AN EVALUATION OF WEB-BASED SOLUTIONS IN EGYPTIAN ARCHITECTURE, ENGINEERING, AND CONSTRUCTION INDUSTRY.

A CASE STUDY: RCCNET.

By:

HEBA AHMED FAYEK AMEN.

Supervised by:

DR. IAN MITCHELL.

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MSc Business Information Technology

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A thesis submitted in partial fulfillment of the requirements for the degree of

Master in Business Information Technology

MAY 2001

Middlesex University, in collaboration with RITI – Cairo

Abstract

The main goal of this project is to evaluates the Egyptian practice of using web-based technology in the architecture, engineering & construction (AEC) industry, based on surveying the field and studding RCCNET web site as the first and only till Jan 2001, AEC industry information services provider in Egypt , evaluate the current web site, suggest improvement and new services, develop general recommendations on developing the implementation of web-based solutions in the Egyptian AEC .

The main problem faced, was trying to set a suitable evaluation methodology for evaluating web-based solutions, as it is a new technology, so the evaluation methodology was set based on available experience in evaluating other phenomena, this methodology set the evaluation plan used .

Throughout the process of evaluation, a number of inputs and outputs are required. Required input includes statistical information on the current AEC industry status, the IT implementation in Egyptian AEC firms, as well as a survey on RCCNET web site (e.g. services, users..) and the company providing it . During the evaluation processes, and based on the information collected, solutions for the appearing problems were suggested, then a general recommendations were reviewed as guided principles for implementing web-based solution in AEC industry.

The evaluation of the current Egyptian AEC web-based solutions is very important for the Egyptian AEC industry, as it defines recommendations that will provide a roadmap to guide future AEC e-commerce and net markets.

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Chapter 1

Introduction

This chapter provides a description of the research problem, states the research objectives, and gives an overview of this thesis.

1.1 Background and Motivation:

The construction industry is a critical industry for any nation and particularly so in developing countries. The Middle East region associated both with expanding population requirements and economic reforms witch are stimulating a flood of entrepreneurial activities and investments to many countries in the area. Rapid growth creates many opportunities, but it is also a cause for confusion and lost opportunities if participants in the industry cannot access relevant information.

Egypt share's in the Arabian construction market is 1% due to the lack of information, The statistics indicate that the total volume of the construction projects amount to US$ 11 billion per annum of which the Egyptian construction contribution did not exceed US 110 million, which amounts to only 1% of the total volume. Foreign construction companies dominated the market with 80 % of market share. [11] (A report on construction industry in Egypt - Appendix [A]).

Information technology, over the last few years, has raised productivity in most business processes, resulted in an increase in the quality and in the speed of work, betters financial controls and communications, and simpler access to common data. However, the majority of the construction corporations operating in Egypt are still dependent on the more traditional means in both marketing and service delivery, leaving out the new technology that, if implemented, would facilitate communication means in recognizing foreign market needs and international tenders in this field. This will not take place without getting connected to the Internet thus the importance of providing the required operating systems, computer hardware, & software and technical qualified manpower is paramount.

At the present time, there are inadequate linkages between the different branches of the construction industry in the region:

- Contractors need links with consultants, potential investment partners, and they all need access to regional data.

- Contractors are often unaware of all tenders being offered in the region;

- Many investment opportunities in the field of construction are wasted due to lack of information about proposed construction projects;
- Crises arise when a contractor's regular dealers cannot meet an urgent new demand on the spot;
- Suppliers who are unknown to constructors or consultants lose out on business opportunities;
- Time wasted in putting together a tender can mean loss of the job.

In doing so, Misr for Construction and Building Information (MCBI), was the first company established in Egypt to provide a high quality information services to the construction and building industry, devoting information technology to best serve Egyptian engineers, and pave their way towards globalization. The company recognized the essentiality of forming an Internet dynamic network responsible for building information highways between all ends of the industry, and was the motive for establishing the Regional Construction & Contracting Network (RCCNET) .The ultimate goal of MCBI is to develop RCCNET to constantly provide all levels of data and information needed by clients as well as enhancing e-commerce within the Egyptian and regional construction and building industry. (Appendix [B]).

The research will evaluate the Egyptian practice of using web-based technology in the architecture, engineering & construction (AEC) industry, investigate wether RCCNET over come the inadequate linkages between the different branches of the construction industry in Egypt , the above mintioned points ,and compare it with some of the successful, leading trials of other countries over the world wide web .

Several market researches indicate that, E-commerce grew slowly in Egypt over the past year. But "slow" can be a painful experience for e-commerce sites .The concept of e-commerce has not been yet established the way it should be, due to several problems it faces in Egypt, there are not yet local sites that perform complete transactions; therefore, most payments are conducted through traditional channels (e.g. payment – on – delivery system). [9] The major problems e-commerce sites face are the public's lack of trust of online payment systems and poor back-end infrastructure.

In [11], Mrs. Maghraby, Manager Director of the RCCNET affiliated with the Egyptian Construction Union, stated that out of 20 000 local corporations operating in the local market only 250 Egyptian construction corporations are making use of the services RCCNET offers despite the low subscription fee that is LE 500 per annum. So, one of the major objectives of this project is to increase the number of the Egyptian construction corporations that are making use of RCCNET services.

At this point, the need of evaluating this new approach of using web-based technology to best serve the architecture, engineering & construction (AEC) industry in Egypt appears.

1.2 Scope and Limitations of the Study:

Generally , Aims of Evaluation include assessment of aspects of quality such as the usability of the interface and the system's functionality . The result of evaluation are an essential source of information , they are vital for subsequent iterations of design and activities.The Evaluation finding lead to changes,refinements and shifts in priorites which can affect functional requirements,the system's architecture or aspects of its detailed design .

The Study will investigate the use of web-based solutions and systems in Egyptian AEC industry based on surveying the field and studding RCCNET web site as the the first and only till Jan 2001, AEC industry information services provider in Egypt , evaluate the current web site , develop recommendations , and suggest improvement and new services.

1.1. Project Outline and Action Plan:

- Chapter 1: INTRODUCTION:

  This chapter provides a description of the research problem, states the research objectives, and gives an overview of this thesis.

- Chapter 2: EVALUATION METHODOLOGY:

  This chapter gives an overview of what evaluation is, describes the why and how of evaluation process, outlines the steps in conducting evaluations, and finally sets the Evaluation Plan for the chosen case study.

- Chapter 3: EVALUATION PROCESS:

  This chapter provides a detailed review of the evaluation processes and data analysis activities carried out, with respect to the evaluation methodology discussed in chapter 2.

- Chapter 4: RECOMMENDATIONS:

  The primary focus in this chapter is on setting recommendations for improving web-based solutions usage in AEC industry in Egypt, based on the evaluation done in chapter 3.

- Reports :

  - Report on Construction Industry in Egypt.
  - Report on MCBI company.
  - Log File Analysis Technical Report.

Chapter 2

Evaluation Methodology.

This chapter gives an overview of what evaluation is, describes the why and how of evaluation process, outlines the steps in conducting evaluations, and finally sets the **Evaluation Plan** for the chosen case study.

2.1. Introduction:

There is little doubt that the advent of the Internet, and especially of the World Wide Web, has transformed the way the world disseminates information. Currently, there is almost no other area of technology development that is evolving more rapidly than web technology. Every day hundreds of new websites come "online" and new software and hardware options for providing information and browsing the web becomes available, with about 10 million sites on the web in January 2000 and about 25 million by the end of the year and hundred million by 2002, according to J.Nielsen [13].

The aim of this study is to evaluate the use of web-based technology in the construction industry in Egypt. So, RCCNET web site chose to be evaluated, especially because it is the first of its kind in Egypt, this will give an overview of the use of web-based technology in the construction industry in Egypt, and lead to improved suggestions that will help to reach a complete information technology use in the construction industry in Egypt.

Large and small organizations, and many individuals, are scrambling to develop a presence on the web, competing for attention across an increasingly wide bandwidth. As quality of presentation improves, the intensity of the competition among information providers increases. Each new wrinkle in technology development provides new challenges and opportunities for those who develop web sites and provide information.

It is surprising, given the importance of this technology and the resources that are being committed to implementing it, that there has been so little effort to date to evaluate it. There is a remarkable absence of studies that examine how websites are conceptualized, developed, and implemented, or that look at the effects of their use. Scholars and researchers all over the world are now planning and beginning to implement studies of the influence and impact of this new technology. The technology is too important to ignore and the investments too large to go unexamined for very long. [26]

Despite the absence of concerted web evaluation efforts, I'm clearly not starting from scratch. There are at least a half century of experience in evaluation and methods development. The purpose of this chapter is to describe the web evaluation effort, to set based on available experience in evaluating other phenomena, the types of questions that can and will be addressed and the methods that are likely to play a prominent role. Much of the evaluation that will be done will use familiar approaches, borrowing from other fields.

But as with any new technology, these methods will have to be adapted and new strategies devised to address the unique phenomenon of the web.

Web site Evaluation is concerned with gathering data about the usability of a web site design, which will help in understanding how web site objectives are translated into action.

Before setting up the evaluation plan that is going to be used in the chosen case study, let's have a look at the traditional definition of Evaluation and it's main steps.

Generally speaking, the main reasons to conduct program evaluation are:

- To determine the effectiveness of programs for participants;
- To document that program objectives have been met;
- To provide information about service delivery that will be useful to program staff and other audiences; and
- To enable program staff to make changes that improve program effectiveness. [19]

In other words, evaluations help to foster accountability, determine whether programs "make a difference"; and give staff the information they need to improve service delivery.

2.2. What is Evaluation?

Evaluation is the systematic collection and analysis of data needed: to assess the extent of the system's functionality, to assess the effect of the interface on the user, and to identify any specific problems with the system. [17]

It is a central part of user-centered system design. Without doing some form of evaluation it is impossible to know whether or not the design fulfils the needs of the users.

Here are just some of the evaluation activities that are already likely to be incorporated into many programs:

- Pinpointing the services needed;
- Establishing program objectives and deciding the particular evidence (such as the specific knowledge, attitudes, or behavior) that will demonstrate that the objectives have been met;
- Tracking program objectives----for example, setting up a system that shows who gets services, how much service is delivered, how participants rate the services they receive, and which approaches are most readily adopted by staff; or

- Trying out and assessing new program designs----determining the extent to which a particular approach is being implemented or the extent to which it attracts or retains participants.

Through these types of activities, those who provide or administer services determine what to offer and how well they are offering those services.

The different **dimensions of evaluation** have formal names: **process**, **outcome**, and **impact** evaluation. These three dimensions can also be thought of as a set of assessment options that build upon one another, allowing program staff to increase their knowledge about the activities they undertake as they incorporate more options or dimensions into their evaluation.

2.2.1. Process Evaluation:

Describes and assesses program activities. It is likely to occur while programs are being developed, as a check on the appropriateness of the approach and procedures that will be used in the program.

2.2.2. Outcome Evaluation:

Assesses program achievements and effects. Outcome evaluations study the immediate or direct effects of the program on participants. The scope of an outcome evaluation can extend beyond knowledge or attitudes, And to examine the immediate behavioral effects of programs.

2.2.3. Impact Evaluation:

Looks beyond the immediate results of policies, instruction, or services to identify longer term as well as unintended program effects. It may also examine what happens when several programs operate in unison.

Others may have the interest and the resources to pursue an examination of whether their activities are affecting participants and others in a positive manner (outcome or impact evaluation). The choices should be made based upon local needs, resources, and requirements.

