NOTRE DAME UNIVERSITY

End-user Satisfaction of EDP

In The Lebanese Commercial Banks

BY

WASSIM MOHAMMAD ISSAM EL-JAMAL

LOUAIZE, LEBANON

NOV 1994

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A Thesis

Submitted in partial fulfillment of the requirements for the

degree of Master of Business Administration in the Graduate
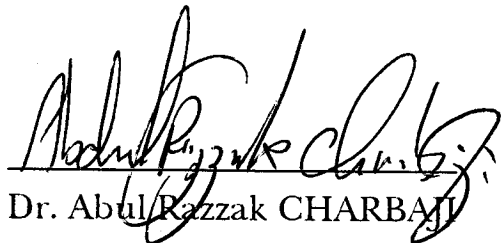
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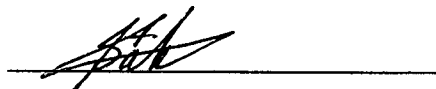
of

Notre Dame University

LOUAIZE, LEBANON

NOV 1994

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End-user Satisfaction of EDP in the Lebanese Commercial Banks

E l - J A M A L

AKNOWLEDGMENTS

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CHAPTER I

INTRODUCTION

General Background

Lebanon with its changing environment is living the information age, where the fast technological development of the 20th century induced the use of EDP "Electronic Data Processing" almost everywhere; universities, schools, insurance companies, banks and many others depend heavily on such a system. In fact, without such technological techniques which are the core of those inventions (EDP), we wouldn't have reached the present level of control that we now have over our business. Computer softwares and hardwares provide us with so many means of processing large volumes of data, organizing our files, and obtaining quick reports; However the most important thing in shaping the form of this technology is the degree of End-user Satisfaction of EDP, which will define the effectiveness and efficiency of the system.

"Performing tasks with computers' availability, users feel like veteran players in a team sport that has not been described yet. (In this sport, which is played continuously, night and day, and probably while we're asleep, some players mostly watch, they begin to understood that is the main strategy of the position they play). The playing field is being laid-out continuously. No one knows the rules, no one has time. The ball is the information, and it is everywhere at once. The game that used to be a sort of sand lot, street corner and local, with a few teams in the internationals, is transforming big regions of business and culture the way soccer finals take over the fabric of life in some European cities. In production industries, in design business, in schools, people are finding that there aren't any sidelines"[1].

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[1] FRYE, Mary Ann. Communication Arts . Vol. 36. #1, March-April 1994.

Since the term "Management Information System" has become synonymous with computerized systems, one of the major functions of computerized business is to maintain prosperous operation of applications software with the following objectives:

a- Provide information to functional users, managers and others.

b- Perform business operations.

c- Support management's decision process.

To achieve these objectives, organizations must focus on the sources, uses and change in the data and information. It is the applications software system that takes data as input, processes the data, and outputs it in the form of defined information. The effective use of information technology, with adequate control, can result in the efficient and effective computerized business system that accepts high-quality data as input and generates meaningful and reliable information as output. The quality of software systems can be regarded as a critical success factor of computerized business systems.

In the past fifteen years there has been an enormous use of computerized procedures in business, education, banking and many other sectors of the economy. This enormous widespread use has been also due to the fast increase in the technology, and to the demand of the economy to free humanity from toil, in the hope that "Computers will enrich our jobs, free us from disagreeable labor, and increase our productivity"[2]. Due to the characteristics of computers that distinguish them from any other tool ever created, advanced technology introduces smaller, more powerful and more

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2 R. Lucky "The Social Impact of the Computer" in the Computer Culture : The Scientific Intellectual and Social Impact of the Computer (New York : Academy of science, 1983). p. 20.

user-friendly machines into the market. All these force most of the companies to follow the increase in the technology, and use a computer system.

The use of computers as an efficient way to do applications does not sufficiently satisfy human wants, where nowadays it is used in management activity and decision making. The use of the Decision Support Systems has increased in an attempt to join forces between machine power and managers' experience. Management Information System (MIS) describes the new managerial support system, where the (MIS) concept is the use of computers as an aid to managers in making decisions relevant to their domain or responsibility.

In an era of increased end-user access to database information, the importance of database performance in response to user queries becomes paramount. A number of considerations must be made to insure that users have efficient and productive access to database, including the evaluation of user interactions with the database, database performance and monitoring, and database tuning in response to system changes. Both hardware and software tools could be used to monitor user interactions with systems. Database administrators and outside evaluators can use the monitoring tool result to tune or organize database as usage changes. End-user evaluations and responses to performance should provide the data administration team means to continuously track and modify the database, thereby supporting the end-user needs for data, information, and decision making requirements.

NEED FOR THE STUDY

Since Lebanon is coming to a new stage in its life, a construction stage where EDP is needed, and since employees of EDP are faced with work- related compound word tension problems affecting their satisfaction, a need for the study exists. Computer-based information systems today are one

of the most important components of modern living, and should be performed in a way to satisfy the needs of the users involved, and enable organizations to achieve a better competitive edge. With competitive pressures in most economies' scales, especially banking systems where this study is concerned, one cannot imagine their functioning adequately without sophisticated computer system support. Finally, user satisfaction is the key success of the acquired information system that will be translated into productivity, efficiency and effectiveness in the work output.

PURPOSE OF THE STUDY

The purpose of this research is to investigate the effect of the following: user acceptance, user involvement, ease of use , frequency of use, usefulness of the system, training programs received by End-User and perception of performance on End -User Satisfaction.

GENERAL STATEMENT OF THE PROBLEM

The better performance of a certain task does not lie only in the new technology and the development of this technology but also in the level of End-user satisfaction that will influence and may change the whole situation. A lot of times performance can be better with acceptable technology and a high level of satisfaction, than with high technology and a low level of satisfaction. End-users are in a powerful position, since all the tasks are done by them. Being in this powerful position, they should be involved in the software development; they should be consulted, and not ignored. Moreover, they might be considered as a future threat and at the same time as an opportunity; that is reason enough for us to aim for ' better than better '.

The main problem of this study is to determine how job characteristics and achievement affect End-user satisfaction of EDP in the Lebanese "Banking system".

RESEARCH HYPOTHESIS

The following research hypotheses were formulated:

H1: The way End-users feel the systems as useful or not affects their satisfaction level.

H2: Higher frequency of use leads to a higher satisfaction level.

H3: User involvement and ease of use lead to user satisfaction with the system.

H4: A positive relation exists between the training program received by end-user and the satisfaction level.

H5: A positive relation exists between user acceptance and user satisfaction.

STATEMENT OF THE RESEARCH QUESTION

Since this study is based on previous studies, the following common questions among those studies will be tested on the "Banking" system.

1- What are the major characteristics of the selected sample for the study?

2- Does the instrument (questionnaire) measure what it is supposed to measure? and does it do it consistently?

3- What is the relative importance of the variables explaining the variation in End-user satisfaction?

User satisfaction, acceptance, involvement, usefulness, ease of use and training lie in the following major importance areas:

1- *User Involvement*: Refers to having the user create his own product through his participation in all the phases of system activity. The benefit of user involvement strategy is that it makes users get what they want and thus ensure success.

2- *Ease of Use:* Refers to the degree of effort that has to be made by the user while using a particular system. It is claimed that an ease of use system is more likely to be accepted by users.

3- *Usefulness:* Refers to the extent a particular system would enhance an employee's job performance and is defined as capable of being used advantageously. It is believed that a useful system is more likely to increase *user satisfaction*.

4- U*ser Satisfaction:* Refers to the extent to which a user is happy with the services received.

5- P*erception* : Refers to the extent to which a user will feel that he/she has been involved in the system development and how it will affect his/her satisfaction level.

6- T*raining*: Refers to the degree of user satisfaction received during training time.

CHAPTER II

REVIEW OF LITERATURE

End-user computing has been growing at a rate of 50 to 90 percent per year (Cornan and Douglas, 1990), with many end-users now relying on unpopular relational database management system packages. There is no shortage of manuals and books which warn of the difficulties of introducing new technology into an organization. Some difficulties are common to all new systems, and others stem from the application specifics. Having scanned the literature, the following summarize the major expected generic difficulties to be found:

1- End users do not receive adequate training.

2- Management does not offer its full support.

3- Users are not sufficiently committed.

4- The plan and goals for the technology are lacking or poorly defined and articulated.

5- Users are not consulted and feel ignorant or neglected.

As the researcher mentioned in chapter I, "Purpose and Need of the Study" , almost everyone and everywhere is and will use the EDP in one way or another. The EDP facilities are increasingly dominating the business world nowadays. The degree of End-user satisfaction will be mirrored in their performance so that it will determine how the EDP system will be influenced. For these reason this chapter will cover and review the issues that affect End-user satisfaction, firstly by clearly defining the problems and secondly by presenting issues that relate to the reasons for these problems, and the various places in which EDP could be applied.

END-USER INTERACTION AND PERFORMANCE

The success of the database system depends on the users' perception of the system as they perform their task. To support an effective End-user database system, it is important to evaluate the interaction of the interface process between a system and its user. " The database administrator must be aware that user perception will change over time and end-user satisfaction will vary as their experience with a system growth"[3]. The quality of a system is a combination of both how End-users perceive performance of a system and the degree the system meets the user information requirements. "Users are more satisfied if they are included in the decision-making process at design time and during the implementation of the system"[4]. "Performance describes the current operations of the automated system success and is where the system designer and end user have agreed that the database system is minimally acceptable"[5]. A system that does not link dependent data together where there is a change is not a successful system. For example, a project must be in place before tasks associated with that project are in to be deleted in order to be acceptable by users. The database must maintain data integrity as well as provide coordination between separate but interdependent systems.

"A formal means of measurement of the system performance should be established, based on the expectations which the issues associated with monitoring the performance of the medium to large scale database in corporate information system's environment that are predominately end user oriented. Monitoring and evaluation of large database systems is necessary in order to provide effective access, security, audit , efficiency and control in a

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3 Green. Gary and R.T. Kelin "After Implementation what's next ? Evaluation". Journal of System Management.(Sep. 1983), pp. 10-15

4 Hoffborg, Alan "EDP Perspective", Office Administration and Automation. (Jan.. 1984). pp. 95-96

5 Nolven. Claudier W. "Utility Software Mainframe Enrichment". Computer Decision. (Jan.. 1985). pp. 90-94

a computer-based environment. A database system must perform at a level that is acceptable to both the database and the database administration team. Moreover, evaluation criteria should attempt to determine whether or not a system performs at the expected level. The End-user perception of performance level should be based on a set of criteria which :

a- Determines the purpose for evaluations.

b- Recognizes what should be evaluated.

c- Selects appropriate techniques for assessing the system.

d- Compares the results of the evaluation with the evaluation criteria.

Results should be interpreted carefully as evaluation results will be based on such important tasks as balancing workloads, scheduling jobs, and setting user priorities. Workload projection can be based on trends and other predictable factors, and when combined with utilization, enables the user to forecast future hardware needs and plan for timely hardware acquisition. "The purpose of the evaluation is to determine if the system complied with stated performance, productivity, effectiveness, and efficiency objectives"[6]. "The evaluation will also determine usage and any maintenance requirements or productivity enhancement that may be necessary"[7].

"Performance evaluation will generally be used as a tool to substantiate user satisfaction or dissatisfaction with the performance of the system"[8]. Performance measures include throughput, capacity, turnaround time, response time, availability, CPU productivity, system utility, overhead internal delay time, reaction time and wait times for I/O and CPU.

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6 Pelly. Lee and Guynes. Carl. "Monitoring Database Performance in an End User Environment". Journal of System Management. (Aug. 1993). pp. 27-30

7 Ibid.. P.30

8 McGoveron. David. "Letting the Breeze Blow In", Database Programming and Design". (June. 1992). pp. 27-35

Performance measures must be well defined since they set a framework for the entire evaluation process.

