signals	Invite a finance expert who is well-versed in database management to train the supervisors in the process of financial and numerical data conversion through digitization.
Using previously collected data for stock control	Invite an accountant to train the supervisors in the use of existing data to implement stock and inventory control.
Using previously collected data as aids to forecasting and strategic planning	Invite an expert in forecasting and strategic planning to illustrate the ways in which existing data can be used to forecast market trends and to make long-range strategic plans.
Sharing information from the organisation's data base	Study the network system and the ways in which data can be derived from the mainframe.

NEEDS	ACTION STEPS
Desktop Publishing Using the graphic capabilities of Word Processing to design advertising material.	Invite a resource person to speak about the ways in which Word processing can be used for designing advertising material and to illustrate the procedure to the SME supervisors
Producing page layouts for flyers and brochure	Invite a technician to demonstrate the process and give the SME supervisors time to work by themselves and produce a brochure.
Setting texts in multiple columns in different fonts and type-face styles	Invite a computer instructor to demonstrate the ways in which different fonts and type-face styles can be placed in multiple columns for the making of brochure and other advertising materials.
Combining text and figures to produce high-quality reports	Invite a computer instructor to demonstrate to the supervisors the combination of text and figures and allow the supervisors sufficient time to produce the reports by themselves.
Handling line and half-tone figures.	Invite a graphic artist to speak on the principles and processes of making line and half-tone figures, and to demonstrate the process. Allow the SME supervisors to practice the process by themselves to the point of mastery.
Using a scanner to convert half tones into digital forms	Let a technician demonstrate the ways of manipulating the scanner to detect half tones and train the supervisors in the process of converting half tones into digital forms and the principles involved in the process.

CONCLUSION AND RECOMMENDATIONS

In the light of the findings of the study, the researchers concludes that the SME supervisors in the GCC regions could facilitate their own learning process with the help of external experts, since they had learned the fundamental computer applications.

RECOMMENDATIONS

In the context of the findings of the study, the researchers recommends:

1. That the SME's maintain a program of study which includes further learning in computer

applications in order to empower themselves in the performance of their control functions.

2. That at regular periods, the SME's invite experts in database management and desktop publishing to give them refresher guidelines in the performance of these applications.

3. That SME's organise themselves for mutual learning opportunities and exchange of ideas on new trends of information technology.

4. That SME's go beyond the acquisition of competencies in computer applications into computer programming.

5. That future researchers conduct studies on the following topics:

5.1. The Use of Data Mining as an Aid to Business Forecasting in the Gulf Cooperation Council Countries (GCC).

5.2. Predominant Practices in Data Protection among the Business and Industrial Corporations of the Selected GCC Cities.

5.3. Averting Security Threats to Data and Data Networks in the Business Sectors.

5.4. The Utilization of Stored Information as Basis for Strategic Planning in the Business and Industrial Corporations of the GCC Regions.

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