Regardless of the kind of evaluation, all evaluations use data collected in a systematic manner. These data may be **quantitative**---such as counts of program participants. They also may be **qualitative**---such as descriptions of services received. Successful evaluations often blend quantitative and qualitative data collection. The choice of which to use should be made with an understanding that there is usually more than one way to answer any given question. [19]

2.3. Why Conduct Program Evaluations?

Evaluations serve many purposes. Before assessing a program, it is critical to consider who is most likely to need and use the information that will be obtained and for what purposes. Listed below are some of the most common reasons to conduct evaluations. These reasons cut across the three types of evaluation just mentioned. The degree to which the perspectives of the most important potential users are incorporated into an evaluation design will determine the usefulness of the effort.

2.3.1. Evaluation for Project Management:

Administrators are often most interested in keeping track of program activities and documenting the nature and extent of service delivery. The type of information they seek to collect might be called a "management information system" (MIS). An evaluation for project management monitors the routines of program operations. It can provide program staff or administrators with information on such items as participant characteristics, program activities, allocation of staff resources, or program costs. Analyzing information of this type (a kind of process evaluation) can help program staff to make short-term corrections; ensuring, for example, that planned program activities are conducted in a timely manner. This analysis can also help staff to plan future program direction.

2.3.2. Evaluation for Staying On Track:

Evaluation can help to ensure that project activities continue to reflect project plans and goals. Data collection for project management may be similar to data collection for staying on track, but more information might also be needed. An MIS could indicate how many customers participated in a service, but additional information would be needed to reveal why participants attended, how useful participants found the service, or what changes the participants would recommend. This type of evaluation can help to strengthen service delivery and to maintain the connection between program goals, objectives, and services.

2.3.3. Evaluation for Project Efficiency:

Evaluation can help to streamline service delivery or to enhance coordination among various program components, lowering the cost of service. Increased efficiency can enable a program to serve more people, offer more services, or target services to those whose needs are greatest. Evaluation for program efficiency might focus on identifying the areas in which a program is most successful in order to capitalize upon them. It might also identify weaknesses or duplication in order to make improvements, eliminate some services, or refer participants to services elsewhere. Evaluations of both program process and program outcomes are used to determine efficiency.

2.3.4. Evaluation for Project Accountability:

When it comes to evaluation for accountability, the users of the evaluation results likely will come from outside of program operations: funding agencies, elected officials, or other policymakers. Be it a process or an outcome evaluation, the methods used in accountability evaluation must be scientifically defensible, and able to stand up to greater scrutiny than methods used in evaluations that are intended primarily for "in-house" use. Yet even sophisticated evaluations must present results in ways that are understandable to lay audiences, because outside officials are not likely to be evaluation specialists.

2.3.5. Evaluation for New Program Development and Dissemination:

Evaluating new approaches is very important to program development in any field.
Rigorous evaluation of longer-term program outcomes is a prerequisite to asserting that a new model is effective. [19]

2.4. Risks of Evaluation:

Despite their value, evaluations are not always welcomed. Because they carry risks and use scarce resources, evaluations are often a low priority for programs. Evaluations are sometimes postponed until the last possible minute or avoided altogether. By understanding the potential difficulties before designing an evaluation, however, it is possible to avoid some of those risks or to minimize their effects.

Evaluations can create anxiety among program staff. Staff members may feel threatened by an evaluation because they believe that their individual performance is being scrutinized or that the program's fate hangs in the balance. They may believe that the tools of evaluation are ill suited to measure the positive changes they see occurring. The best method to overcome staff members' fears and resistance is to involve them in designing the evaluation and in interpreting its findings.

2.5. Steps in Planning Evaluations:

There are practical steps in designing evaluations. This section outlines some of the decisions that must be taking in planning program evaluations.

2.5.1. Identifying the Evaluation's Consumers:

Identifying the potential users will help to determine what questions are most important, what data will be viewed as credible, what analysis should be conducted, and how results should be transmitted and displayed. It is a good idea to solicit the views of other consumers, along with program staff, in drawing up the evaluation questions.

2.5.2. Choosing the Important Evaluation Questions:

There is rarely enough time or resources to answer all of the questions about program practice and effects that consumers pose. A way must be found to establish priorities and to limit the number of questions. The most desirable method is to agree on a limited number of evaluation questions when the program goals and objectives are first established, but often the evaluation questions are drawn up after the fact, or the program has made up goals. Under these circumstances, the number of possible questions may be very large. One device to limit the inquiry is to ask each critical evaluation user to complete the statement, “I need to know ____ because I need to decide____.”

2.5.3. Mapping Out an Evaluation Work Plan:

It is critical to create a step-by-step work plan for conducting the evaluation. The first step will be to review the questions and group them in some logical manner----by subject area, by the data needed to address them, by process/outcome/impact, or in some other manner. The plan should then outline the data that will be collected and how the information gathered will relate to each evaluation question. [19]

2.6. Setting up the Evaluation Plan:

There are several considerations and methods that can be used in evaluation. Chosen the methods that will be used in this case study depends on the information needed, the time available to do the evaluation, access to data & users.

2.6.1. Evaluation Planning:

2.6.1.1. Formulating an Overall Evaluation Strategy:

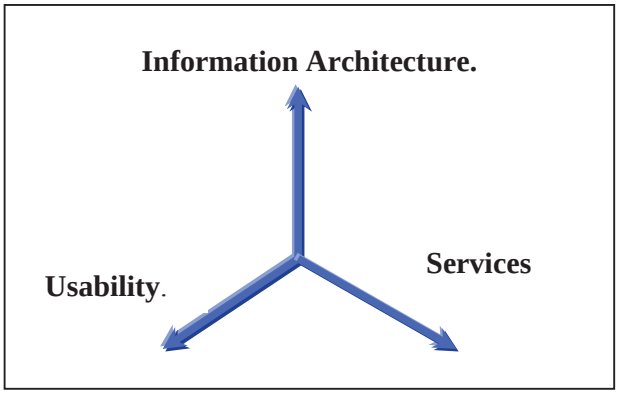
Based upon the consideration of the statement mentioned before in this chapter, "I need to know ____ because I need to decide____." as well as an assessment of time and available resources, the following decisions were made:

First, the reason for evaluating the RCCNET.NET, as discussed in detailed in chapter 1, is to Evaluate this new approach of using web-based technology to best serve the architecture, Engineering & construction industry in Egypt. So, a survey on the Egyptian AEC industry is needed. (Appendix [B]).

Second, the study of the web effectiveness needs the knowledge of IT role in serving the construction activities and tasks, and the needs of the construction planners to best achieve their goals. This will be considered in the surveys in chapter 3. (Questionnaire--- Appendix [E])

Third, according to first, the problem selected has a large number of elements and there are few resources and limited time, As a result, narrowing the evaluation scope in some manner was a must, so the study will focus the evaluation of RCCNET web site in three major directions:

1. Web Information Architecture.
2. Web Usability.
3. Web Services.



The website evaluation directions
Fig. [2 –1].

Finally, to ensure that the RCCNET.NET staff is with this evaluation, the need to enlist their advice in drawing up the evaluation design appeared. Interviews helped to insure this point. (Appendix [D]).

2.6.1.2. Identifying and Developing the Necessary Evaluation Instruments:

According to the overall evaluation strategy, the methods that will be used to collect and analyze data will be set:

- Survey Methodology:

Traditional survey methodology will play an important role in both, the survey on the impact of the information technology on the Egyptian architecture, engineering & construction industry and in RCCNET.NET website evaluation. Surveys can be used to identify potential users and ascertain their information needs and computer expertise. It can be used in discovering the user reactions to both the content and usability of the site.

- Computerized Evaluation Methodologies:

One of the most exciting prospects is the potential for using the website itself to collect and analyze evaluative data. One of the most important methodological areas of this type is the use of software to monitor, analyze and report on the utilization of the site. There are varieties of approaches to analyzing the utilization log files that are routinely collected by web servers.

A second way to employ the website itself for evaluation is to construct online surveys to collect user information and feedback. Forms in HTML (Hypertext Markup Language) must be designed and use the use of Common Gateway Interface (CGI) to process the data that users submit through online forms, that can then be imported into databases and statistical programs for analysis.

- Achievement Testing and Measurement:

In the web site evaluation, it doesn't much matter how fancy a website is, or how cleverly the technology is utilized, if the desired goals are not achieved. A key question will often be whether the user use the website effectively. The most common method of assessing such questions is through some form of content-based achievement testing.

- Heuristic Evaluation**:**

Heuristic evaluation is the most popular of the usability inspection methods. Heuristic evaluation is done as a systematic inspection of a user interface design for usability. The goal of heuristic evaluation is to find the usability problems in the design. Heuristic evaluation involves having a small set of evaluators examine the interface and judge its compliance with recognized usability principles (the "heuristics").

2.6.2. Data Collection:

Collecting data needed for the evaluation, will be done through:

- Observing operations, and reviewing data from existing data sources;
- Administering questionnaires; --- Appendix E.
- Conducting interviews. --- Appendix D.

2.6.3. Data Coding:

- Reviewing the information gained through data collection;
- Translating collected data into usable formats for analysis.

2.6.4. Data Analysis:

- Conducting any statistical analyses related to evaluation hypotheses,
- Preparing summary statistics, charts, tables, and graphs.

2.7. Conclusion:

Methodology is the systematic analysis and organization of the rational and experimental principles and processes, which must guide a scientific inquiry. This chapter sets the evaluation methodology that is going to be used, for the chosen case study, which is new in evaluation field, based on available experience in evaluating other phenomena, and identify the types of questions that can and will be addressed, and the methods that are likely to play a prominent role.

Chapter 3

Evaluation process.

This chapter provides a detailed review of the evaluation processes and data analysis activities carried out, with respect to the evaluation methodology discussed in chapter 2.

3.1. Introduction:

Evaluation is the systematic collection and analysis of data needed to assess the extent of the system's functionality. Also assess the effect of the interface on the user, and to identify any specific problems with the system. [17] And without doing some form of evaluation, it is impossible to know whether or not the design fulfils users needs. This chapter, will investigate the use of web-based solutions in Egyptian AEC industry based on surveying the field and studding RCCNET web site as the first and only till Jan 2001, AEC industry information services provider in Egypt, evaluate the current web site, develop recommendations, and suggest improved and new services. So, before starting the evaluation processes, a detailed description of the web site is needed.

3.2. A Description of RCCNET Web Site:

Misr for Construction and Building Information (MCBI) is a regional company that offers information services to the AEC industry in Egypt, the Middle East, and Africa. It is based in Cairo - Egypt and has several branches throughout the country. (Appendix [B])

Recognizing the essentiality of forming an Internet dynamic network responsible for building information highways between all ends of the industry was the motive of MCBI for establishing the Regional Construction & Contracting Network (RCCNET)**.**

I'll proceed with a description of the web site by performing a quick navigation throw it and answering several questions about its objectives, users, and services provided. So the following questions and their answers will provide a complete vision of RCCNET web site:

3.2.1.What is RCCNET?

URL: www.rccnet.net

The Regional Construction & Contracting Network (RCCNET) is the main service offered by MCBI aiming at developing communication channels between all ends of the construction industry.

This network contains a large database of construction companies working in this field, consultants, suppliers, training centers, price of materials, tenders and opportunities of investments, in addition to a help desk to support the network by answering the clients inquires.

RCCNET web site objectives are:

- Opening new investments and business opportunities through an online tenders announcements database.
- Creating communication channels among companies working in the construction community through an on line suppliers database, contracting companies database and engineering consultants database.
- Providing online Marketing or clients providing real life applications, case studies and best practices.
- Online benchmarking for companies working in the contracting business.

3.2.2.What are the important user categories and what are their motivations and goals?

Engineers and companies working in the construction community are the main target. RCCNET web site members can find a large database of construction companies, consultants, suppliers, training centers, price of materials, tenders and opportunities of investments.

The majority of subscribers (construction companies, consultants, suppliers, and training centers) are either, members in The Egyptian Federation for Construction and Building Contractors (EFCBC) or in The Arab Federation for Construction and Building Contractors. Other subscribers include all types of construction materials and equipment suppliers working in this field of business.