Productivity enhancement can improve information processing control and managerial decision making. "Information processing improvement may be realized by increasing the number of indexes or further partitioning the database"[9]. Control over integrity, security and availability of data is essential in the user environment. Productivity can be increased by a database that controls data in a multiple user environment with appropriate retrieval, update and locking mechanisms which do not require the user to re-do work because of failure of these mechanisms. The effectiveness of a system is described in terms of the capability to process a given workload, and the capability to meet the time requirement of individual users. Efficiency is measured by internal delays and utilization of individual components versus demand. Effectiveness measures are the prime performance measure and can be assessed from observations made at the external side of the evaluation interface, i.e., what is seen by the system user.

Other measures of determining user satisfaction include evaluating the utilization of shared data by capturing statistics on who is using the data, and for what purpose the data is being captured. "The actual usage of a database system should be compared to the usage that had been predicted to determine if there may be resistance to using the new system"[10]. If there is a significant discrepancy between expected and actual use, an investigation of

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[9] Fiori. Richard E. "DBZ Performance Considerations from the Top Down". Enterprise Systems Journal. Jan.. 1992. pp. 77-80

[10] Green. Gary and R.T. Kelin "After Implementation what's next ? Evaluation". Journal of System Management. (Sep. 1983), pp. 10-15

causes should be obtained through the use of interviews and user surveys. These could be done to more closely focus on the perception and attitudes of the users.

END USER FRUSTRATION

Many frustrated End-users have shied away from internally developed customized software that would have the greatest likelihood of satisfying their unique information manager needs, turning instead to generic software that produces a less than optimal fit, but is timely and less expensive. "The term 'software' crisis was coined in the 1960's to describe the problem software developers faced meeting end-user needs in a timely fashion"([11]). The problem was further compounded by the exorbitant development and maintenance costs of software. As a result, it has been suggested that the user of information systems became increasingly frustrated with the development of application software. This problem continues today for many of the same reasons, which include, among others :

1- Development is often time-consuming and expensive.

2- User expectations are often unfulfilled.

3- Delivery systems are inflexible.

4- Maintenance is expensive.

"These frustrations are especially problematic for end-users who wish to develop their own customized software"([12]). Because End-users must rely on systems analysts and programmers who may not fully understand their information-management need, they are less likely to reap. As a result, many

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[11] Steinberg. Geoffry and Foley. Robert. "Automatic Database Generation". Journal of system Management. (Mar. 1994), pp. 10-14

[12] Ibid. P.15.

frustrated End-users have shied away from the internally developed, customized software that would have the greatest likelihood of satisfying their unique information-management needs. Instead, they have turned to purchase software that is generic and produces a less than optimal fit, but is timely and less expensive. One logical solution to many of these problems would be to encourage End-users to get more involved in the design and development of the software they use.

1) A development of the software they use.

2) A development of the environment that convert user domain specifications to the application code ameliorates many of the user frustrations related to application software.

The advantages of this non-conventional methodology include:

1) The time it takes to complete any application system will be considerably shortened.

2) The absence of the technical specialists in the system development process diminishes the possibility of system requirements being misunderstood or corrupted as they pass from user to tester.

3) Software that is automatically created from specifications is likely to be more easily maintained than software developed using conventional means.

Should a user discover that environmental or other factors render a system specification inadequate, a new specification could be submitted and a new software version easily generated. User documentation accommodates the software changes and would be automatically generated as part of the methodology. Thus, software enhancement or maintenance could become as simple as the user both altering the specifications and examining a new prototype in an interactive fashion until satisfied.

QUALITY ISSUES FOR END-USERS

"Until the 1980s, most computer-based applications were developed by professional information-systems specialists. However, the development of the microcomputer and related user-friendly software, coupled with a substantial application backlog, initiated a strong trend towards end-user developed applications, or end-user computing"[13]. One of the overriding concerns caused by the trend towards end-user computing has been the potential decrease in quality and control as individuals with little or no formal information systems training have increasingly taken responsibility for developing and implementing systems of their own making. A previous study done on this subject declares two questions.

First, have companies developed procedures and controls for ensuring adequate testing and documentation of end-user developed applications?

Second, could a framework proposed for controlling the documentation of end-user developed systems be extended to also establish appropriate testing policies?.

A questionnaire form was developed and administered to information system and non-information systems managers working in 52 firms in the Boston, Massachusetts area to determine:

1- Existing corporate testing and documentation policy for end-user developed applications.

2- The opinion of the respondents as to the adequacy of the policy in their organization.

The subjects were first asked if their organization maintained any policy, either written or unwritten, at the corporate or department level, on

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[13] Cole. Edward. "Quality issues for End-User developed Software". Journal of system Management, (Jan.. 1994). pp. 36-40

the testing and documentation of end-user developed systems. Table "1" present the result of those questions.

TABLE 1

Company Policy
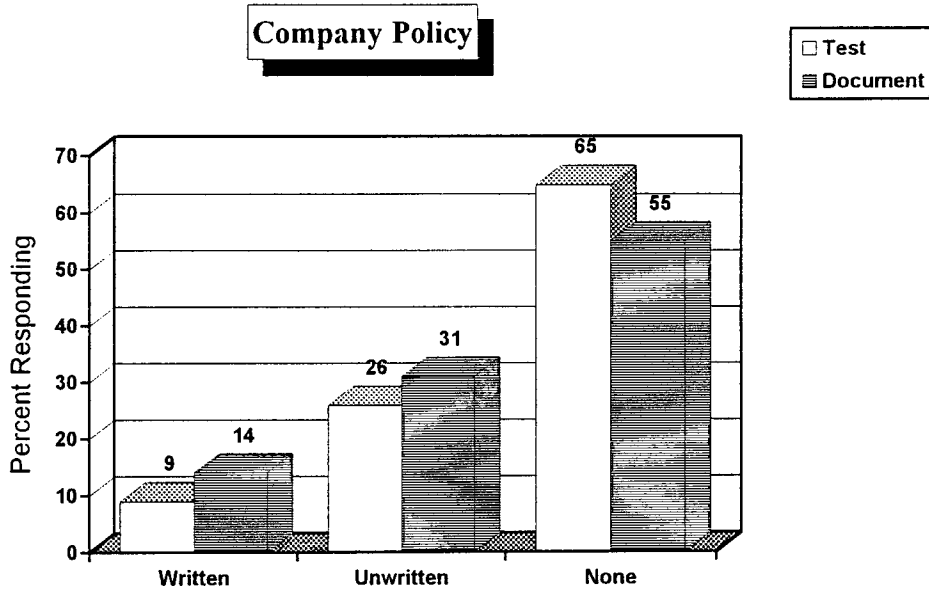
□ Test
≣ Document

Table "1" shows that few of the surveyed organizations have made much of a formal attempt to control either the testing or the documentation of end-user developed software. The next question, which stated "Lack of testing of end-user developed applications is a potentially serious problem", is presented in table "2".Significantly, the great majority of those surveyed either agree or agree strongly with that statement. It is also interesting to note that while table "1" shows that there were slightly more documentation policies in place than testing policies, Table "2" indicates that the respondents were slightly more concerned about the lack of testing policies. One might surmise that this small inconsistency arose from the greater difficulty in defining testing, as opposed to documentation standards. It is clear from these two tables that while most firms have no formal policy regarding testing and documentation, their managers view the oversight as a potential serious problem.

The following question. which stated "My organization provides adequate support (time. people. guidance) for the (testing/documentation) of end-user developed applications". appears in table "3".

Coupled with table "1" and "2". table "3" provides corroborating evidence that typical corporate policy and support on testing and documentation is viewed as inadequate in all but a small percentage of firms surveyed.

TABLE 2

Lack Procedures - Serious Problem
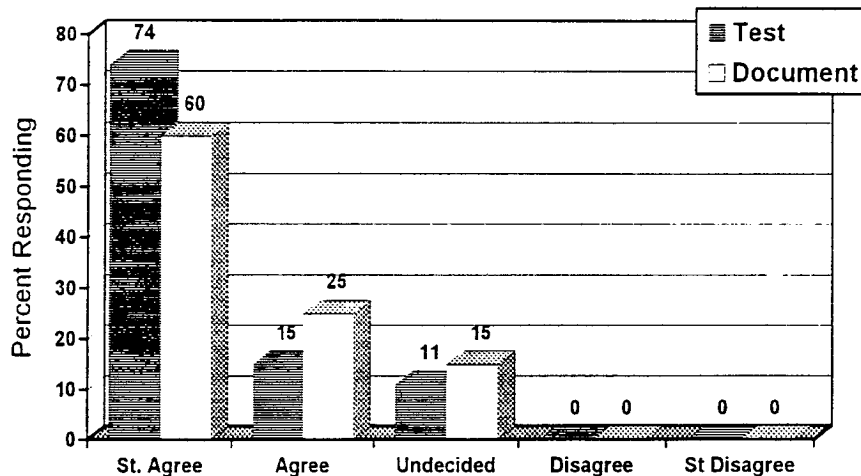
TABLE 3

Company Provide Adequate Support
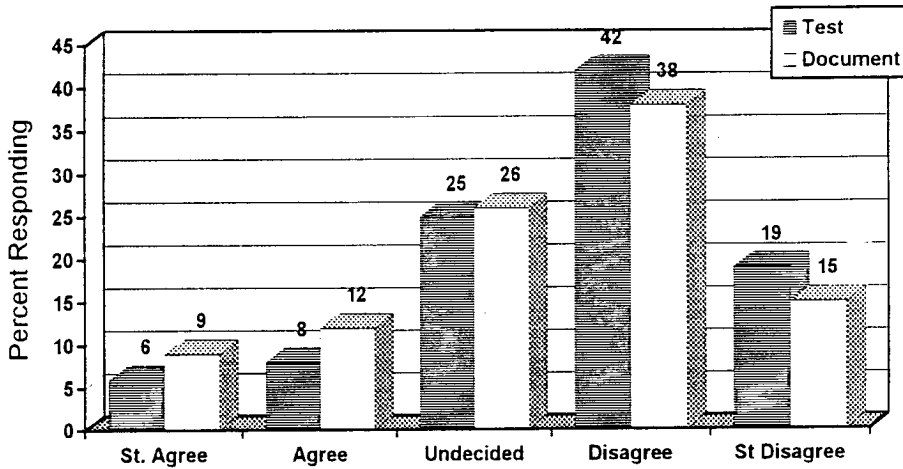
Concluding from the collected data, there are strong indications that :

1- Few firms have yet formulated a policy on requiring or supporting formal testing and documentation of end-user developed software. Of those that have, fewer than one in eight have developed a written policy.

2- Managers working both within and without the formal information-systems functions view such a lack of formal policy as a potentially serious problem, and roughly 60% of those managers view the support effort of their firms as inadequate.

3- The operationalization of such a framework presented in this form appears to touch on factors which the questionnaire respondents felt were relevant to testing and documentation policy. As a working hypothesis, one might formulate a policy that requires testing and documentation whenever the application will be used

by two or more people, or whenever it will update databases used by two or more people.*

END-USER TRAINING

"End-user computing has become an area of major importance to organizations over the past several years. As non-professional computer users come to rely on computer systems to perform more and more of their basic skills, MIS managers need to ensure that those individuals learn to use software packages effectively"[14]. A laboratory experiment was conducted to compare a commonly used direct manipulation interface (DMI) with a commonly used command-based interface. Results of the study indicate that individuals using (DMI) performed substantially better than those using the command-based interface. However, there was no difference between these two groups in terms of perceived ease of system use. Also, in contrast to previous studies there were no differences in outcomes related to the two types of training method. Assimilation theory is used to explain these results.