3.2.3.What kind of information is comprised in RCCNET database?

- **Tenders database:**

Tenders announcements in Egypt and the Middle East are daily updated availing business opportunities to all the companies operating in the construction business in this region. RCCNET web site enables users to find tenders announcements from various sources like governments, banks, and private sector. Construction tenders are classified according to country, type of work value, and nature of project.

- **Contractors database:**

Using the Contractors database search engine includes all contracting companies with a membership in The Egyptian Federation for Construction and Building Contractors (EFCBC), The Arab Federation for Construction and Building Contractors as well as foreign companies working in the region. The database is build according to the categorization system set by the (EFCBC). Name, activity license number, legal form, and an outline of the company's business history, information about key personnel and technical staff identify each company.

- **Suppliers Database:**

Comprise information about all companies that supply the construction industry with construction materials and equipment. We have companies specialized in cement, tiles, steel, paints, marble, bricks, heavy equipment, furniture, interior design etc. This database enables suppliers to present continuously updated product ranges and prices.

- **Consultants Database:**

Contains information about all engineering-consulting firms working in the region.

3.2.4.What other information can be found on RCCNET?

All information that assists construction companies in conducting business in Egypt, the Middle East and Africa is installed. This also includes market research, country economic analysis, stock market analysis, construction laws and regulations. Furthermore they provide case studies best, practices and job opportunities to employees working in the Construction and Building sector.

3.2.5. Does RCCNET sends newsletters to its members?

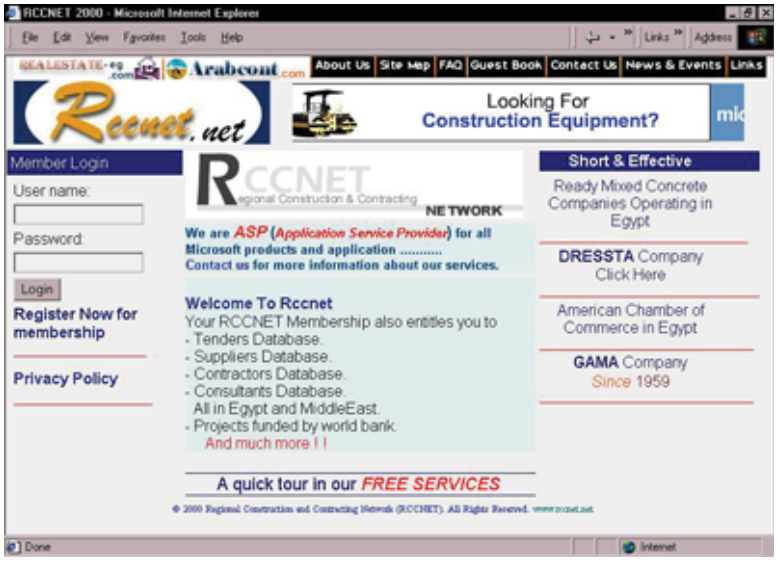
Yes they do. They constantly send newsletters to their members, updating them with the latest developments in the site and the important news affecting their business in Egypt and the Middle East region.

3.2.6.A quick navigation survey:

When typing the RCCNET'S URL: www.rccnet.net in the address bar of any Internet browser, an introductory page appears, (Fig [3-1]). In this page visitor finds two links, one to enter a non-flash version and the other is to enter a Flash one.

RCCNET's first introductory page.
Fig [3-1]

Both links at the end leads to another introductory page, (Fig [3-2]), if the visitor is a member he will type his user name and password and login to members pages, If not, he will be able to login to a free services area by a link provided at the bottom of the page, " a quick tour in our free services" and the top navigation bar. Also in this Page, visitor can find links to other companies web sites, " Short & Effective".



RCCNET's second introductory page.
Fig [3-2]

If member, main home page appears, (Fig [3-3]), member can find Links to all services provided by RCCNET web site. If not a member, see fig [3-4], links available are:

1. **Training**: Construction Management Training, Construction Technical Training.
2. Links to useful **web sites**.

RCCNET'S members home page
Fig [3-3]

RCCNET'S non-members home page
Fig [3-4]

This quick navigation gives an over view of how RCCNET's visitor can access the web's different services.

3.3. RCCNET Web Site Evaluation:

According to the evaluation plan set in chapter 2, the RCCNET web site evaluation processes will focus in three major directions:

1. Web Information Architecture.
2. Web Usability.
3. Web Services.

3.3.1. Web Information Architecture:

Information architecture is an integral part in developing Web sites that retain and inform users, and provide an intuitive platform for business transactions.

Louis Rosenfeld and Peter Morville, in their book, [20] Information Architecture for the World Wide Web, defined Information Architecture in technical writing, as a set of ideas about how all information in a given context should be treated philosophically and, in a general way, how it should be organized. In web site design, information architecture has a similar meaning, but focused somewhat more narrowly on web content as building blocks to be fit into a site's visual design and navigation scheme.

Jennifer A.Vodvaka, in his report on information architecture [14], suggested defining web site information architecture, by defining some of the web site's most basic aspects:

1. Web site user experience.
2. Web site organization.
3. Web site navigation.
4. Web site labelling.

3.3.1.1. The User Experience:

How people experience the Web site is vital in determining how they should be designed and developed. " The user experience makes or breaks a site"[14].

User experience is defined by finding the answer of the following question:

- How users interact with the site?

Log file analysis (Appendix [F]) helps in monitoring the user experience and answering this question.

Investigating RCCNET Users Experience:

➢ How users interact with the site?

I gathered some basic facts and conclusions about RCCNET users and their interaction with the web site through the statistics reports generated from log files analysis (see appendix [F]& attached summary report for detailed graphs and tables), the following points expose in details the results:

1. **Traffic Statistics:**

1.1. **Hourly transmission statistics** indicated that the web site most visited time starts from 6:00 am to 1:00 pm.

1.2. **Weekly transmission statistics** showed that Friday, the official weekend in Egypt, has the fewest visitors, the other weekdays has almost the same average of visits.

Points 1.1 & 1.2 Indicate that users visit the web site during the official working hours, this supports the idea that the main target of users are engineers and companies, and this means that information presented in the web site useful for their job, But it seams that the site doesn't fulfill their other points of interests.

1.3. **Monthly Transmission Statistics** showed that the number of visitors is increasing every month, and this is a good sign, shows that the web site interests users, but the challenge here is not only polarizing visitors, the visitors should find all their needs and interests. (To support this consideration, I prepared a questionnaire especially for engineers in different engineering specializations to discover their needs and points of interests, and will be discussed in details later in this chapter in evaluating services provided).

2. **Web Pages:**

2.1. **Most Accessed Pages Statistics** showed that the most accessed pages are in sequence:

- First: the First introductory page, (Fig [3-1]), in this page visitor finds two links; one to enter a non-flash version and the other is to enter a Flash one.
- Second: the Second introductory page, (Fig [3-2]).
- Third: The member's home page, (Fig [3-3]).

2.2. **Least Accessed Pages Statistics** results were some project opportunities in Jordan and Bosnia, in my opinion it seams un-interesting for users; this problem could be avoided by understanding users interests.

2.3. **Top Entry Pages Statistics** results were the same as Most accessed pages statistics (2.1), but with different sequence, the Second introductory page first.

2.4. **Top Exit Pages Statistics** exposed that the top exit pages are:

- First: the Second introductory page, (Fig [3-2]).

- Second: the First introductory page, (Fig [3-1]).

Above Points 2.1,2.2,2.3, & 2.4 signify the importance of re-designing introductory pages to be more interesting and welcoming. I suggest one main introductory page only.

2.5. **File Type Statistics** indicated that files of gif and jpj types are forming 85.13% of the whole file types in all web pages, and they cause too much error during the down loading. I must point that gif and jpj are image file extensions, and this signifies the need of reducing images use and size.

3. Demographics:

3.1. Country access statistics indicated that local requests are the most, with 62.09%, and others (non-local) are 37.91%. This means Egyptians are using the site most of the time.

4. Referrals:

4.1. **Referral Sites Statistics** tracks back that most visitors, with percentage of 98%, come from typing the RCCNET URL directly, the few remaining comes from different search engines.
4.2. **Search engines statistics** given results were, in sequence: google.com, search.yahoo.com, and altavista.com.
4.3. **Search Engines Keywords Statistics** showed that the major search key words were companies' names, the remaining were either Egyptian projects titles such as " Nasser Lake and Toshka project" or general key words, such as " Contracting, Egypt industry, and Egyptian construction industry".

5. Systems:

5.1. Browser access statistics indicated that the majority of users use Explorer 5.0 & 5.5, and I must point that these browsers supports Arabic fonts.
5.2. Operating system access statistics indicated that the majority of users use Windows 98 (67.87).

Eng .O. Gad mentioned, in interview 4 (Appendix [D]), that the web site designed to best be viewed with Internet Explorer browser.

6. Visitors:

6.1. Visitors' time online behavior statistics showed that most web site visitors' stay for 10 to 29 minutes.
6.2. Circulation regularity statistics discovered that most web site visitors are new visitors with percentage of 52.18% of web site visitors, the members with percentage of 47.82%, the member seams to visit the site many times during the same day.

3.3.1.2. Web Site Organization: Site Map:

The site map is a hierarchical approach to the organization of information and transactions. It is a visual representation of how the site is classified, illustrating dependencies between parent categories and their children.

The foundation of almost all good information architectures is a well-designed hierarchy. In this hyper textual world of nets and webs, such a statement may seem blasphemous, but it's true. The mutually exclusive subdivisions and parent-child relationships of hierarchies are simple and familiar. We have organized information into hierarchies since the beginning of time...Hierarchy is ubiquitous in our lives and informs our understanding of the world in a profound and meaningful way. [14]