"User training has been identified as one of the key factors responsible for ensuring the success of end-user computing. A recent survey of senior information system (IS) executives found that 'organization learning and use of IS technologies' ranked fifth out of a list of 20 critical (IS) management issues"[15]. (However, it still appears that very little is known about how to design effective end-user training literature to find examples of the problems that user training still encounters. these include over extending non-computer experience to computer systems.)

1- Inability in recalling and using command syntax.

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* This study is a summary from "IS Fundamentals" Journal of system Management.(Jan.. 1994). pp. 38-42.

14 Sid A. Davis and Robert P. Bostrom . "An Experimental Investigation on the Roles of the Computer Enterprise and Training Methods". MIS Quarterly. (March. 1993). pp. 66-78

15 Niederman. et al. 1991. p. 480

2- Difficulty in applying software packages to specific tasks.

3- Frustration with the complexity of training materials, and confusion about how to recover from errors.

The purpose of this study is to investigate the impacts of specific types of computer interface and training methods on novice users' learning performance and on their perception of the ease of using a system. It compared two training methods: exploration and instruction-based training. "User performance was measured through hands-on use of a computer system, and perception of its ease of use was measured by responses to validity instruments"[16]. Assimilation theory was used to predict and explain the relationship between training methods, computer interface, and training outcomes.

A- Computer Interfaces

In today's computing environment there are three major types of interfaces: Command-based, Direct manipulation, and Menu-based. Command-based interfaces use a conversational metaphor that requires the user to enter and read English-like commands, e.g., a DOS-based system. Direct manipulation interfaces (DMI) allow users to enter commands by "pointing" to icons, objects, words, or cells on the screen, and reading "output" as the effect of these commands on the objects, e.g., as in desktop metaphor. Finally, Menu-based interfaces requires users to select command options from lists or menus. Each of these interfaces presents a model of the computer system either directly in the form of objects to be manipulated or indirectly through the conventions of its command language or menu system. The interface as a model suggests that individuals learn systems by actually using them. This study focused on DMI and command-based design because

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[16] Davis 1989

they represent radically different views of how users should interact with systems.

B- Assimilation Theory and Training Method

Assimilation theory defines two types of learning; Meaningful learning; and rote learning, or memorization. Individuals who experience meaningful learning are able to integrate and combine knowledge in ways that they have not done previously. Rote learning, on the other hand, relates new technology to existing knowledge in an arbitrary and verbatim way. Learners simply memorize information with little or no regard for its meaningful connection to prior knowledge. Studies typically measure rote and meaningful learning by using two types of tasks: Near-transfer and Far-transfer. The first task measures rote learning through the ability of individuals to retain specific pieces of information, while the second task measures meaningful learning through the ability of learners to transfer knowledge to new or novel situations. Such tasks often involve the application of problem-solving skills to determine which information is relevant and how to use it to achieve a desired result.

The explanation is that DMI would be more effective than command-based interfaces in facilitating performance in novel tasks, i.e., Far-transfer tasks. That is, there will be no difference between the performance of direct manipulation subjects and command-based subjects in Far-transfer (main effect). Also, there will be no difference in perceived ease of use between the direct manipulation interface and the command-based interface (main effect): Moreover, there will be no difference between the performance of instruction-based subjects and exploration subjects in Near-transfer tasks (main effect). In addition, there will be no difference between the performance of instruction-based subjects and exploration subjects in Far-transfer tasks (main effect). There will be also no difference between the

performance of direct manipulation subjects given exploration training and other interface/training in Far-transfer tasks (main effect). Finally, there will also be no difference between direct manipulation subjects given exploration training and other interface training subjects in terms of perceived ease of system use (interaction effect).

D- Result

The result showing that only the computer interface effect was significant, indicates that the models accounted for a good deal of the variation in these dependent variables. The experiment shows that DMI subjects performed significantly better than their command-based (counterparts). Also, it is interesting to note that DMI subjects performed significantly better than command-based subjects in Near-transfer tasks. In addition, the means for perceived ease of use indicate that the subjects in the DMI group also tended to find the computer easier to use.

The effect of training method, and the interactions between interface and training method on performance and perceived ease of use also could not be rejected. However, in Near-transfer tasks the instruction-based group did score slightly higher than the exploration group and this difference approaches significance. In Far-transfer tasks the mean score of the exploration and instruction-based groups were virtually identical. For perceived ease of use the DMI /exploration group had a lower mean score (easier to use) than the other interface/training group. However, again, this difference was not significant.[17]

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[17] - This study is based on :"Training End Users : An Experimental Investigation of the Roles of the Computer Interface and training Methods". MIS Quarterly. (March, 1993). Vol. 17. pp. 61-78.

DEVELOPMENT EFFECT

Over the past ten years, the advances in feature, storage, speed, power, compactness and probability have been phenomenal, while the advances on user's interface have been minimal. End-users are today living in an incredibly fast technology environment where the software that they get used to it is constantly in change. It is therefore very important for businesses to keep updating their software. It is, however, unwise for software companies to make radical changes where customers are already accustomed to the old softwares. A computer user who works with a program everyday, and knows function keys like the back of his hand, may throw out the old software and learn to use icons instead. The result is a hybrid interface where you are faced with a screen full of icons, menus and dialogue boxes requesting your preference. However , it is much more profitable for companies to develop new features; more features sell more software, and it is much more quantifiable than an overhaul of a user interface. And here is what bothers end-users the most. "We have learned the language of these computers and we have accepted it. It was hard but we did it. And now, as we are faced with more and more complexity, we figure OK, we will learn a little more, because we already have so much time and money invested. It only hurts a little, and we are used to it. It is a subtle form of abuse"[18]. We hear about the advances that incorporate new technology, like voice recognition. These are incremental changes that are built on the top of the existing user interface. The next logical step in user friendly computing is uttering short, militaristic commands like 'Open window' and 'Select folder'. It is incremental fixes that will ruin us. When something is vastly better than its predecessor, it is pretty damn hard to put it aside completely, get a fresh look and make a radical change. Clicking on icons and selecting from menus is a world better than

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18 - Richmond, Wendy. "Ten Years. One User Interface". Communication Arts. (Jan./Feb., 1994, Vol. 34, N° 8), p. 140

typing cryptic commands. It is time to think about making 'better' better. Finally, software systems require extensive maintenance and updating during the system life cycle.

USER INVOLVEMENT

User involvement is generally considered an important factor to insure system quality improvement and the system implementation success. A review of the literature done by Ives and Olsen shows that the common views were that, "Participation by those who will be affected by the system is essential, and in relation to other factors. e.g., top management support. competence of EDP staff and quality of goal setting. user involvement seems to be the only factor which is consistently related to the quality of the final outcome"[19]. A variety of reasons have been given for following such courses. System development is predicted to improve system quality by:

1- Proving a more accurate and complete assessment of user information requirements.

2- Avoiding development of unaccented features.

3- Improving user understanding of the system.

It may lead to user acceptance by: Developing realistic expectations about the system, decreasing user resistance to changes and committing users to the system. Positive results may frequently be attributed to common method variance. Nonsignificant result may often be a result of poor instruments or lack of control over the research setting..

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[19] Black Ives and M. H. Olson. "User Involvement and MIS Success : A Review of Research". <u>Management Science</u>. (Vol. 30. N° 5. May 1984). pp. 586-603

USER SATISFACTION AS MEASURE OF SYSTEM EFFECTIVENESS

User satisfaction has been extensively used by many researchers as a measure of effectiveness as perceived by users. It is well noticed that productivity in computer services means efficient allocation of the resources available for the effective utilization of the outputs of data processing. It is also argued that utilization is directly connected to the user's sense of satisfaction with those services.

In the literature there exist several attempts to measure user satisfaction where users were asked to evaluate their computer services according to their level of satisfaction.. From these attempts, a study by Bailey and Pearson[20] reported on a technique for measuring user satisfaction. Questionnaires were distributed to several users, who where asked to measure the rate of their satisfaction concerning accuracy, reliability, timeliness, assistance, adequacy, accommodation, communication, access, cost and environment. The respondents were then asked to evaluate each item on a five-point scale from very satisfied to very unsatisfied. No questions were asked to identify why an attribute was unsatisfactory. They used a measure for satisfaction which they called "appreciation". This operational definition consisted of 16 items such as timeliness and adequacy.

Based on the literature they reviewed, they found that there was a clear need for a definition of satisfaction which contained a complete and valid set of factors and an instrument which could measure not only the user's reaction to each factor, but why users responded and reacted as they did. There are a number of factors affecting computer user satisfaction. Based on the literature they reviewed, they identified 36 distinct factors. Next, tests for completeness and accuracy were conducted. As a first step, data processing

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20 - James A. Bailey and Sammy W. Pearson. "Development of a Tool for Measuring and Analyzing Computer User Satisfaction". Management Science (Vol. 29, N° 5, May 1983) pp. 530-545

professionals were interviewed and asked to review the list. Upon their review, two additional factors were recommended to be added. This expanded list was then empirically tested in 8 different organizations using the responses of 32 middle managers. Interviews here were also conducted to investigate the respondents' attitude toward the computer services and products. The completeness of the expanded list has been examined using a critical incident analysis technique. According to the researchers' assumption, the list would be assumed complete if at an alpha = 0.01, any factor mentioned in the interview appeared on the list with a probability of 0.90. This analysis resulted in 638 factors being mentioned of which 625 could be placed on the list. Using the normal approximation to the binomial, they had $Pr(x>=6.73)=0$. Thus completeness of the list is tested and presented in (table 7). Respondents were then asked to rank in order the factors in terms of importance relative to their own satisfaction. At the end, each respondent was asked to evaluate his overall satisfaction on a seven interval scale ranging from "extremely satisfied" to "extremely unsatisfied".

Table 7 : List of factors included in the tool used for measuring user satisfaction

Factor
1. Flexibility
2. Accuracy
3. Timeliness
4. Reliability
5. Completeness
6. Confidence in systems
7. Relevancy
8. Precision
9. Technical competence of EDF staff
10. Currency
11. Priorities determinations
12. Error recovery
13. Response- turnaround time
14. Convenience of access
15. Attitude of the EDP staff
16. Time required for new development
17. Perceived utility
18. Documentation
19. Feeling of participation
20. Processing of change request
21. Communication with EDP staff
22. Relationship with the EDP staff
23. Understanding of systems
24. Degree of training
25. Job effects
26. Top management involvement
27. Feeling of control
28. Schedule of products and services
29. Format of output
30. Mode of interface
31. Security of data
32. Expectations
33. Organizational position of the EDP function
34. Volume of output
35. Language
36. Charge-back method of payment for services
37. Organizational competition with the EDP unit
38. Vendor support
39. Integration of systems

Source : Bailey and Pearson, p. 532

Moreover, this tool, which was developed for measuring and analyzing user satisfaction, was tested for both reliability and validity.

Reliability of the satisfaction questionnaire was calculated for each factor. The results reported a very high reliability coefficient of the 39 factors, 32 resulting in a coefficient greater than 0.9. The average coefficient was 0.93 and the minimum was 0.75, which means that the reliability of the measurement was attained. As for the validity, the researchers reported that, "although no statistical measure of constructed validity was available, there is no significant intuitive evidence to support a positive contention. The fact that unexpected results did not occur is evidence that the measurement questionnaire does reflect the true user satisfaction construct"[21].

ASSOCIATION BETWEEN USAGE AND SATISFACTION

Use of a system should be closely related to acceptance of the system. This was clearly shown by a study done by (Ivos and Olsen)[22]. Their interpretation of the result was that although use is measured at a point in time, it represents an activity that is always repeated, the thing that makes the relationship between acceptance and use complex. Theoretically, acceptance should result in use. This use experience and its impact on performance will subsequently influence acceptance. This implies that the "use of a technically and organizationally valid system should be a positive experience, resulting in better performance and satisfaction, and ultimately increased user acceptance of the system"[23]

In the study conducted by (Davis), both factors' ease and usefulness, which were used as a measure of user acceptance, were significantly correlated with system use[24]. In the study, self-reported current use had a correlation

21 Avi Rushinek and Soru F. Rushinek. "What Makes Users Happy?". Communication of the ACM.(VOL., 29, No. 7, July 1986). PP. 524 - 528.

22 H.C. Lucas. "User Reaction and The Management of information Services". Management Information. (Vol. 2. Number 4, Aug. 1973), p. 25

23 H.C. Lucky. The social impact of the computer". in Computer Culture. The scientific, Intellectual & social impact of the computer. NevYork: Academy of science. 1983. p. 25.

24 F.B. Davis. "Perceived Usefulness. Perceived use of use, and user Acceptance of Information technology. MIS Quarterly. (Vol. 12. N° 1. Sep 1989). pp. 312 - 340.

coefficient of 0.63 and 0.45 with perceived usefulness and perceived ease of use respectively. In another study, self-predicted use had a high correlation coefficient of 0.85 and 0.69 with perceived ease of use and usefulness. These correlations, as reported by (Davis), compare favorably with other correlations between subjective measures and self reported uses found in the MIS literature.

SYNTHESIS DRAWN FROM THESE STUDIES

All the above mentioned studies point out that the satisfaction level of End-users of EDP in different places differ according to many aspect, such as the following:

- ➤ The training received by the End-user.

- ➤ Time-usage of machines by the End-user.

- ➤ The performance that can be achieved by the End-user.

- ➤ Developed software.

- ➤ Work environment and education level experience.

These studies point out to the fact that a gap exists between the perception of performance and the level of satisfaction. Where there is higher satisfaction, performance can be better than with low satisfaction. All these require us to explore real world cases to test the extent of End-user computing systems and their relation with experience, as well as the relation between management support (training program) and end-user satisfaction. In other words, in order to throw light on the particular area of information systems executives should take into consideration what makes MIS successful, in order to render this trend successful and productive.

This chapter presented a detailed review of certain studies that tackled the problem of End-user satisfaction. These studies were made in different

places. In the following chapter, we will find out to what extent the satisfaction level of end-users in this country (Lebanon) are based on what is already mentioned.

Chapter III

PROCEDURE AND METHODOLOGY

Population And Samples Selected

This research has been conducted with the intent of determining the factors that will affect user satisfaction via acceptance of the EDP. The population of this study consist of a heterogeneous group of EDP users in Lebanon working in a diverse range of banks including main outlets and branches. The study also attempts to examine the various aspects related to computer use and the relationship between computer use and satisfaction and training programmed user satisfaction. These users are characterized by having different demographic characteristics in terms of age, sex, marital status, education level, experience and occupation. So, as a result, the study will be limited to the banking industries in most of the Lebanese areas, especially Tripoli, Beirut, and Jounieh, and should satisfy the following criteria:

1- Operating for at least 10 years.

2- Presence of a computer with large volume of useful data.

3- End-users have a different education level, job level, line in the business.

4- Having an independent EDP department in the organization hierarchy.

These conditions were set so as to ensure that banks are sufficiently exposed to an information system. In order to define the population which would serve as a target for this study, a pretest survey consisted of a selected list of banks, with most being selected from the banks in the area already mentioned. A questionnaire and follow-up interview were used to collect

data from the staff that are daily exposed to the computerized information system in the banking system.

Based on this. the population of the study consisted of at least 60 banks including their branches. with most of them having their main branch in Beirut. The researcher's aim is to cover the population in most of these banks with 5 to 10 questionnaires which will be distributed to each place according to its size. It is important to mention that the strategy used by this research follows that used in pervious studies. (Olson and Ives, 1981; Tait and Vessy, 1988)

SELECTED VARIABLES AND THEIR MEASUREMENTS

The questionnaire was developed to measure factors leading to user satisfaction. It contained eight parts:

- **Demographic characteristics:** A list of questions about sex, age, marital status. line in the business and job level. These are considered as independent variables.

- **Computer experience:** This is concerned with the past experience of the users (Nbr. of softwares, frequency of use per week/hour, training programs) and finally if all of these influence their satisfaction level.

- **Ease of use:** How they find the system, and if they find it much easier to do business with the help of computers or if they prefer to go back to manual performance. Also generally, how easy they find the system itself to use, and where the difficulties in exist.

- **Usefulness:** To test if they are content with the system achievement, and if it differs from manual performance. Also, whether it is more useful to work with computers or not; would it make the data more accurate and easier to access than before?

- **User satisfaction:** The degree of their satisfaction with the system, what mostly affects their satisfaction, and does the usage time change their satisfaction level?

- **User acceptance:** How do they find the system as a whole and do they accept all of its functions, or do they think that some of it needs to be changed? Does the system meet all the information required by their organization, do they have any conflict with some aspects of their job, and finally, are they satisfied with the system abilities or do they think that something else is needed?

- **User training:** Consists of ten questions, about past training received, and whether they think it is acceptable, or that they need more training time. Does the specialist who trains them affect their satisfaction level? Does he treat them in a different manner according to his like or dislike and does this affect them?

- **User involvement:** Do they participate in the system development or not? Do they think that their participation will positively affect the impact upon the development of the systems and thus eliminate some of the mistakes in the system if any exist?

This is in brief the summary of the research questionnaire which exists at the end of the study in **Appendix « A »**. In it the researcher considered the following as independent variables : user acceptance, user involvement, training programs, perception of performance, ease of use, computer experience and frequency of use. On the other hand, the researcher considered the user satisfaction as the dependent variable.

All responses were scored on a five-point scale, ranging from 5: (strongly agree) to 1 (strongly disagrees). To avoid the misunderstanding of any question by any user, the researcher chose in each bank a person working

there to explain to him the questionnaire form and asked him to pass by all his friend and see if anybody needed help in the filling of the questionnaire. Also, in some branches the researcher was ready to answer any question posed. Moreover, at the beginning, the researcher stated to them that the questionnaire is for research study only and wouldn't be distributed to their managers and wouldn't affect them at all. When the questionnaires were distributed, it was explained to respondents that they have to rely on the current system they are using and not on any previous experience with other systems, or on their attitudes about factors leading to system success in responding to the questionnaire.

About 64 banks were approached for the data collection purpose. All of the banks contacted were exposed to computers for at least 5 years. All banks in the sample have centralized data processing with an EDP responsible for data collected from all branches.

CONCEPTUAL FRAMEWORK FOR ANALYZING THE DATA

Responses were analyzed by means of the *Statistical Package for Social Science* (SPSS). The facilities used for the reasons behind this were as follows:

1- To build a regression equation that includes the variables that are most likely to be associated with user satisfaction and user acceptance, the regression analysis was used.

2- The percentage and frequency analysis will be used to describe the major characteristics of the Lebanese end-user.

3- Elaboration of variables (cross tabulation using chi-square) will be used to test the relation between extent of satisfaction upon "training, experience, involvement", i.e., the respondents characteristics.

4- As a data reduction technique, factors' analysis will be used to
    discover the hypothetical factors underlying the relationship
    between: involvement, performance, training and satisfaction.
    Since the purpose of the study is to explain the validity of EDP
    employees' attitudes toward job satisfaction where faced with job
    frustration, especially the role of training, experience and the role
    of quality issues for end-user.

5- Finally, multiple regression analysis will be used to determine the
    result of these questionnaire data indicating that there were
    significant or non-significant differences between satisfaction
    level and training, experience, time usage, involvement and ease
    of use.

Chapter IV

FINDINGS OF THE STUDY

After presenting the methods followed and tools used for analyzing the data collected for this study, chapter IV answers the research questions that were posed in chapter I as follows:

1- What are the major characteristics of the selected sample for the study.

2- Does the instrument (questionnaire) measure what it is supposed to measure? Does it do it consistently?

3- What is the relative importance of the variables explaining the variation in End-user satisfaction?

MAJOR CHARACTERISTICS

The size of the sample upon which the study was conducted was 150 computer users; this being the number of questionnaires returned out of a total of 400 distributed. People surveyed in this study are bank employees reoriented with a computer as an essential part of their job. The result of the residual analysis showed that 25 cases should be dropped. Examination showed that these outlets where a source of entry errors rather than useful data which, might be to the fact that some respondents might have given random responses to the various questions in the questionnaires.

Coming to the general characteristics of the 125 respondents we will find the following:

Age
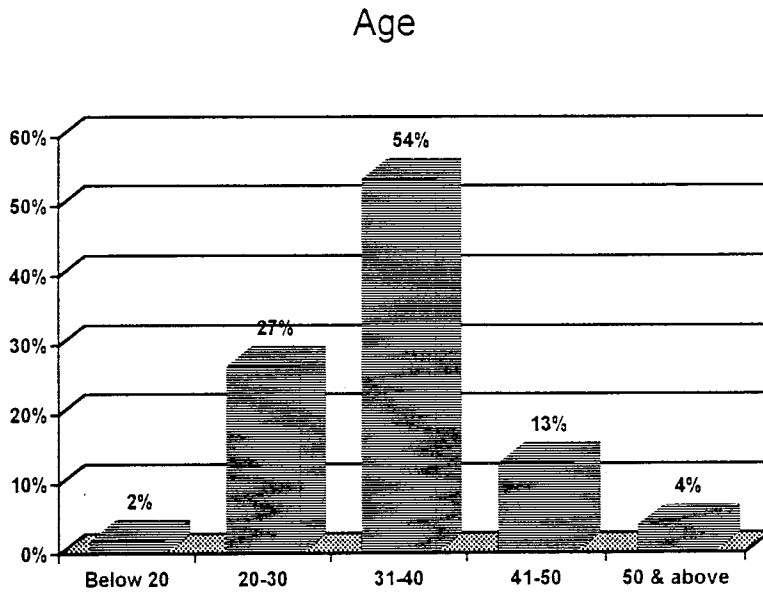
Fig. 1

The age of the respondents, which is about normal, is shown in figure 1. The age of the majority lies between 31 and 40 (54% of the respondents). The age of 27% of the respondents lies between 20 and 30, while the age of 13% lie between 41 and 50. In summary, the majority of the respondents are young, 81% of the sample being between 20 and 40.
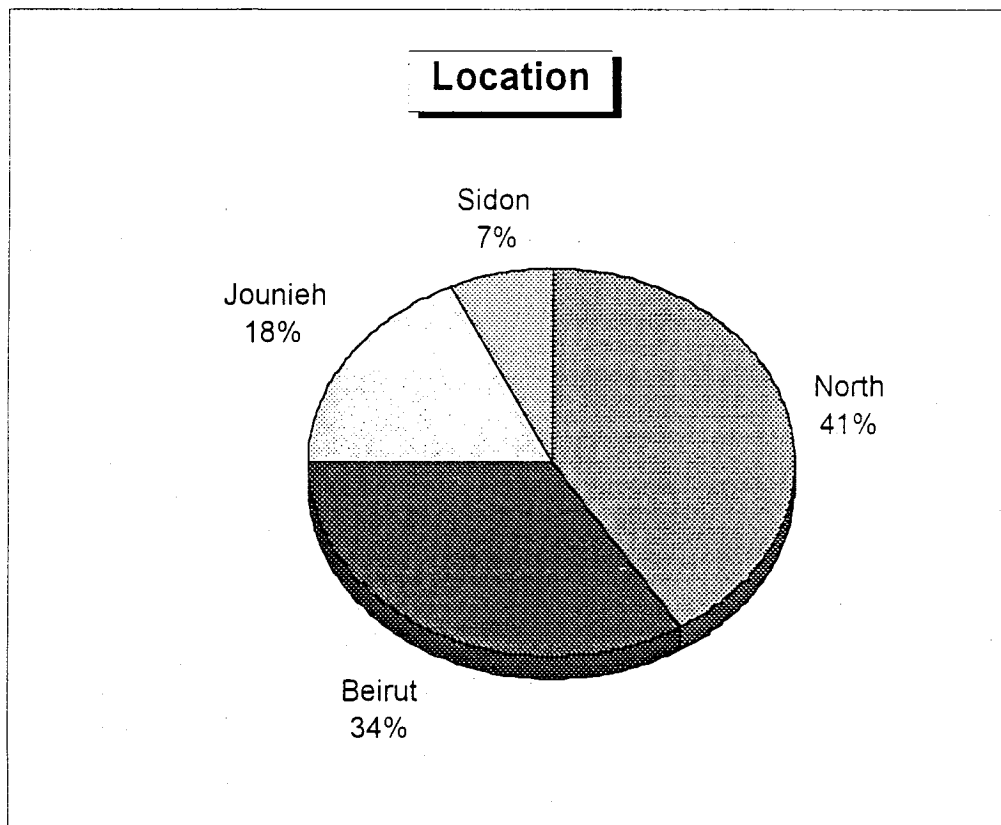
Fig. 2

Fig (2) shows that 34% of the respondents were from Beirut, 18% from Jounieh, 41% from the North, and very few -approximately 7%- from Sidon.