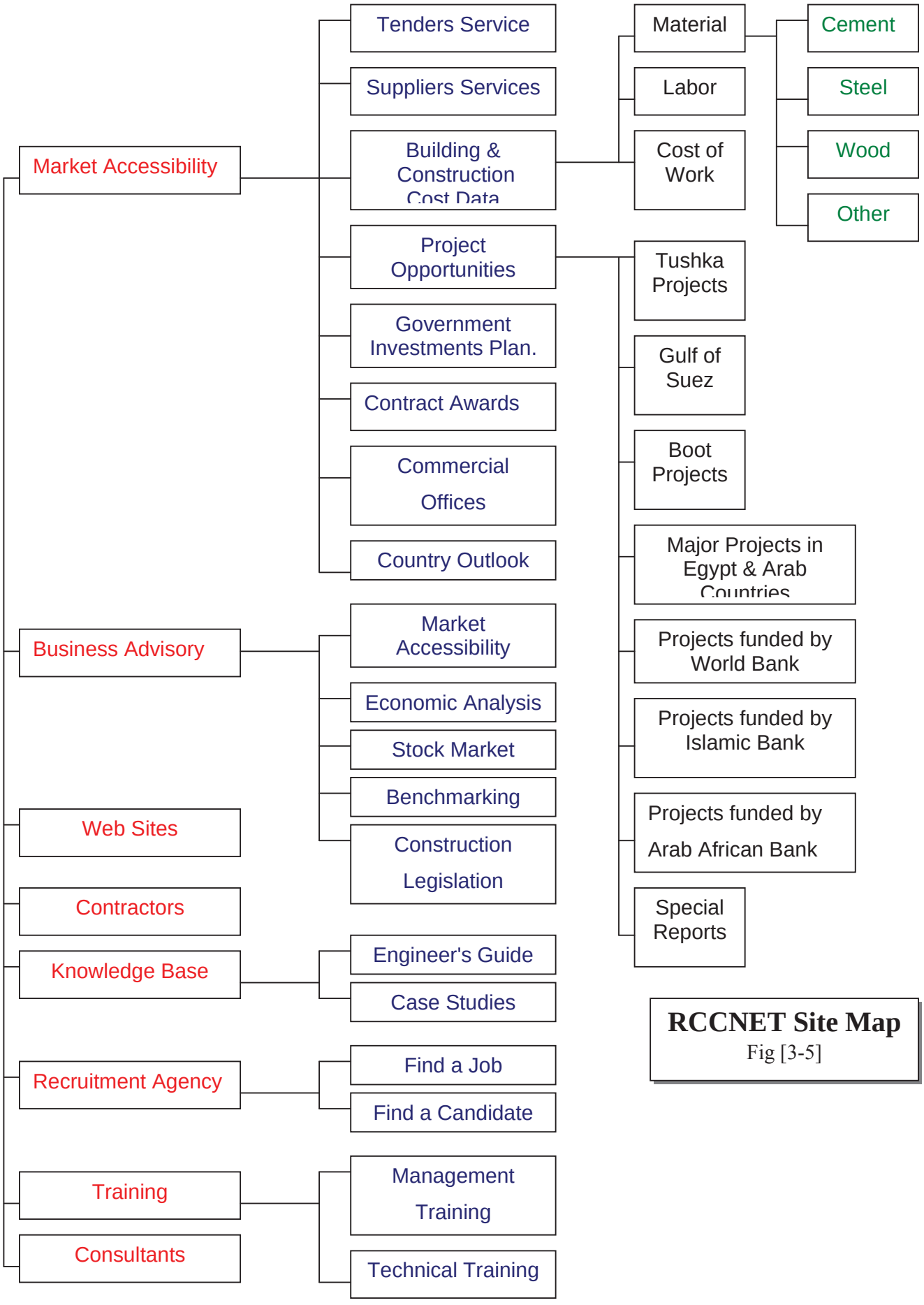
By studying the organization of RCCNET web site, (next page, Fig [3-5]), it is found that Hierarchies are broad, and deep. A well-designed site should seek a balance of the two to give the user the correct amount of choices without overwhelming them or making them drill too deep to find what they need. According to J.Nielsen [13], web users are fleeting, and they want information now – not five clicks from now.

The organization of information in the web site must be in the most logical manner possible, creating a structure and hierarchy of information that users can move through to find what they seek.

In my opinion, the design of RCCNET web site must be as an Engineering Portal, Portals are excellent in information organization, they allow the user to follow lines of interest necessitates breaking away from a strict hierarchical system of navigation, and to support this, the site must be designed to provide a good navigation, so while user reading an article; there is a navigation tool on the page that links user to other articles relating to the relative subjects.

This leads us to a very important purpose, **web customer engagement**, it grows from providing customers with the content that they need in a way that furthers the web site business objectives.

To do this, the web site needs mechanisms to collect customer information, and to then deliver the content. It is possible to frame up this progressive development effort in a series of stages, progressing from meeting the needs of the individual customer, to responding to the customer as a member of number of groups. (I discussed this in details in chapter 4 – Recommendations).



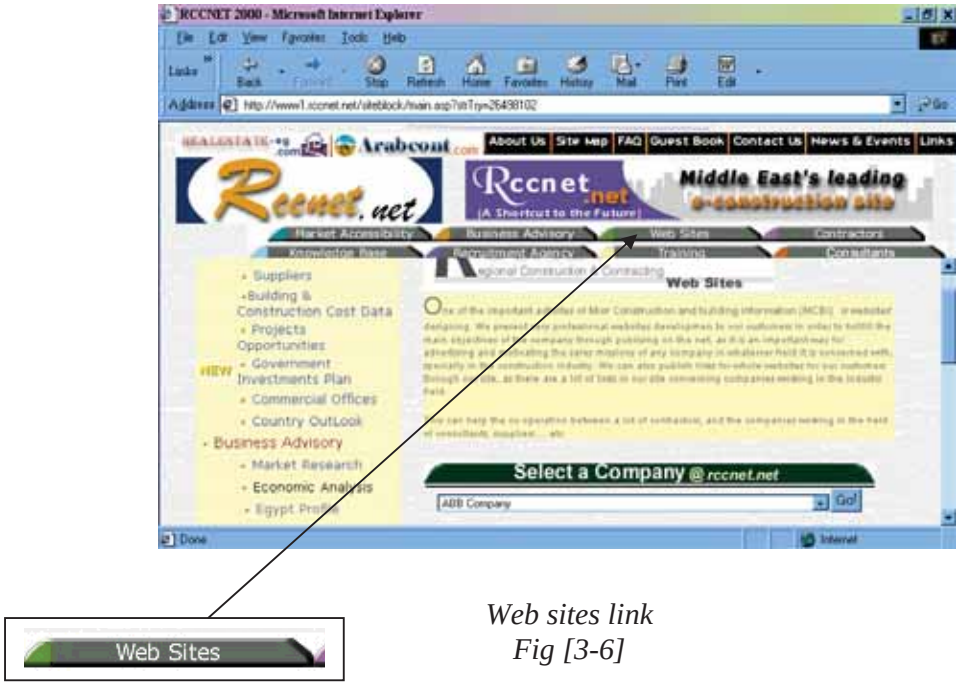
RCCNET Site Map

Fig [3-5]

3.3.1.3. Web Site Labelling:

Language on the Web can be confusing or contradictory. It is the information architect's job to create a labeling system for site wide navigation. The question to answer is: How to label navigation links to clearly illustrate their meaning and set expectations? . [14]

Different terms can mean different things to different people. Therefore, nomenclature on the Web needs to be carefully thought out. Using terms that are obscure, confusing or based on internal organizational systems is a mistake for public Web sites, in RCCNET web site, it is found that some links are confusing customers, as an example, a link named " Web Sites" links to a database of different construction companies web sites, the labeling of this link doesn't indicate what the user is going to get, Changing the naming of the link to "companies" may solve this problem.



Web sites link
Fig [3-6]

According to J.Vondvarka, [14], Another key to nomenclature is consistency. Names of navigation links shouldn't change mid-way through the site if they point to the same pages, RCCNET web site supports labeling consistency, within the web site it self and across the World Wide Web, the site must never ignore prominent trends in information architecture and design on the Web. If terms or metaphors reoccur on many sites, then it's a good bet that users are becoming very familiar with the meaning behind them. It's sometimes difficult to set aside the desire to be creative and groundbreaking when it relates to the Web, but confusing users will inevitably hurt the bottom line in the long run.

3.3.1.4. Web Site Navigation:

A navigation scheme answers four questions:
1. Where am I?
2. Where have I been?
3. Where can I go?
4. How can I get back to where I was?

Users pick up visual cues from the navigation and graphic design to help orient them within a site. This becomes especially important when users bypass a site's home page and land on an interior page. Often, sites will offer “deep links” to one another, taking the user past a site's traditional portal of entry directly to a page that addresses their specific need or interest. Users must quickly reorient themselves to their new surrounding, and the navigation structure helps to supply context.

- **Types of Navigation Systems:**

Often, on more complex sites, several systems of navigation will be utilized. There are three main types of navigation on any given site:

- **Global Navigation:** This navigation closely follows the site map and sets up the overall organization. This will most likely be present on every page within the site and should be consistent throughout to meet user expectations. These links are more ``hard coded'' into the site design and are typically located at the top or left-hand side of the site. For instance, Amazon.com's global navigation includes Welcome, Directory, and some of their featured stores (content areas) such as DVD, Books, Auctions, Music and Video.

- **Local Navigation:** Local navigation defines the hierarchy of a content area. Using the Amazon.com example, the local navigation of a main content area such as Books is Best Sellers, Featured in Media, Award Winners, etc.

- **Contextual Navigation:** Contextual navigation allows users to browse through content related to content they are viewing. “See also” links or underlined texts within paragraphs are examples of contextual navigation. [15]

To evaluate RCCNET web site navigation, I will depend on [15], J.Fleming’s list of the ten qualities of successful navigation.

1. Ease of Access.
2. Consistency.
3. Feedback.
4. Clarity.
5. Alternatives.
6. Attention Economy.
7. Clear Visual Massages.
8. Clear Labels.
9. Appropriateness.
10. Support Users Goal.

In RCCNET home page there are three navigation bars, two in top (part of the top frame) and one left; they guide the user through the site; also, the site has Contextual navigation within paragraphs.

1. The first top navigation bar, is available in both members & non- members pages, it has tabs linking to:
   - ✓ About us.
   - ✓ Site Map.
   - ✓ FAQ (frequently asked questions).
   - ✓ Guest Book.
   - ✓ Contact us.
   - ✓ News & Events
   - ✓ Links.

First top navigation bar
Fig [3-7]

2. The second top navigation bar, is available in members only pages, it has tabs linking to:
   - ✓ Market Accessibility.
   - ✓ Business Advisory.
   - ✓ Web Sites.
   - ✓ Contractors.
   - ✓ Knowledge Base.
   - ✓ Recruitment Agency.
   - ✓ Training.
   - ✓ Consultants.

Second top navigation bar
Fig [3-8]

3. In the left navigation bar there are hypertexts linking to the same topics as the links in the second navigation bar, but with more details.

Left navigation bar
Fig [3-9]

Of course careful design of navigation bars is the simplest and most effective way of guiding users to select options.

Studying RCCNET web site navigation according to [15] J.Fleming's ten qualities of successful navigations, signify the need of changes; the new navigation schema should support the following:

- Navigation Aids: It is necessary to show the user the navigation options, which are available, and the different representations, which can be chosen. So, all pages should follow the same navigation schema. Providing links on each page to a list of the local contents, a site map and home, the site map tab must be added to the prototype in the top navigation bar.

- Different navigation types should provide useful feedback to the user as to where they are.

- Clustering: In order to structure and present information according to a certain subject matter, items clustered and grouped together in the navigation bar. The conceptual relationships between items of information within a cluster in the navigation bar should be high, while those between different clusters should be low, clusters are to be used to good visual effect.

- It should be shown which information can be reached with a certain navigation step and this can be by using ALT tags.

- It is obvious that there are to many repeated links all over RCCNET web site, with different types, Tabs, text or images links to the same place. Standardization helps user to learn how to navigate through the web site easier and faster with out any confusion.

Also, recommendations of J.Niederst [16], should be considered:

- Minimize the number of links to final content, try to make sure users can get to useful information in no more than four clicks.

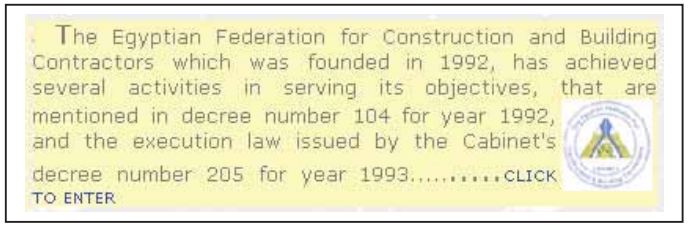
- Use page titles, which make meaningful bookmarks (do not start titles with "Welcome to." or use generic titles such as "products or Peripherals"). [13]

- Avoid dead ends – plan that any page could be the first page for users reaching the site from a search engine.

- Provide a site map or overview – this helps users understand the scope of the site.

- According to J.Nielsen, the oldest web design rule is to avoid using " click here" as the anchor text for a hypertext link. There are two reasons for this rule. First, only mouse-using visitors do in fact click, whereas disabled users or users with a touch-screen or other alternative device don't click. Second, the words " click" and " here" are hardly information – carrying and, as such, should note be used as a design element that attract the user's attention.

Fig [3-10] is a shot from RCCNET home page, it is found that there are two links to the same page, one is a Logo image, and the other is a hypertext. Instead of saying: " …CLICK TO ENTER", it is better to use " The Egyptian Federation for Construction and Building Contractors" as a hypertext link, using the words that matter is important. And repeated links should be avoided.