Main & Branch

Main
12%

Main to area
18%
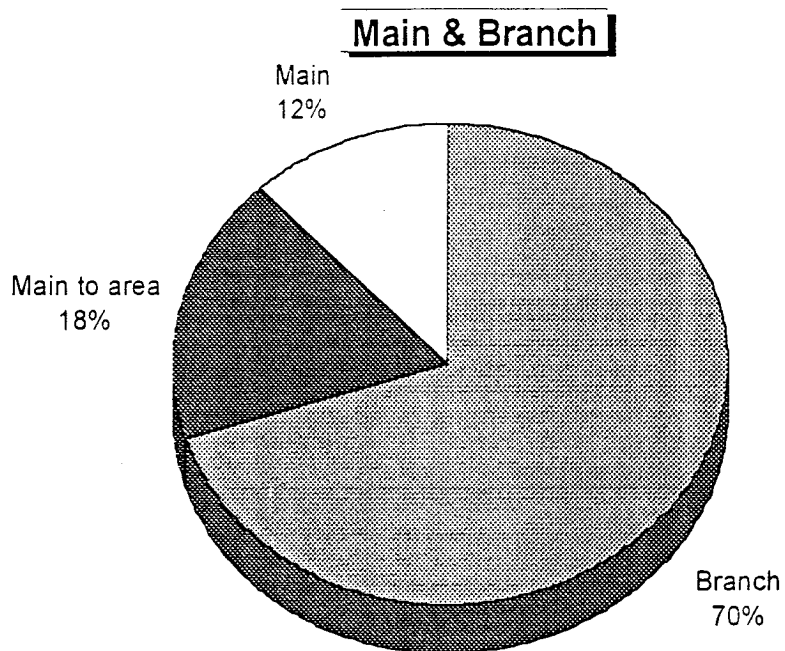
Branch
70%

Fig. 3

Fig (3) shows that 70% of the sample selected are working in branches while 30% only are working in main branches. Mowever, this 30% is divided into two parts, where 12% are working in the main branch as main to Lebanon, while the remaining 18% is main for an area (like main for Tripoli, or main for Sidon).

Distribution by Sex
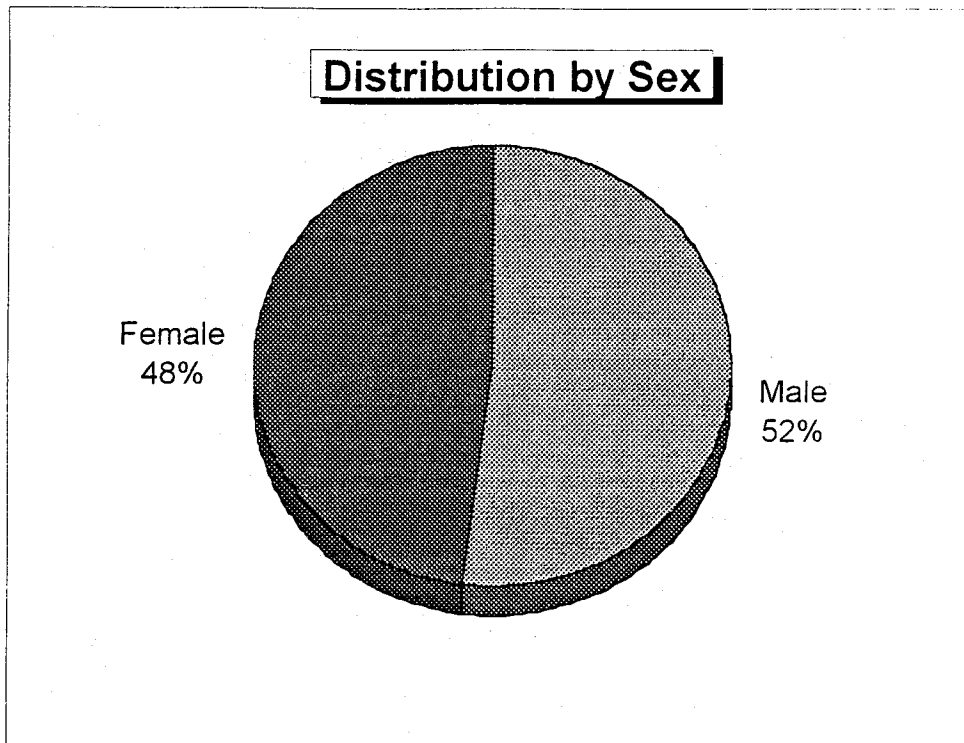
Female
48%

Male
52%

Fig. 4

Fig (4) shows that 52% of the employees are male while 48% are female, which is normal for banks.

Educational Level

BHS : Before High School   HS : High School
FCS : Former College Student   BD : Bachelor Degree
MS : Master Degree
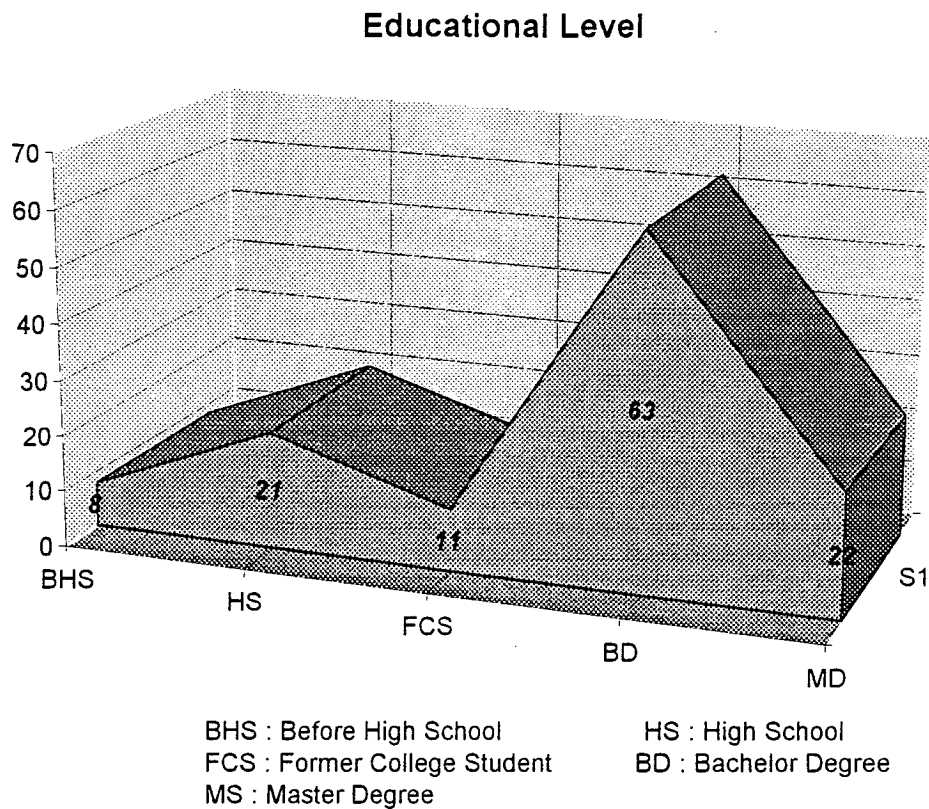
Fig. 5

Fig(5) shows that 50% of the respondents hold a Bachelor degree, and

that 18% of the respondents hold an MBA or MS, which means that 77% of

the respondents hold a higher degree than high school. Taking into

consideration that 9% of the respondents were former students, it can be seen

that most of them are educated. The distribution is very skewed, the peak of

the curve being at the BD level. However, this usual in banks, since formally-

educated people have a high priority of employment.
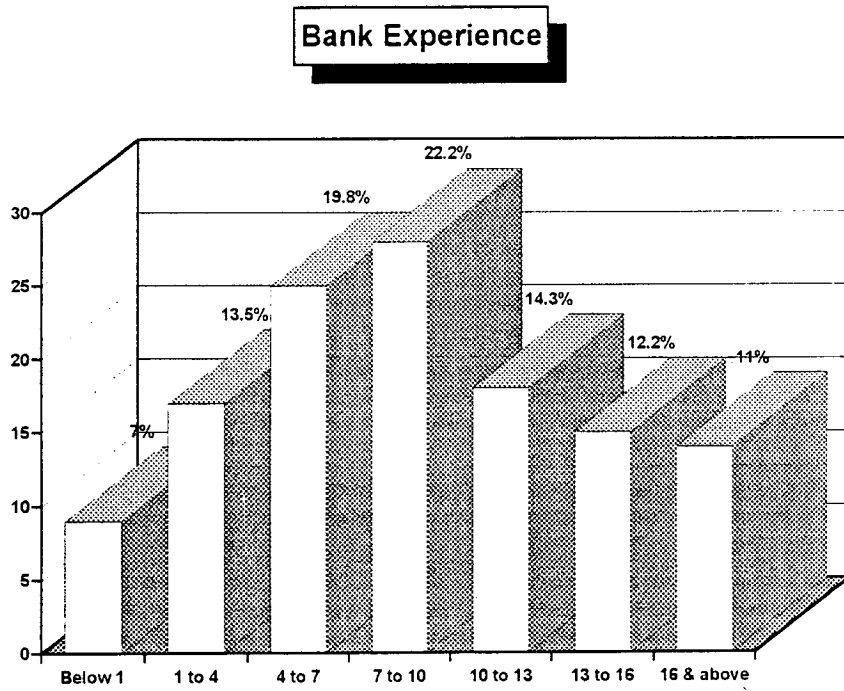
Fig. 6

Figure (6) shows that the majority of the sample, approximately, 80%, has

been employed for more than 4 years.