The Egyptian Federation link in RCCNET home page.
Fig [3-10]

- Users should always know where they are and how they can navigate in the site.

So, in the top navigation bar the tabs should support this by showing where is the user at the moment. A good example to be guided by is the top navigation bar in Acer.com, (Fig [3-11]).

The top navigation bar in Acer.com
Fig [3-11]

3.3.2. Web Usability:

Site design, is important for usability because users are never going to even get close to the correct pages unless the site is structured according to user needs and contains a navigation scheme that allows people to find what they want.

Usability Critical Analysis:

The usability of RCCNET web site will be checked through investigating three main aspects: Attention, Clarity, and Consistency.

3.3.2.1. Attention:

When discussing attention I have to examine how the following elements have been used to help in focusing the user's attention and not distract his attention.

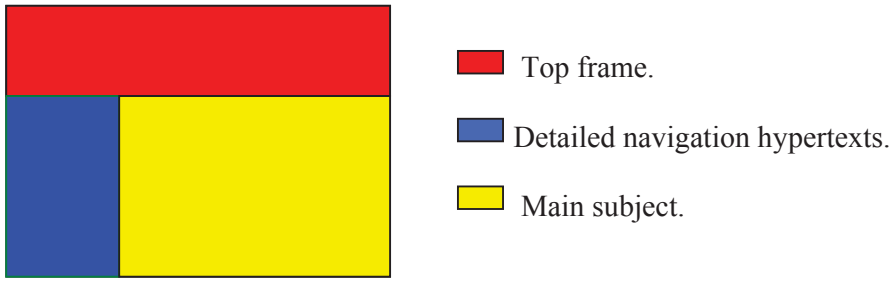
- Structure.
  - Page Structure.
  - Site Structure.
- Colors.
- Alert Mechanisms.
- Spatial Cues.
- Temporal Cues.

- **Structure:**

Generally speaking, the structure can be used to represent a set of nodes and the relationships between them. Evaluating the web site structure will be through discussing the page structure and the site structure.

- Page Structure:

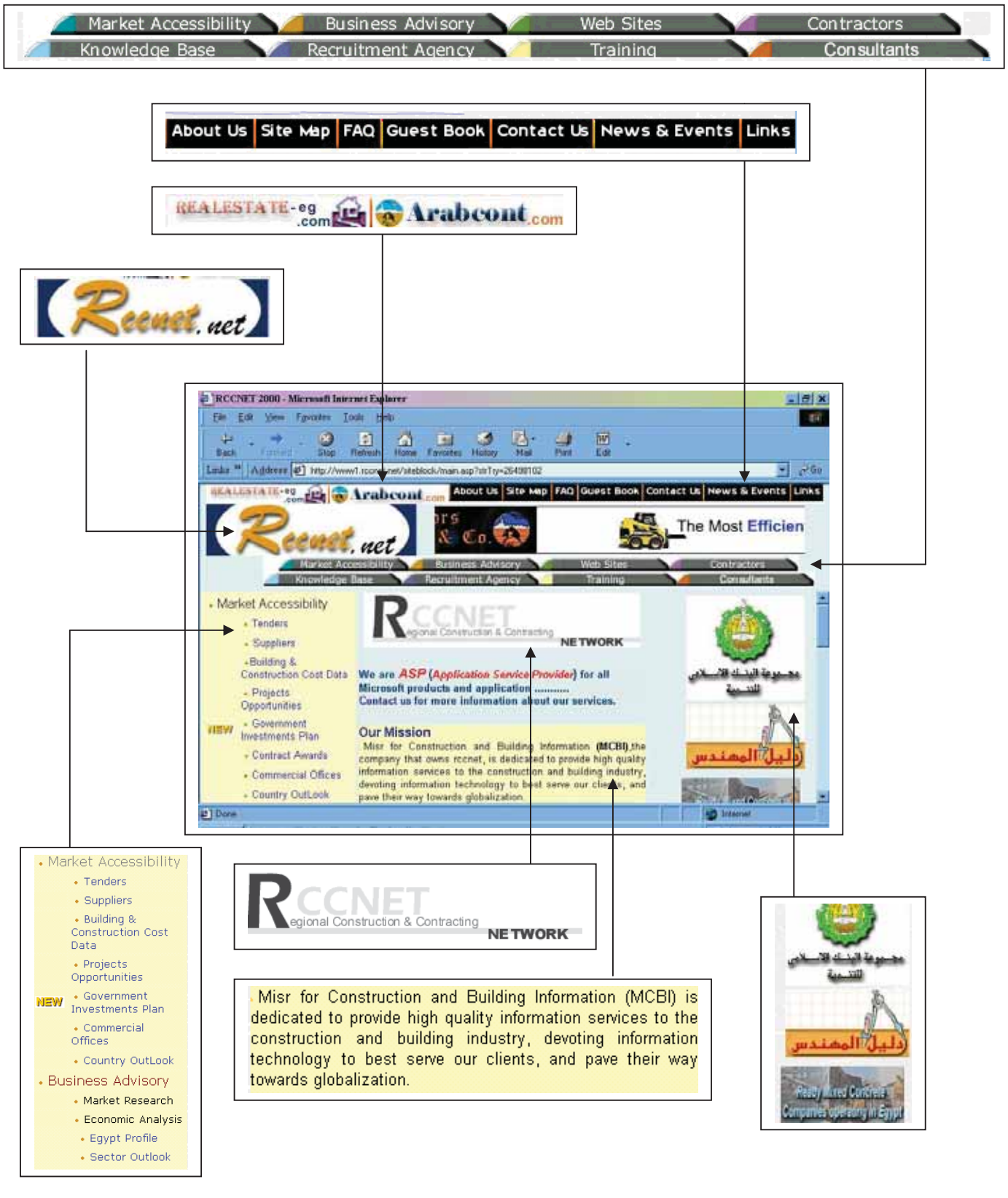
An overall view through the web site pages, figures out that most pages are structured using frames technique, detailing, the page is divided in to two frames top and bottom, in the top frame we can find RCCNET logo, navigation bars, links and a scrolling advertising banner, the bottom frame is divided in to detailed navigation hypertexts and the page main subject.



Page Structure diagram.
Fig [3-12]

Home Page Structure Elements

Fig [3-13]



I will discuss the home page structure as a more detailed example; Home pages must establish the site identity and gives a clear overview of the content. (Fig [3-13]).

A general principle for all user interface design is to go through all of the design elements, and remove them one at a time. If the design works as well without a certain design elements, kill it. [14]

Simplicity always wins over complexity, especially on the Web where every three bytes saved is a millisecond less download time.

It is obvious that there is more than one design of RCCNET logo all over the site, more over; some pages have two different RCCNET logos with different designs in the same page. (Fig [3-14]).

RCCNET logo repetition.
Fig [3-14]

Another point is that, on the Web it is impossible to predict what size monitor the user will have, personally I tested the home page design on different monitors size, I found it best viewed on 17-inch monitor, on others the layout become cramped, and users have to scroll to see all parts of the page they need, so I suggest using a **Resolution – Independent Design**, The main principle for resolution- Independent Design is to never use a fixed pixel-width for any tables, frames or other design element. Instead of using fixed sizes, you should specify layouts as percentages of the available space. The font size must be respected, so the design must ensure working well with both larger and smaller fonts, because some users may simply have a high-resolution screen on which small font size are too tiny to be readable. And graphic elements should be designed with different resolutions in mind, because the higher the resolution, the smaller any given graphic will be displayed. And because of that, J.Nielsen [13], recommended not to include any text in graphics.

According to J.Nielsen [13], Web pages should be dominated by content of interest to the user, unfortunately, In RCCNET home page, it is found that they spent more screen space on navigation than they do on the information that they supposedly caused the user to visit in the first place.

"Navigation is necessary evil that is not a goal in itself and should be minimized." [13].

As a test, I blocked out the main regions in the home page and count the proportion of pixels used for various purposes.

Home page regions map.
Fig [3-15]

Most of the screen space ends up being used for distracting machinery that is extraneous to the content the user came for. Of the 480,000 precious pixels on an 800× 600 display only 20% are used for the content of interest to the user (indicated in green on the map Fig [3-15]). Additionally, 31% of the pixels are used for operating system and browser controls (blue), 27% are used for site navigation (yellow), and 10% are used for advertising (red). The remaining 12% of the pixels go unused (white) because the coding of this page dose not allows it to reformat to fit the window.

As a rule of thumb, content should account for at least half of page's design, and preferably closer to 80 percent navigation should be kept below 20 percent of the space for destination pages[13].

White space is not necessarily useless, and it would be a mistake to design overly compact pages, White space can guide the eye and help users understand the grouping of information.

From a usability perspective, it would be best to eliminate advertising, and the navigation design will have to be reduced in weight.

- Site Structure:

No matter what navigation design is picked for the site, there is one common theme to all navigation: all it dose is visualize the user's current location and alternative movements relative to the structure of the underlying information space. If the structure is a mess, then no navigation design can rescue it, over here we realize the enormously connection between site structure and information architecture: Site organization, Poor information architecture will always lead to poor usability.

According to J.Nielsen [13], there are two important rules about site structure:

1. To have a site structure, and to make it reflects the user's view of the site and it's information and services. It may seem obvious to have a site structure, but many sites evolve without any planned structure and ends up in total chaos as a collection of random directories without any systematic relations among different parts of the site.

2. A second common mistake is to have the site structure mirror the company's own internal thinking instead of reflecting the user's view. The site structure should be determined by the tasks users want to perform on the site.

Part of site structure Search Capabilities, J.Nielsen usability studies show that slightly more than half of all users are search-dominant, about a fifth of the users are link-dominant, and the rest exhibit mixed behavior. The search-dominant users will usually go straight for the search button when they enter a web site. They are not interested in looking around the site; they are task-focused and want to find specific information as fast as possible. In contrast, the link-dominant users prefer to follow the links around a site Even when they want to find specific information, they will initially try to get to it by following promising links from the home page. Only when they get hopelessly lost will link-dominant users admit defeat and use a search command. Mixed-behavior users switch between search and link following, depending on what seems most promising to them at any given time, but they do not have an inherent preference.

Despite the primacy of search, web design still needs to be grounded in a strong sense of structure and navigation support. All pages must make it clear where they fit in the larger scheme of the site. First, there is obviously a need to support those users who don't like search or who belong to the mixed-behavior group. Second, users who do use search to get to a page still need structure to understand the nature of the page relative to the rest of the site. They also need navigation to move around the site in the neighborhood of the page they found by searching.

Search should be easily available from every single page on the site. RCCNET web site use search capabilities in searching it's databases only, and doesn't support the idea of searching the site.

- **Colors:**

Color is important in effective websites design for a number of reasons; for example:

- It makes the screen layout more attractive.
- It may reduce users' interpretation errors.
- It emphasizes logical organization of the information.
- It is very efficient at drawing the user's attention to a given part of the screen.

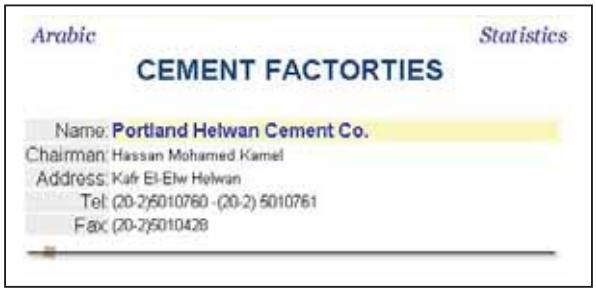
Advantages of Using Colors:

Color is useful for:

- Dividing the display into areas.
- Showing relationships between functionally related items.
- Emphasizing a given item against the background, thus reducing search time.
- Simplifying search tasks for novice users.
- Attracting the user's attention e.g. in alert situations.
- Supplementing other coding schemes such as labels, shape, and size and thereby reducing the required processing time.
- Coding an information element.

In RCCNET web site, the following is found:

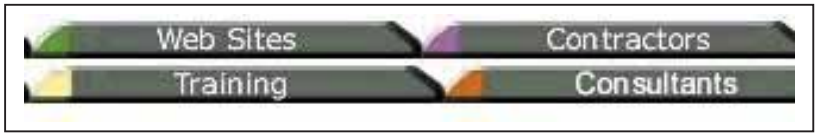
- Black text on a white background provides the highest contrast ratio and optimizes visual processing for text. (Fig [3-16]).



Black text on a white background
Fig [3-16]

But unfortunately,

- Colors in navigation bars have not been used carefully to avoid unintended visual effects and creating problems for people with color deficiencies. (Fig [3-17]).



Colors in the top navigation bar
Fig [3-17]

- Color is one of the most commonly used means of encoding information, So it is better to use it in Coding information element, epically in the navigation bar.

- The meaning of colors is not consistent along the whole site, exception of black and white.

- When color is used, we must take into consideration the fact that higher contrast is needed to differentiate between two elements, and this can be achieved by changing the colors in the navigation bars, In Fig [3-18], the contrast ratio should be maximized when selecting colors for background and foreground elements.

White background and gray foreground text.
Fig [3-18]

- **Alert Mechanisms:**

Avoiding use of flashing or animation in side the pages design, as users find this very distracting. And this is realized in RCCNET pages, but regarding the flash version of the site, it is an introduction presentation, that is unimportant and is not considered as an Alert mechanism.

- **Spatial Cues:**

Users should always know where they are in the site.

In the top navigation bar the tabs doesn't show where is the user at the moment, and not all pages support top navigation bar.

- **Temporal Cues:**

In RCCNET site, temporal cues are not used, it doesn't tell users where they are in the action or tell them what to expect. So it is better if the site provide an interaction bar telling the user where they are in the action and what to expect next.

3.3.2.2. Clarity:

When discussing Clarity I will examine how the following elements have been used to avoid misinterpretation in Presentation:

- Readability.
- Fonts.
- Graphics.

- Readability:

Text is the most flexible means of presenting information on screen, and is also well suited to conveying large amounts of information.

(A)

(B)

Text should be used if it will be necessary for the user to read information. As we find in (B) it is important to read information about a RCCNET Mission because it is "About us" page, but in (A) there is no need to put all these textual elements in the home page and repeat RCCNET Mission.

To avoid such problem, in the home page, cut off everything except the first initial parts of the information and let users click a " More…" link for the rest.

Also, recommendations of J.Niederst[16], should be considered :

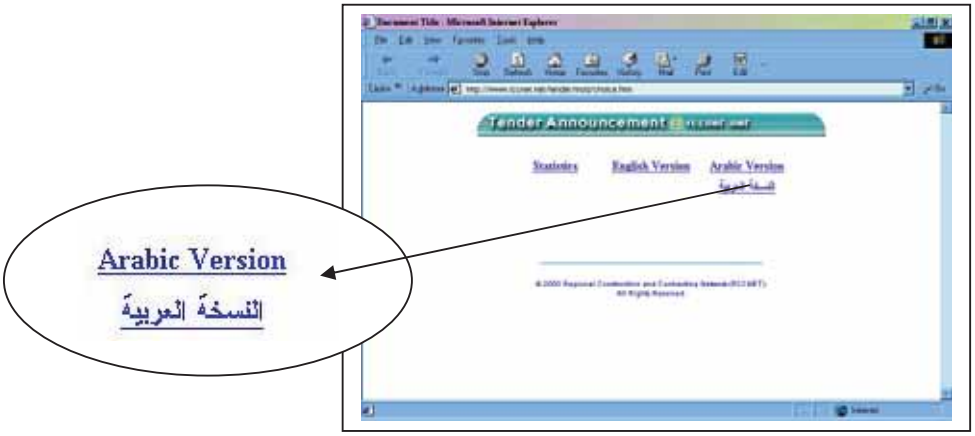
- Rather than trying to replace textual elements with pictures, the designer should consider how to present text in an acceptable way.
- A clear reasonably large font should be used.
- Users will also be put off by the display of large amounts of text and will find it hard to scan.

- Use short words because they are easy to read and easy to lay out on the screen. Sentences should be short and concise and not be split over pages; the user needs directions and hints that are easily understandable.

Another important point is: Language Choice.

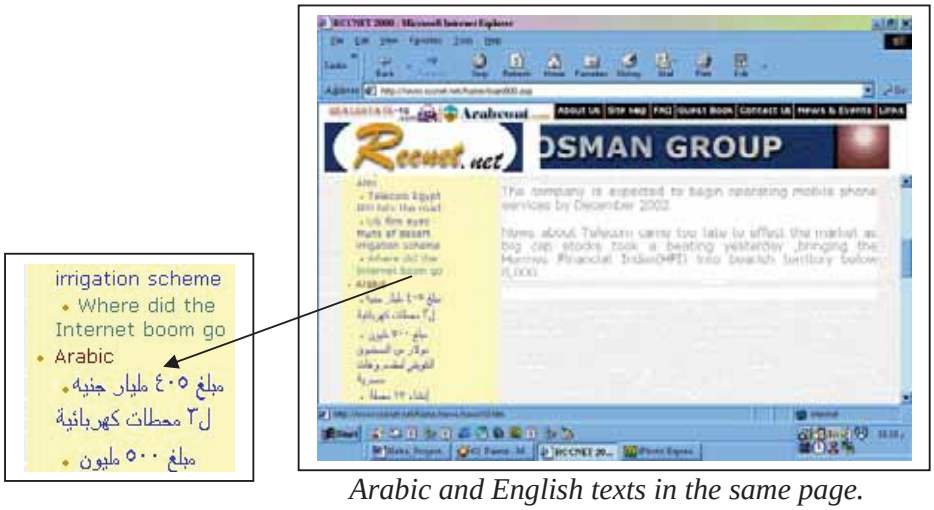
It is supposed that RCCNET web site is directed to serve the construction sector in Egypt and Middle East region. And it is known that their mother tongue is Arabic.

I'm off the view that, the site recognized the impotency of translating the information provided so they offered a language choice in some pages. In Fig [3-19], it is found that RCCNET offers users to search their Tenders database either in English or in Arabic.



Arabic version link.
Fig [3-19]

But, unfortunately in other pages, it is found out that Arabic and English is used at the same time, and without being translated, the English version is talking about some thing and Arabic one talk about some thing else. (Fig [3-20])



Arabic and English texts in the same page.
Fig [3-20]

To over come this problem it is recommended to add the option of deciding the Language (Arabic or English) to the home page. Then all pages must be in the same language and provide anchor to change it at any time, according to users needs.

- Fonts:

For choosing the font, consider the distance between the user and the display, Fonts less than 12 points in height are generally too small to read comfortably.

- Graphics:

From Log files analysis (appendix [F), File type statistics, indicated that files of gif and jpj types are forming 85.13% of the whole file types in all web pages, and they case too much errors during the down loading. I must point that gif and jpj are image file extensions, and this signifies the need of reducing images use and size.

It is important to minimize the download time as most web users have slow connections, so It is a must to use the minimum number of colors to reduce the size of graphics, use small images, use interlaced images, and repeat images where possible.

Using the ALT tag to describe graphics is a very important issue, as many users do not wait for graphics to load, and some use the option of hiding graphics in their browsers to fast downloading.

As a simple test on home page, I hide graphics, unfortunately 50% of the screen disappeared, users can't deal with the site in this case. (Fig [3-21])

Home page with hides graphics option.
Fig [3-21]

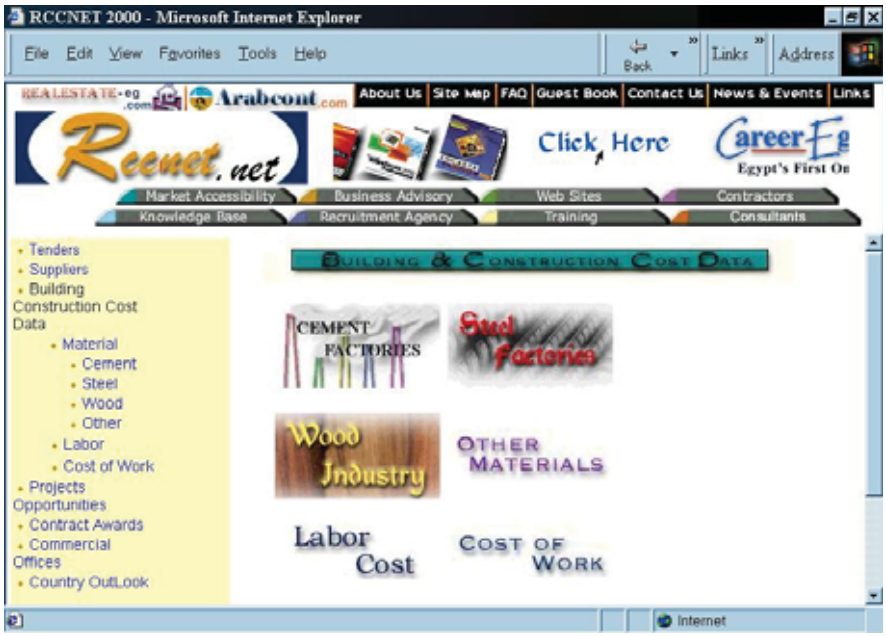
Photographs or Images:

Photographs or images are used to represent factual and documentary information**.** They should be used to reproduce things as closely to reality as possible, colored images appear livelier, and images is a good way to supplement text.

As with text, presenting too many pictures can reduce their impact.

Unfortunately, this appears clearly in the site map page, the images used doesn't support the text, they only maximize the page download time.

The site map page images design.
Fig [3-22]



Building & Construction cost data page images design.
Fig [3-23]

Generally speaking, using images supports the user to quickly locate the item of information they are interested in, this was the main purpose for using images in a page like "Building & Construction cost data", However I don't think they turn out as planned. (Fig [3-23]).

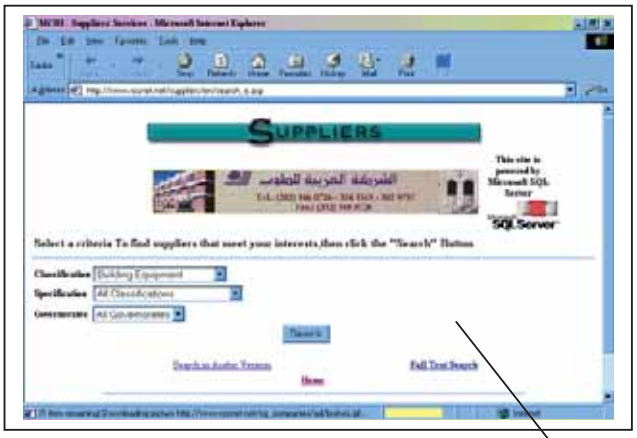
The amount of graphics on web pages should be minimized, as J.Nielsen [13] recommended, because of the horribly long download times they require. " An image takes two thousand words worth of download time".

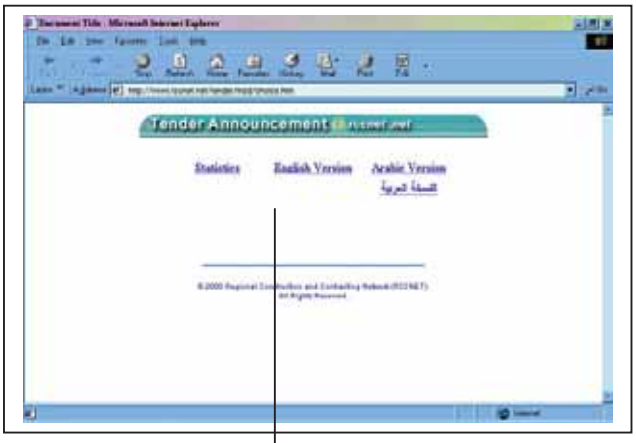
3.3.2.3. Consistency:

Consistency can be studied particularity within the web site it self and generally across web sites.