Computer Experience

5 Years & above
18%

Below or = 1 Year
21%

4-5 Years
11%

1-2 Years
21%

3-4 Years
11%

2-3 Years
18%
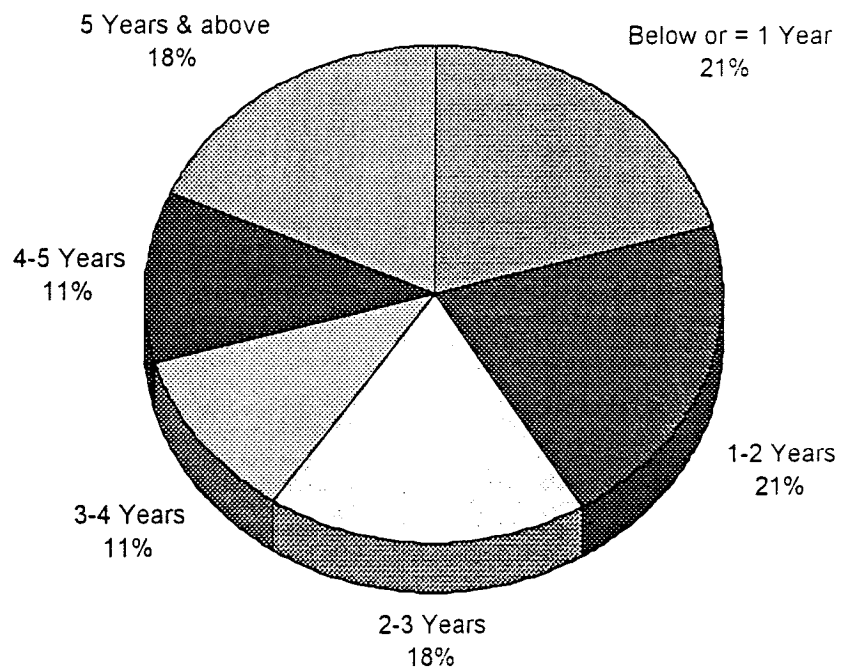
Fig. 7

Fig (7) shows that only 42% of the respondents have an exposure to computers which is less than or equal to 2 years, while the rest (58%) have an exposure of 2 years and above. Only 21% of the respondents have an exposure of less than one year. In summary, most of the respondents (79%) have an experience in computers of more than one year.

Frequency of use per hour
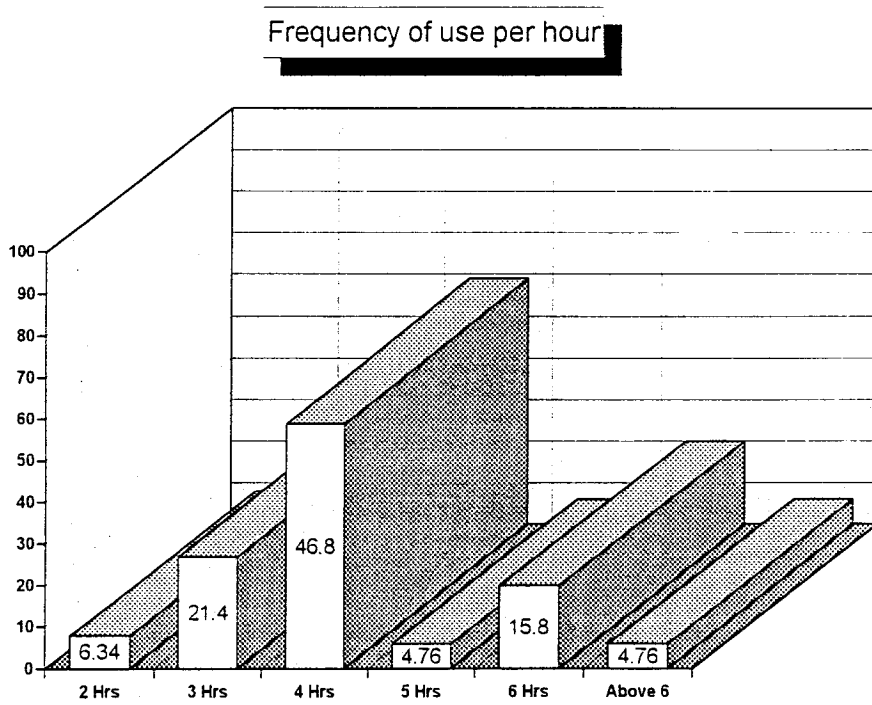
Fig. 8

Figure (8) shows that approximatly 28% of the sample use the system for 3

hours while 27% use the system for 4 hours or more per work day.

System Use

System use was divided into two parts.

First : Time/hours spent on the system

Second : Frequency of use. (daily* time per week).

Time spent on the system

Hours	Frequency	Percent
2	8	6.3%
3	27	21.5%
4	59	47%
5	6	4.76%
6	20	15.8%
7.7	6	4.76%

As a conclusion, most of the respondents spent more than four hours using the system (72%). The reason for this result is that the major part of work for these respondents involves the use of the system.

The result of frequency of use shows that 85% of the respondents classified themselves as daily users.

It is important to mention that 65% of the respondents were data-entry clerks, 29% were on 1st level supervisors and only 6% were EDP managers.

RELIABILITY ANALYSIS - SCALE (ALPHA)

ACCEPTANCE

N of Cases =   125.0   N of Items = 3

Alpha =   .5723

EASE

N of Cases =   123.0   N of Items = 3

Alpha =   .8304

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TRAINING

N of Cases =   123.0   N of Items = 3

Alpha =   -.8903

Reliability Coefficients

SATISFACTION

N of Cases =   124.0   N of Items = 6

Alpha =   .8457

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****** Method 1 (space saver) will be used for this analysis ******

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Reliability Coefficients

USE

N of Cases = 125.0   N of Items = 5

Alpha = .8234

Reliability Coefficients

PERCEPTION

N of Cases = 114.0   N of Items = 6

Alpha = .8767

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****** Method 1 (space saver) will be used for this analysis ******

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R E L I A B I L I T Y   A N A L Y S I S - S C A L E   (A L P H A)

Reliability Coefficients

INVOLVEMENT

N of Cases = 18.0   N of Items = 3

Alpha = -1.2805
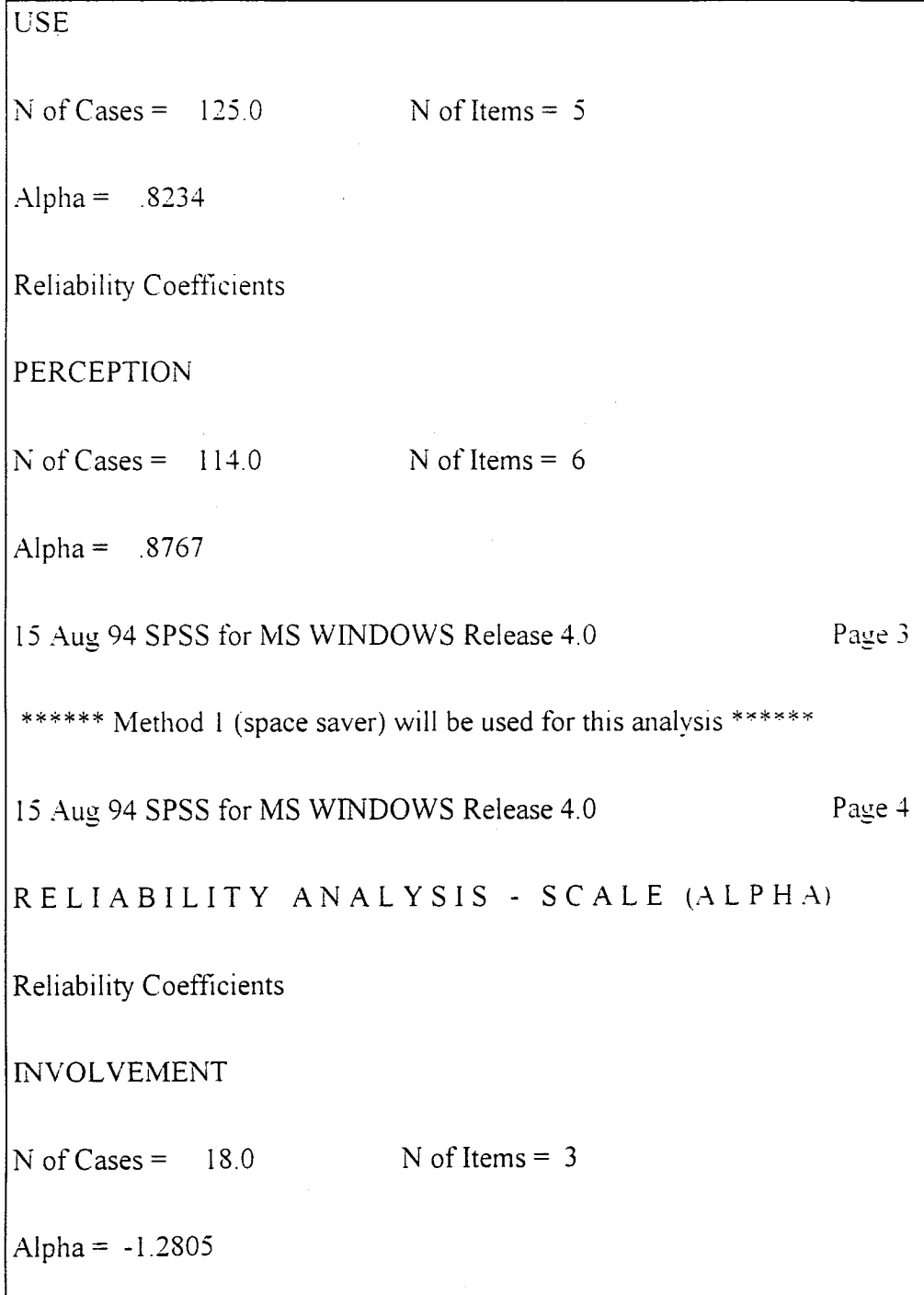
Fig. 1

Reliability and Factor Analysis

Reliability

Fig. 1 shows the reliability coefficient of all Sub-Scales. It was tested

by using the factor analysis technique. This technique is used to identify a

relatively small number of factors that can be used to represent relationships among sets of many unrelated variables. As shown in fig. 1 the reliability of sub-scales (Ease of use, training, satisfaction, usefulness of the computerized system, perception) are high and above 8 except for the sub-scale for acceptance which is above average at 57.

In summary, the sub-scale are reliable except for involvement, where only 18 of the respondents filled this part, and its alpha is below average. For this reason it was decided to delete it from the analysis. In other words, the result of this instrument can be relied on in studying End-user satisfaction, taking into consideration that the study was not representative of the whole population, and that it is limited to the sample selected.