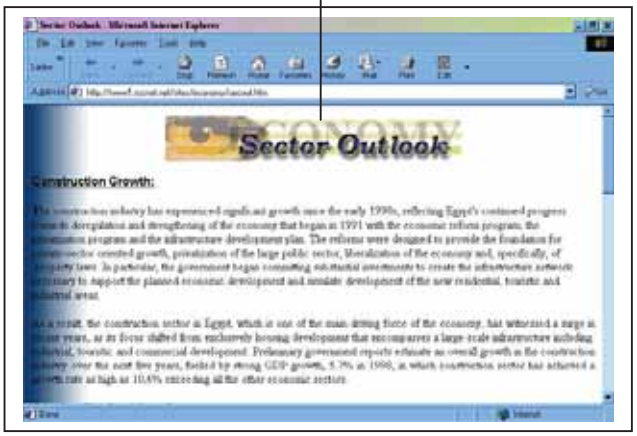
In RCCNET web site:

- The main problem of this site is that no Consistency at all, pages change it's layout all the time. (Fig [3-24]).
- It is important to offer a consistent layout to achieve good orientation for the user.
- The same function or display element should always be available at the same place.
- The same action should always produce the same result.





- Market Accessibility
  - Tenders
  - Suppliers
  - Building & Construction Cost Data
  - Projects Opportunities
  - NEW Government Investments Plan
  - Commercial Offices
  - Country OutLook
- Business Advisory
  - Market Research
  - Economic Analysis
  - Egypt Profile
  - Sector Outlook



The main problem of this site is that no Consistency at all, pages change it's layout all the time.

Fig [3-24]

3.3.3. Web Services:

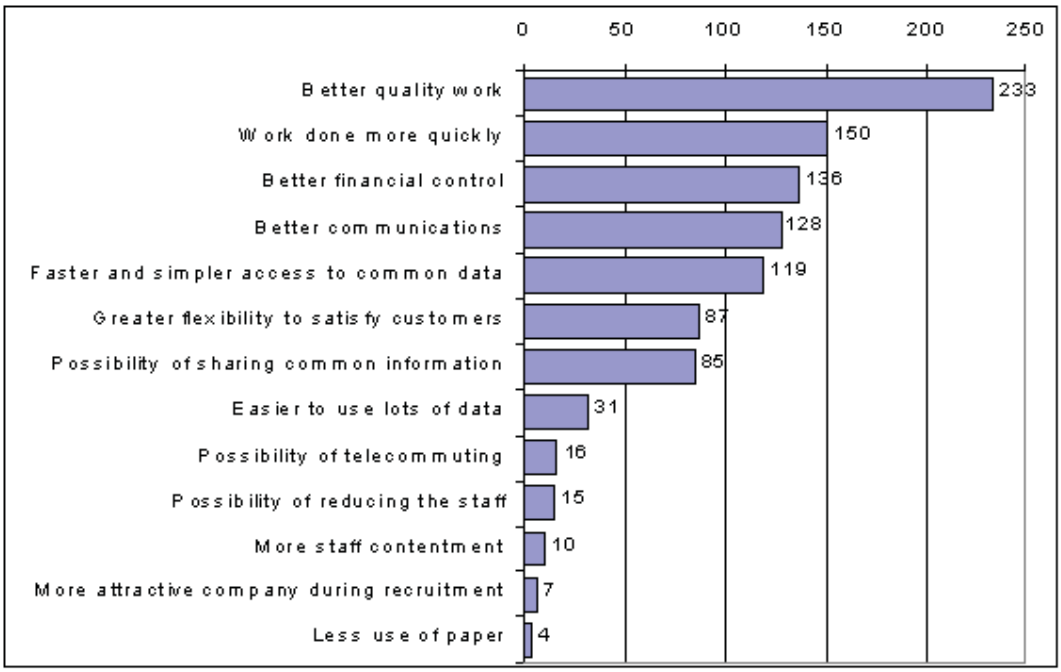
'A web site will not meet the needs of the organization providing it, unless it meets the needs of the intended users, and provides " Quality in use".'[26]

3.3.3.1. IT & Construction Attribution:

Construction is a collaborative activity involving a multi-disciplinary team including client, architect, engineer, consultant, contractor, etc. Each member of this team is responsible for certain aspects of the project. Different professions use their own unique processes to undertake their tasks, but often have to rely on information supplied by others. At present, the communication problem between the team members is often a cause for project delay and building defects. Improving the communication link has been identified as crucial to further efficiency gain in construction [21].

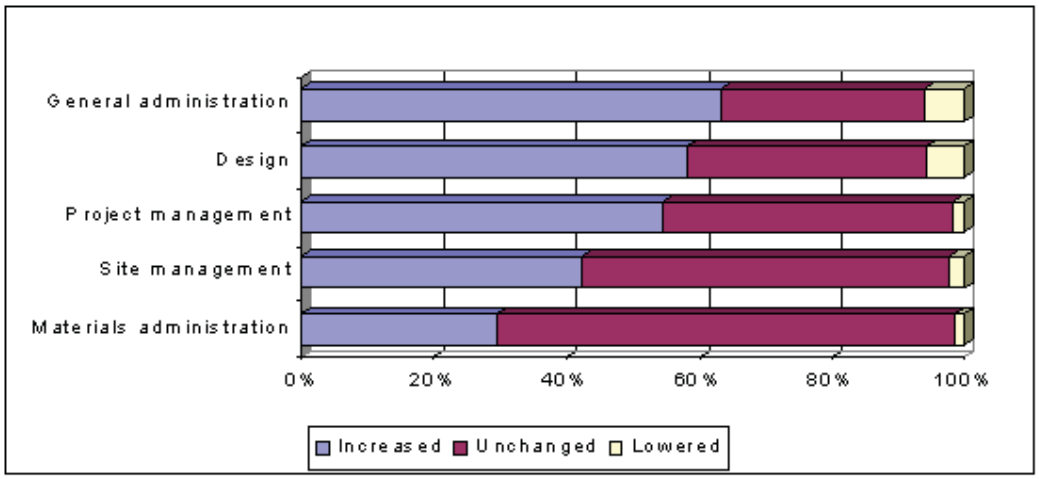
Information Technology (IT) is bound to revolutionize the way people exchange information and documents. IT is defined as "the use of electronic machines and programs for the processing, storage, transfer and presentation of information". [20]

Fig [3-25] displays the main benefits achieved by the adoption of IT [12]. The main advantages provided by a greater use of IT are better quality work; work done more quickly, better financial control, better communications, and simpler and faster access to common data according to the respondents.



Benefits of IT.
Fig [3-25]

The introduction of information technologies is considered to have raised productivity in most areas [12], as is shown in Fig [3-26]. General administration, design and project management are the areas for which productivity has increased the most while materials administration has largely remained unchanged according to the respondents.



The impact of IT on the productivity of business activities.
Fig [3-26]

3.3.3.2. RCCNET Services:

Generally speaking, the services provided by RCCNET (table [3-1]) are good and leading in the Middle East, but they need to be developed and enhanced, one of the most important needs is to encourage visitors to become members, and this can't be reached with out developing and increasing free services provided to gain visitors trust.

RCCNET as most AEC portals currently available on WWW, approach the web through a mix business models, they sell some products directly on the web site, they use the web to support their traditional non-web based, and they may also sell some advertising or generate leads for partners, Such mixed models can work just fine, but they can also be a significant source of difficulty and confusion. (Discussed in details in chapter 4: Recommendations).

To evaluate the services provided by RCCNET web site, I will follow up three separate data collection efforts, which will provide a comparison field to help evaluating and setting recommendations for development:

- **First:** a review of different researches and surveys recommendations.
- **Second:** a survey on services provided by a similar leading web site.
- **Third:** a survey on users.

RCCNET services could be divided in to two kinds:

- Pre-paid Services.
- Free Services.

	Pre-paid Services	**Free Services**
Users	Members only.	Any Visitor.
Services	• Market Accessibility: Tenders, Suppliers, & Building & Construction Cost Data: Material, Labor & Cost of Work. • Project Opportunities Projects in Egypt & Arab Country, Government Investments Plan, Contract Awards, Commercial Offices, Country Outlook. • Business Advisory Market Accessibility, Economic Analysis, Stock Market, Benchmarking, Construction Legislation. • Contractors • Knowledge Base Engineer's Guide, Case Studies • Recruitment Agency Find A Job, Find A Candidate • Consultants	• Web Sites: Web sites Database of companies working in different construction fields. • Training: 1. Construction Management Training. 2. Construction Technical Training.

Table [3-1]

Through strategic partnering and supplying excellent customer service to existing clients, a web firm can expand the number of projects able to bid and is a firm that the client will approach again for upgrades and new services. [8] RCCNET web site, according to this fact, should increase partnering.

On February 2001 RCCNE announced Strategic Partnership with AssetLine.com for on-line construction equipment exchange into Egypt and Africa.

- **First:** Recommendations of Researches and Surveys:

Unfortunately, there are few researches and surveys conducted on Construction IT in general. This section will review several researches and surveys concerning developing the use of web-based solutions and enhance e-commerce in architecture, engineering, and construction (AEC) industry. And extract conclusions to evaluate services provided by RCCNET web site.

1. Several surveys have been conducted in the past couple of years to determine the impact of information technology in the construction industries of various countries. Such surveys were conducted in New Zealand; Sweden, Denmark and Finland; Hong Kong; and Saudi Arabia, they are all published in the electronic journal of IT in construction, www.itcon.org .The purpose of these surveys was to provide a portrait of the use of electronic technologies in the industry. It provides an interesting comparison between the construction industry and other service industries, but is already two years old.

2. The Canada Mortgage and Housing Corporation (CMHC) conducted a survey in 1997 to determine the level of penetration of the Internet in the housing sector [7]. This survey focused on associations, organizations, and government agencies involved in the housing sector. Only 17% of the respondents were from the private sector. Hence, this survey provides a clear picture of the use of the Internet within non-profit associations and governmental agencies but not within consulting firms and contractors.

3. Hugues Rivard, Assistant Professor at Concordia University- Canada, [12] conducted a survey in 2000 to reveal the current and planned use of computer-based and telecommunication technologies as well as to determine their impact on architectural firms, engineering firms, and contractors (AEC) in Canada. To achieve this purpose, the survey looked at the availability and usage of computers, computer-aided drafting software, networks, and information technology among AEC firms. The results provided directions in research, development, training, and strategies that will respond to the needs of this industry. The findings of the survey concluded facts and remarks:

    - It is clear from the survey that information technology and computers are now an integral part of the day-to-day business within most of the AEC industry.
    - Almost every single employee in architectural and engineering firms does work on a desktop computer and access WWW.
    - Almost every architectural and engineering firm, produce most of the drawings they generate, using CAD software.
    - Many business processes such as bookkeeping, invoicing, and specification writing are now almost completely computerized and the tendency is toward a greater computerization of the remaining processes.
    - The firms of most respondents have adopted the Internet and are now using e-mails and the WWW on a daily basis. The remaining firms will inevitably adopt this new technology in the coming years if not months. Many firms even have a presence on the Web, and half of those, which do not have a presence, intend to do so in the near future.