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---------- F A C T O R   A N A L Y S I S ----------

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
SAT1	**.75932**	-.02028	.09701	-.02373	-.10608
SAT5	**.68615**	.01976	.05416	.10731	-.16987
SAT6	**.56233**	.15784	-.13361	-.04660	.01870
SAT2	**.54942**	.00772	-.08070	-.19862	-.09664
SAT3	**.54817**	.17384	-.01688	-.21367	.10973
SAT4	**.45887**	.12623	-.02757	-.18800	-.05304
PERC2	.23878	**.80930**	-.02954	.00761	.05237
PERC3	-.19735	**.80204**	.08273	-.03559	-.12678
PERC1	.20142	**.76885**	.02290	.02665	-.06708
PERC4	-.13034	**.76497**	.12619	-.09611	.01084
PERC6	-.06336	**.71739**	-.01043	-.06918	-.04221
PERC5	.04610	**.67217**	-.09645	.31964	.12226
INV1	-.10760	-.05406	**-.88913**	-.01904	-.03202
INV2	.07157	.03878	**.80176**	-.10406	.22590
INV3	-.12254	-.02382	**.77968**	.05532	-.21531

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---------- F A C T O R   A N A L Y S I S ----------

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
ACC2	-.04082	-.01422	-.11764	**.74606**	-.18444
ACC1	-.07743	.12638	.00838	**.74008**	.02578
ACC3	.04470	-.10336	.16466	**.61505**	.25220
EASE3	-.13163	-.02486	-.02607	-.06168	**.87591**
EASE1	-.07301	.02619	-.01252	.06679	**.81568**
EASE2	.02500	-.04027	.05188	-.01140	**.71334**

T2	.21389	.02531	-.08335	.00565	-.06544
T3	-.09938	-.09965	-.04480	.01987	.14538
T1	.12426	-.15323	.02887	.08796	.14430
USE2	-.04142	.01676	.04639	-.06373	.03597
USE3	-.08347	-.07161	-.00130	.15393	.03125
USE1	.16692	.14239	.11731	.01510	-.13309
USE5	.00793	.02513	-.07534	-.13119	-.07754
USE4	.25950	-.17916	.06206	.04449	.00444

	Factor 6	Factor 7
SAT1	-.04267	-.00017
SAT5	-.20815	.00827
SAT6	-.12072	-.30852
SAT2	.09877	-.17732
SAT3	.03700	-.28648
SAT4	-.42380	.05922
PERC2	.17639	.05824
PERC3	-.12873	-.01200
PERC1	.02725	.09068
PERC4	-.22832	.04685
PERC6	-.02824	-.06833
PERC5	-.11043	-.06381
INV1	-.05428	.03962
INV2	-.04482	-.07902
INV3	.04393	.02106
ACC2	.03727	-.02627
ACC1	.15730	-.8018
ACC3	-.13713	.11450

	Factor 6	Factor 7
EASE3	.06842	-.05106
EASE2	-.01121	.06114
EASE1	.18977	.04535

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----------- F A C T O R A N A L Y S I S -----------

	Factor 6	Factor 7
T2	**-.72229**	-.06114
T3	**.71162**	.08466
T1	**.68921**	.13830
USE2	-.10249	**-.82496**
USE3	-.08720	**-.75259**
USE1	.23954	**-.71801**
USE5	.00046	**-.70054**
USE9	-.14492	**-0.65307**

Fig. II

FACTOR ANALYSIS

Fig. II shows that the researcher found 7 factors underlying the instrument in which item SAT (1, 5, 6, 2, 3, 4) has high loading on the 1st factor . Therefore the first factor was named Satisfaction. Item Percentage (2, 3, 1, 4, 6, 5) has a high loading on the 2nd factor and it is named Perception. Item INV(1,2,3) has a high loading on the 3rd factor and it is named Involvement. Item ACC (2,1,3) has a high loading on the 4th factor and it is named Acceptance. Item Ease (3,1,2) has a high loading on the 5th factor and it is named Ease of use. Item T(2,3,1) has a high loading on the 6th factor and it is named Training. And finally, item Use (2,3,1,5,4) has a high

on the 7th factor and it is named Usefulness. The seven factors show that the instrument is valid whereby items under a given sub-scale are measuring the above dispersion (Phenomena). Which means that the instrument used had a valid result in studying End-user satisfaction limited the huge sample selected.

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* * * *   M U L T I P L E   R E G R E S S I O N   * * * *

Listwise Deletion of Missing Data

	Mean	Std Dev	Label
ZSAT	23.532	3.316	
ZUSE	20.892	2.691	
FREQU	7.441	2.074	
ZPERC	22.072	3.806	
ZACC	8.459	1.872	

N of Cases = 111

Correlation, 1-tailed Sig:

	ZSAT	ZUSE	FREQU	ZPERC	ZACC
ZSAT	1.000	.497	.621	.334	-.271
	.	.000	.003	.000	.002
ZUSE	.497	1.000	.227	.049	-.075
	.000	.	.183	.306	.217
FREQU	.621	.227	1.000	-.417	-.106
	.003	.183	.	.043	.338
ZPERC	.334	.049	-.417	1.000	.021
	.000	.306	.043	.	.414
ZACC	-.271	-.075	-.106	.021	1.000
	.002	.217	.338	.414	.

Fig. III

REGRESSION ANALYSIS

To study the goodness of fit of the model proposed in chapter I, the regression was used to build a regression equation that could depict the potential relationships between dependent and independent variables. A dependent variable is the variable whose variation is likely to be explained. An independent variable is a variable used to explain variation in the dependent variable. The intention was to build one regression, taking user-satisfaction as dependent variables, and the others as independent.

A first step in developing the regression model was to examine the relationship between each independent variable and the dependent variable, and between each independent variable and other independent variables. The dependent variable is user-satisfaction ZSAT. The independent variables selected were usefulness ZUSE, frequency of use FREQU, perception ZPERC, and Acceptance ZACC. As a result, usefulness, perception, and acceptance are the important independent variables in analyzing the variation in End-user satisfaction.

The resulting correlation matrix as shown in Fig. III indicates that there is a strong relationship between independent variables, where the highest correlation coefficient is between frequency of use and satisfaction and the lowest is between satisfaction, and perception. The longer the correlation coefficient, the stronger the linear association. In summary, the correlation matrix as in Fig. III shows that frequency has the highest correlation

coefficient among all the independent variables along with satisfaction, followed by usefulness, acceptance and lastly perception. Thus, the independent variables could be arranged rocked in the order of their importance as potential predictors of satisfaction. Also, a stepwise regression analysis was used to build the regression equation through a forward selection of variables.

15 Aug 94 SPSS for MS WINDOWS Release 4.0			Page 4
**** M U L T I P L E R E G R E S S I O N ****			
Equation Number 1 Dependent Variable.. ZSAT			
Variable(s) Entered on Step Number			
4.. FREQU			
Multiple R	.66891		
R Square	.44744		
Adjusted R Square	.42577		
Standard Error	2.51623		
Analysis of Variance			
	DF	Sum of Squares	Mean Square
Regression	4	522.94397	130.73599
Residual	102	645.80369	6.33141
F = 20.64880 Signif F = .0000			

Table C

As expected, the first independent variable entered to the regression equation was usefulness of the system followed by perception, acceptance, and finally, frequency of use per hour. Table C, showing the result of the regression output at significant level, R^2, the coefficient of determination, shows how much the variation in the dependent variables could be explained by the independent variables included. In this output, $R^2 = 0.44744$, i.e.

44.7%, which means that about 44.7% of the variation in user satisfaction could be explained by the usefulness, perception, acceptance and frequency of Use per hour factors. On the other hand, 55.3% of the variation in user satisfaction is explained by variable not included in this study, such as the role of conflict and ambiguity, the effects of wages or salaries, and the effect of the monitor's radiation in the user's eyes after long hours spent behind it, and finally the effect of long standing on users banks.

------------------ Variables in the Equation ------------------					
Variable	B	SE B	Beta	T	Sig T
ZUSE	.536235	.091257	.441019	5.876	.0000
ZPERC	.265389	.064150	.305131	4.137	.0001
ZACC	-.535431	.137617	-.296135	-3.891	.0002
FREQU	1.086952	.387625	.215771	2.804	.0060
(Constant)	4.633977	3.061077		1.514	.1332

------------- Variables not in the Equation -------------					
Variable	Beta In	Partial	Min Toler	T	Sig T
ZEASE	-.136966	-.168747	.838734	-1.721	.0884
ZT	.005774	.007197	.908649	.072	.9762
AGE	-.036799	-.046672	.888838	-.470	.6397
COMPBG	-.067386	-.076706	.715983	-.773	.4412
EXP	.039459	.050729	.908649	.510	.6108
FREQH	-.037558	-.049955	.906124	-.503	.6163
MB	.139885	.168208	.798973	1.715	.0894
NSOFTW	.005774	.007197	.858451	.072	.9425
OWNC	-.022499	-.027855	.846970	-.280	.7800
PREEXP	-.064744	-.073518	.712492	-.741	.4605
ZPLACE	.002297	.002973	.914250	.030	.9762
ZCOMP	-.116032	-.151825	.907844	-1.544	.1258

End Block Number 1 PIN = .050 Limits reached.

Table D

Table D shows, that out of 16 explanatory variables, four independent variables are significantly important in determining end-user satisfaction, where usefulness is the most important, followed by perception, acceptance and finally frequency of use per hour, summerized under the title 'Variable' in the equation.

Variables under the title 'variables not in the Equation' were not used because they have no importance in determining end-user satisfaction. In other words, the effect of these variables on end-user satisfaction is nil, keeping in mind that the variables are limited to the sample selected. For example, training was not significant, possibly due to the gap between training received and the training actually needed. This occurs, for example, when training sessions are taken for Lotus 113 or Excel, and work is done using different Software. Age was also insignificant, since the majority of the sample were young, 81% being between 20 and 40. Computer background was not significant, possibly due to discrepancy between users' background and the bank's software. Location was also not significant, which means that user-satisfaction is not affected by it.

Chapter V

CONCLUSION AND RECOMMENDATION

Conclusion

The purpose of this study was to identify the important factors most likely to be associated with MIS success and effectiveness. As a first step, based on previous research, measurement scales for a dependent variable, « satisfaction », and five independent variables « acceptance, usefulness of the system, ease of use, perception of involvement, and training », were adopted and modified to fit the sample selected. Following this, computer system usage was investigated along individual demographic variables, and a regression analysis was performed to identify the factors that have a high potential in determining or in predicting user satisfaction.

As for the measurement scales, they were based on previous researches. To enhance their content validity of the sample selected, they were pretested in a pilot study. This resulted in two things: First, that some questions were rephrased, since they were considered unclear by some respondents, and second, the deletion of some questions, since they were considered useless for the study. Moreover, part one of involvement was deleted from the study, since only 18 respondents out of 125 responded to this part semicolon; involvement part two was renamed 'perception of involvement' since it tested how users perceived involvement and its effect upon the system

success. After this, the measurement scales were tested for both reliability and validity, which have been proved.

Concerning computer usage, various statistical techniques were used to examine the relationship between use and other individual variables, such as sex, education level, position, age, and so on. It was found that there were no significant variations in computer use along the various position levels. Also, no variations in use across the various educational levels and along the two sex groups could be reported. Users with a higher computer experience level reported using the computer more extensively and more frequently than those with a lower level. As for involvement, which was deleted from the study, it was found that only high-level management were involved in the development of software.

Regression analysis was performed to identify the factors that are most likely to be associated with user satisfaction. The regression equations were built to related user satisfaction to the independent variables « usefulness of the system, frequency of use per hours, perception of involvement, and acceptance ». The coefficient of determination, R^2, was 0.447, indicating that 44.7% of the variation in user satisfaction could be explained by these factors. The individual independent variables were tested for significance, and they were shown to be highly significant in the prediction of to dependent variables.

Finally, the relationship between system usage (Frequency of use per hour) and satisfaction was examined. It was found that the highest relationship was between satisfaction and frequency of use per hour, followed by usefulness of the system, perception of involvement, and finally, acceptance of the system. This was attributed to the nature of the sample selected, because the respondents were required to work with the computer system as a part of their jobs, whether they accepted it or not.

RECOMMENDATION

The data collected in this sample was confined to the users at banks only, which means that this research is limited to the selected sample, and is not representative. Because of this, I recommended that further research is needed that would take into consideration the limitation mentioned. Moreover, an important recommendation here is for managers and system developers to give use involvement more attention and better care for their critical role, because this factor, i.e. involvement play an important role in determining a higher level of user satisfaction, thus in determining MIS success and effectiveness.

APPENDIX A

Questionnaire Form

DEMOGRAPHIC CHARACTERISTIC:

1- In which age bracket should I place you ? العمر

اسم البنك

A) Bank Name: ---------------------

المكان

☐ a) Below 20   أقل من ٢٠ سنة

B) Place: ....

☐ b) 20 To 30   C) Please Specify

☐ c) 31 To 40   ☐ Main   ☐ Branch

☐ d) 41 To 50   فرع   رئيسي

☐ e) 50 And above   اكثر من ٥٠ سنة

2- Are you

☐ Male   ذكر   ☐ Female   انثى

3- Education Level   التحصيل العلمي

☐ a) Less than high school.   أقل من ثانوي

☐ b) High school   ثانوي

☐ c) Former college student   تلميذ جامعي سابق

☐ d) Bachelor degree   بجاز

☐ e) Master degree   ماجستير

غير ذلك. من فضلك حدد...............

☐ f) Other, Please specify:................................

4- How long have you been employed?   مدة العمل

------ Months شهر   ------ Years. سنة

ما هو مركزك في البنك ؟ ....

5- What is your position in the bank ?---------------------.

COMPUTER EXPERIENCE   خبرتك في مجال الكومبيوتر

1- What kind of computer(s) are you using?   ما هو نوع الجهاز الذي تستخدمه ؟

□ a) P.C.   □ b) Mini   □ c) Both a & b

□ d) Others, Please specify--------------   نوع آخر ؟ من فضلك حدد ....

2- For how long have you been exposed to computers ?   منذ متى تستخدم الكومبيوتر ؟

----- Months شهر   ------ Years سنة

ما هي أنواع البرامج التي تعمل عليها ؟ حدد من فضلك

....

3- What kind of software packages are you using or used before, Please specify

----

4- The computer system you are using was: الكومبيوتر الذي تستخدمه هو

□ a) Bank property   للبنك

□ b) You have it at home.   خاص بك

□ c) 1 & 2.   او الاثنين معا

□ d) Other, Please specify----------   آخر حدد........

5- How frequently do you use the system?   الى أي مدى تستخدم الكومبيوتر

□ a) Not at all   أبدا

□ b) Less than once a week.   اقل من مرة في الأسبوع

□ c) Once each week   مرة في الأسبوع

□ d) Several times a week   عدة مرات في الأسبوع

□ e) Once a day   مرة في اليوم

□ f) Many times a day.   عدة مرات يومياً

حدد عدد الساعات لجوابك في الرقم (٥)............................

6- For your answer in part (5), please specify for how many hours: -------- hours

هل لديك اية خبرة سابقة في حقل الكومبيوتر ؟

7- do you have any past experience □ No   □ Yes,

If (yes), please specify   في حال الايجاب حدد

□ by taking courses   عن طريق برنامج تعليمي

□ Following a training program   عن طريق برامج تدريبية

USEFULNESS OF THE COMPUTERIZED SYSTEM

اجب باختيار احد الأجابات التالية

Please answer the following questions by choosing one of the following answers :

SA	Strongly Agree	أوافق بشدة
A	Agree	أوافق
U	Uncertain	محايد
D	Disagree	لا أوافق
SD	Strongly Disagree	لا أوافق بشدة

السيطرة على العمل أسهل بوجود الكومبيوتر

2) Control over the work is easier with the system   SA   A   U   D   SD

الاداء الشخصي أفضل بوجود الكومبيوتر

3) Personal Performance is better with the system.   SA   A   U   D   SD

الاداء اسرع من خلال استخدام الكومبيوتر

6) Performance of work using the system is enhanced   SA   A   U   D   SD

الكومبيوتر يزيد انتاجية العمل

11) The system increase productivity   SA   A   U   D   SD

الكومبيوتر يسهل العمل

12) The system make job easier   SA   A   U   D   SD

EMPLOYEE SATISFACTION

اجب باختيار احد الأجابات التالية

Please answer the following questions by choosing one of the following answers :

SA Strongly Agree أوافق بشدة

A Agree أوافق

U Uncertain محايد

D Disagree لا أوافق

SD Strongly Disagree لا أوافق بشدة

تصميم التقارير يقدّم بشكل مقروء وواضح
1- Report layouts are presented in a readable form. SA A U D SD

تصميم الشاشة هو مقروء وواضح
2- The screen displays are presented in a readable form SA A U D SD

المعلومات داخل الكومبيوتر هي محفوظة
3- The data in the computer system are secured SA A U D SD

استطيع استخدام الكومبيوتر عندما تستدعي الحاجة
4- I can use the system, whenever it is convenient to me SA A U D SD

التقارير تؤمن لي معلومات واضحة ومفيدة ومناسبة
5- The System's Reports provide me with relevant, clear,
useful information SA A U D SD

اظهار المعلومات وأو سرعة التنفيذ تستحق التغييرات المستحدثة عن طريق استخدام الكومبيوتر
6- The information I can retrieve and/or the speed in doing my
work were worth the changes I had to make to adopt my
self to the procedures SA A U D SD

EASE OF USE

اجب باختيار حد الأجوبت تالية

Please answer the following questions by choosing one of the following answers :

SA	Strongly Agree	أوافق بشدة
A	Agree	أوافق
U	Uncertain	محايد
D	Disagree	لا أوافق
SD	Strongly Disagree	لا أوافق بشدة

أجد أن المعلوماتية محبطة

1- I find that information systems are frustrating.　　SA　A　U　D　SD

المعلوماتية التي استخدم صلبة وغير سلسلة الاستعمال

2- The system I am using is inflexible and rigid to reach
it with.　　　　　　　　　　　　　　　　SA　A　U　D　SD

ارتبك من استعمال المعلوماتية

3- I am often confused when I use the system.　　SA　A　U　D　SD

TRAINING

اجب باختيار احد الأجابات التالية

Please answer the following questions by choosing one of the following answers :

SA	Strongly Agree	أوافق بشدة
A	Agree	أوافق
U	Uncertain	محايد
D	Disagree	لا أوافق
SD	Strongly Disagree	لا أوافق بشدة

التمارين التي تلقيتها هيئت لي بداية جيدة

1- The training that I received meets all the requirement for good start. SA A U D SD

أعتقد ان هناك من تلقى تدريا افضل مني

2- I think that somebody receive better training than another SA A U D SD

اعتقد اني لو تلقيت افضل لتحسن ادائي

3- I think if I received better training my performance would be better. SA A U D SD

USER ACCEPTANCE

<div dir="rtl">

اجب باختيار احد الأجابات التالية

</div>

Please answer the following questions by choosing one of the following answers :

<div dir="rtl">

SA	Strongly Agree	أوافق بشدة
A	Agree	أوافق
U	Uncertain	محايد
D	Disagree	لا أوافق
SD	Strongly Disagree	لا أوافق بشدة

</div>

<div dir="rtl">

من أسباب تفاني في العمل هو المعلوماتية

</div>

1- One of the reasons behind my devotion to my job is the
   computerized procedures we have.   SA A U D SD

<div dir="rtl">

المعلوماتية تهدد مسيرتي في العمل

</div>

2- I feel that the computer system is a direct threat to my
   continuity in my job.   SA A U D SD

<div dir="rtl">

المعلوماتية تحدث بعض التناقضات في تنفيذ العمل

</div>

3- The computer system conflicts with some aspects
   of my job.   SA A U D SD

USER INVOLVEMENT   مشاركة المستخدم

اعتقد ان افكاري اخذت بعين الاعتبار

1- I believe my ideas were taken into consideration?

☐ St Agree (SA)   ☐ Agree (A)   ☐ Uncertain (U)
☐ Disagree (D)   ☐ St Disagree (SD)

مشاركتي ساعدت في تطوير البرنامج المتبع بطريقة افضل

2- My participation has made assess the worth of the system in a better way.

☐ St Agree (SA)   ☐ Agree (A)   ☐ Uncertain (U)
☐ Disagree (D)   ☐ St Disagree (SD)

هل كوفئت مشاركتك

3- In what ways your participation has been rewarded?

☐ No
☐ Yes, Please specify .... نعم ، حدد

PERCEPTION OF INVOLVEMENT

<div dir="rtl">اجب باختيار احد الأجابات التالية</div>

Please answer the following questions by choosing one of the following answers :

SA	Strongly Agree	<div dir="rtl">أوافق بشدة</div>
A	Agree	<div dir="rtl">أوافق</div>
U	Uncertain	<div dir="rtl">محايد</div>
D	Disagree	<div dir="rtl">لا أوافق</div>
SD	Strongly Disagree	<div dir="rtl">لا أوافق بشدة</div>

<div dir="rtl">مشاركة المستخدم في التصميم له تأثير ايجابي على سير العمل</div>

1- Participation of the enduser will have a positive impact upon the development of the system.   SA A U D SD

<div dir="rtl">مشاركة المستخدم في التصميم تخفف كثيرا من الاخطاء في البرنامج</div>

2- User involvement would eliminate much of the mistakes found in the system.   SA A U D SD

<div dir="rtl">بازدياد المشاركة تزداد الاستخدامية</div>

3- As involvement increases the system usage will increase. SA A U D SD

<div dir="rtl">اعتقد ان المشاركة سبب من اسباب نجاح المعلوماتية</div>

4- I believe that user participation is critical for the success of a computerized system.   SA A U D SD

<div dir="rtl">اعتقد انه اسهل علي فهم النظام والقيم الجديدة للمعلوماتية</div>

<div dir="rtl">لو اني شاركت في خطوات التصميم .</div>

5- I believe that I would have understood the value of the system easily if I was involved in one phase of the system development life cycle.   SA A U D SD

<div dir="rtl">اعتقد ان مشاركة المستخدم تقلل من المقاومة لعدم استخدام المعلوماتية</div>

6- User involvement will reduce the resistance towards the acceptance of the new system.   SA A U D SD

THANK YOU FOR YOUR PARTICIPATION

BIBLIOGRAPHY

1. Alan Hoffborg. "EDP Perspective", <u>Office Administration and Automation</u>, (Jan., 1984).

2. Avi Rushinek and Soru F. Rushinek, "What Makes Users Happy?", <u>Communication of the ACM,</u>(VOL., 29, No. 7, July 1986).

3. Black Ives and M. H. Olson, "User Involvement and MIS Success : A Review of Research", <u>Management Science</u>, (Vol. 30, N° 5, May 1984).

4. Claudier W. Nolven. "Utility Software Mainframe Enrichment", <u>Computer Decision</u>, (Jan., 1985).

5. David McGoveron. "Letting the Breeze Blow In", <u>Database Programming and Design</u>,(June, 1992).

6. Davis, "Perceived Usefulness, Perceived use of use, and user Acceptance of <u>Information technology, MIS Quarterly</u>, (Vol. 12, N° 1, Sep 1989).

7. Edward Cole. "Quality issues for End-User developed Software", <u>Journal of system Management</u>, (Jan., 1994).

8. Gary Green, and Kelin R.T. "After Implementation what's next ? Evaluation", <u>Journal of System Management</u>,(Sep. 1983).

9. Geoffry Steinberg and Robert Foley. "Automatic Database Generation", <u>Journal of system Management</u>, (Mar, 1994).

10. James A. Bailey and Sammy W. Pearson, "Development of a Tool for Measuring and Analyzing Computer User Satisfaction", <u>Management Science </u>(Vol. 29, N° 5, May 1983).

11. Lee Pelly and Carl Guynes. "Monitoring Database Performance in an End User Environment", <u>Journal of System Management</u>, (Aug. 1993).

12. Lucas, "User Reaction and The Management of information Services". <u>Management Information</u>. (Vol. 2, Number 4, Aug. 1973).

13. Lucky R. "The Social Impact of the Computer" in the <u>Computer Culture : The Scientific Intellectual and Social Impact of the Computer</u> (New York: Academy of science, 1983).

14. Mary Ann FRYE. Communication arts. Vol. 36, #1, March-April 1994.

15. Richard E. Fiori. "DBZ Performance Considerations from the Top Down", <u>Enterprise Systems Journal</u>, Jan., 1992.

16. Sid A. Davis and Robert P. Bostrom . "An Experimental Investigation on the Roles of the Computer Enterprise and Training Methods". <u>MIS Quarterly</u>. (March. 1993).

17. "Training End Users : An Experimental Investigation of the Roles of the Computer Interface and training Methods", <u>MIS Quarterly</u>, (March. 1993), Vol. 17.

18. Wendy Richmond. "Ten Years, One User Interface". <u>Communication Arts</u>, (Jan./Feb., 1994, Vol. 34, N° 8).