- The majority of AEC professionals still exchange design information by means of paper drawings and specifications as they used to do prior to the advent of computers. It is a question of time before the various players get accustomed to this new mode of communication.
- The AEC industry was a little slower in adopting IT than other service industries that are more information intensive such as the communications industry and business services, but this is understandable since the AEC industry tends to be risk avert and prefers to adopt a technology that has been proven. Technological improvement in this industry is usually driven by necessity rather than by the need to be at the cutting edge.
- Adopting a new technology always involves significant investments. The great majority of respondents reported that their companies have increased their investment in IT in the past two years and that they will increase them further in the next two years. Factors such as efficiency, demands and competition are all considered important motivators to make new investments in IT. The majority of the respondents consider that the main area for investment in the next two years will be computer-aided design by far followed by the Internet and accounts systems. The staff is in general very receptive and even actively involved in the introduction of new IT solutions.
- The advent of IT has been both beneficial and detrimental. According to the respondents, IT has raised productivity in most business processes and particularly in general administration, design and project management. The main benefits achieved by the use of IT is an increase in the quality of documents, an increase in the speed of work, a better financial control, better communications, simpler and faster access to common data as well as a decrease in the number of mistakes in documentation.
- The main area, Fig [3-27], for future investments is computer-aided design (CAD). This is a major investment cost since almost every architectural and engineering firms surveyed depend on CAD to do their work. The next areas are the Internet, accounts systems, cost control systems and project management. Very little investments are planned in the areas of product models and virtual reality.

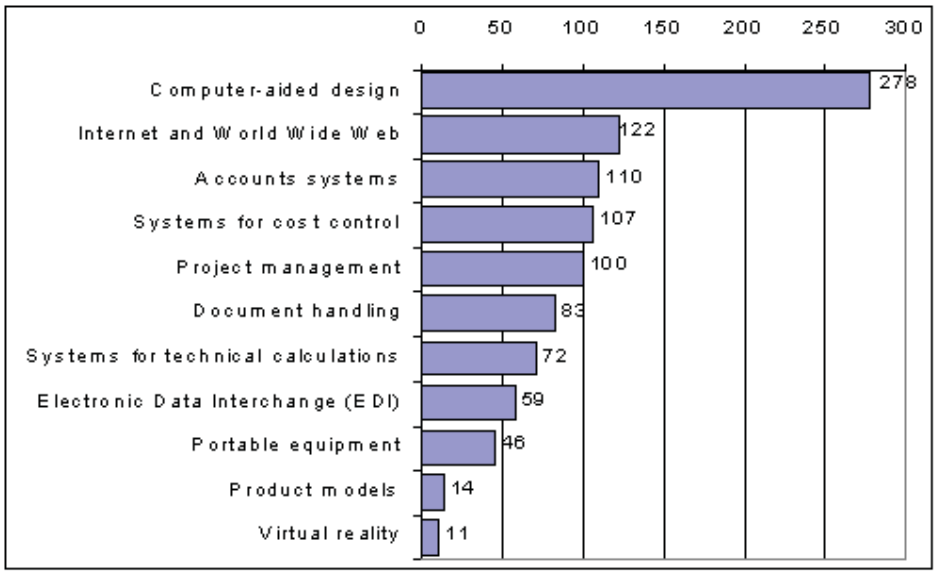


Fig [3-27]

4. M.Sun, G.Aouad, at the research center for built and human environment, University of Salford, UK [22], prepared a research and published it July - 1999, this research shed a light upon the problem of the integration of AEC applications. While not denying the benefit of individual AEC application in automating certain tasks during the construction process, it has been widely acknowledged that the next breakthrough for further efficiency gains lies in the integration of AEC applications. There is a wide spectrum of integration systems from simple workflow coordination -- a simple form of automated document management to fully integrated concurrent engineering systems supported by Internet. This paper has classified these IT application roughly into six groups:

    - General-purpose applications, i.e., word-processing, spreadsheet, e-mail, groupware, databases, etc.;
    - Computer Aided Design and Information Systems;
    - Building Engineering Applications;
    - Cost Estimating and Accounting;
    - On-site Management;
    - Facilities Management.

    Fig [3-28] is a 'roadmap' showing when and who is using different applications during the construction process. Each group of applications likes an island of automation. While individual application may be good at automating certain tasks, the lack of integration between discrete applications means the same building information needs to be entered many times and stored at different places. This obviously causes inefficiency and more risks for errors.

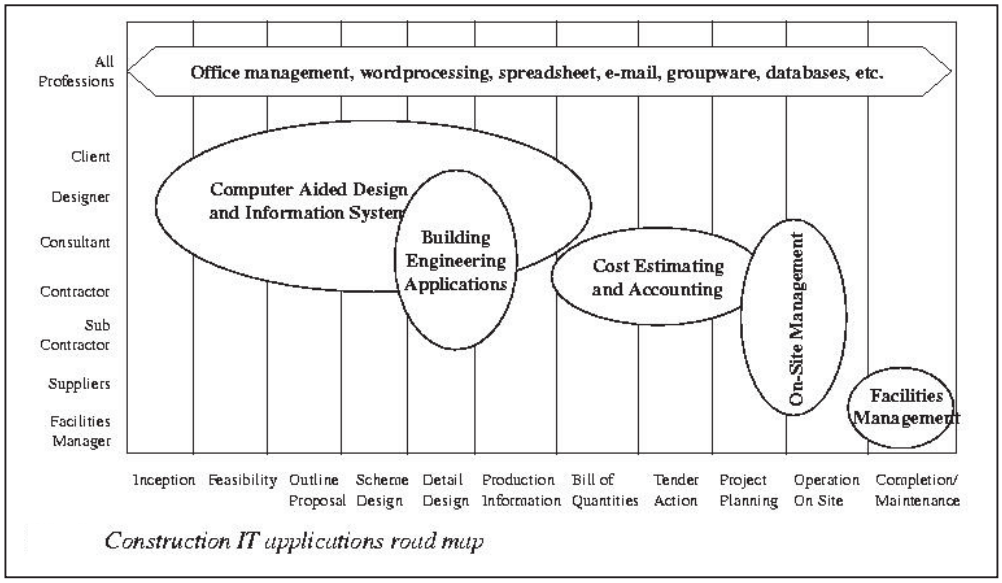


Fig [3-28]

The paper suggested using AEC specialized web sites to bind all factors together to over come the problem of integration. Following, RCCNET should support their users by providing usefull information on different applications and their best applying.

5. Benchmarking the use of IT support supplier management in construction [1], This paper follows an element of the research programme of the Construct-IT Centre of Excellence, a UK-based organisation responsible for promoting the strategic awareness of IT within construction enterprises. The paper reviewed the use of IT to support supplier management wich provides a useful case study of how performance improvement might be possible within construction.

Benchmarking methodologies are primarily a tool for organisational continuous improvement. As competitors provide challenge within marketplaces, they also provide insight into how operating costs can be reduced and efficiency increased. Benchmarking through objective competitor analysis allows companies to measure products or services against competitors and best-in-class companies in other industries.

The paper defined benchmarking as `an external focus on internal activities, functions or operations in order to achieve continuous improvement.' As a tool to manage change, benchmarking recognises the futility of maintaining a competitive edge in a dynamic marketplace.

The paper identified four types of benchmarking; internal, competitive, parallel industry and best practice. The research that forms the basis of this paper uses all except internal benchmarking. Internal benchmarking is often a first step for many companies in learning a benchmarking methodology. The comparison is between different operating divisions or regions of the company where data are often readily accessible.

- *Competitive benchmarking,* occurs between firms within the same industry sector who sell an identical or similar good or service. This form of benchmarking is often the most difficult as it relies upon competing firms to share details of how processes are performed with each other.

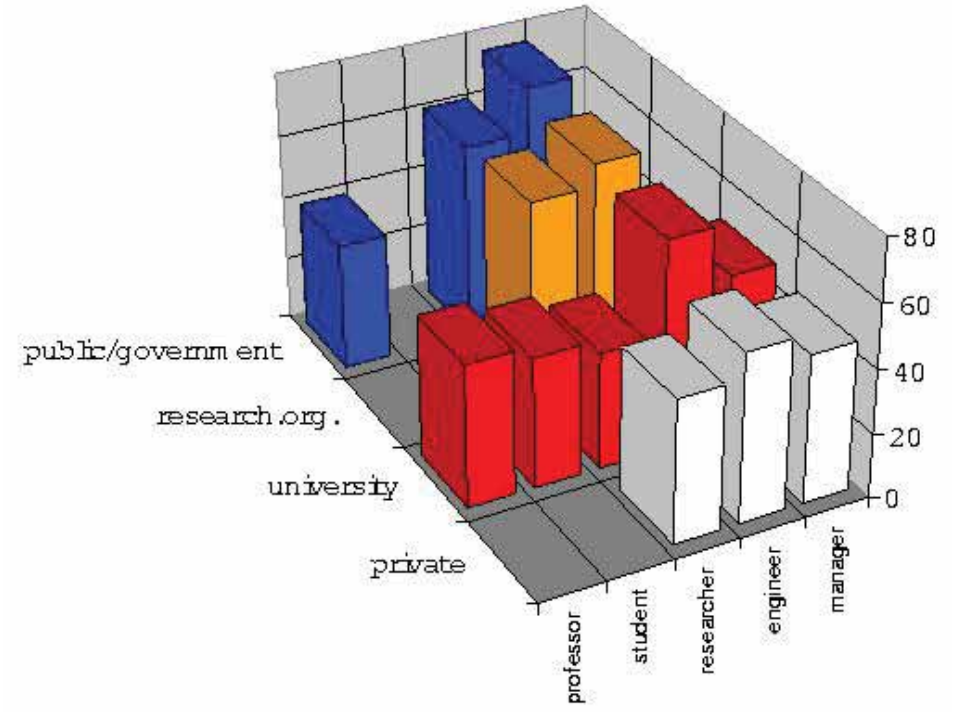
- *Parallel industry benchmarking* ,occurs between companies from different sectors who undertake a similar process of production or service. This type of benchmarking is considered easier than the previous example as issues of access and willingness to participate in a comparative study will not be as problematic between companies who are not in direct competition.

- *Best practice benchmarking* ,considers the merits of a comparison from a particular market leader who is known to have an exemplary process. While all of the operations of the process may not be totally transferable between firms due to different industry structures, there will often be important lessons that can be learnt.

RCCNET has a sub link for benchmarking under the main link of business advisory, But it is still underconstruction , it is recommended to consedier the previous kinds of benchmarking to prove superior, particularly because it is the first web site to cover benchmarking among Middle East companies.

6. A survey on the impact of the Internet on scientifc pubishing in construction IT and construction managemnt was conducted in Aprile 2000[3]. aimed at measuring to what extent Internet is already changing the scientific information exchange and how researchers feel about the changes. The paper presents the results based on 236 replies to an extensive Web based questionnaire. 65% of the respondents stated their primary research interest as IT in AEC and 20% as construction management and economics. The questions dealt with how researchers find, access and read different sources; how much and what publications they read; how often and to which conferences they travel; how much they publish, and what are the criteria for where they eventually decide to publish. Some of the questions confronted traditional and electronic publishing with one final section dedicated to opinions about electronic publishing. According to the survey researchers already download half of the material that they read digitally from the Web. The most popular method for retrieving an interesting publication is downloading it for free from the author's or publisher's website. The shift that the Web is causing seems to be towards the "just in time" reading of literature.

The survey showed Surprisingly that, the professor/teachers use the Internet more than the students. The heaviest users of the Internet are engineers and professors not working at a university (Fig [3-29]). The Internet seems popular in environments where traditional paper publications are not available, are difficult or too much trouble to get, or where tangible results are expected quicker (engineers, researchers, non-university environments). This chart also shows that the biggest opportunity of the Internet lies in the vertical communication of the scientific results between the academia, research and practice. The respondents from research and practice, however often found scientific articles "too academic or too long".



Part of time spent (in %) reading scientific information retrived over the Internet rather than in paper form, split by the job function and affilication.
Fig [3-29]

According to previously reviewed survey, RCCNET should support the Latest Scientific publishing in Construction IT & Construction management. This could be implemented by adding the ability of publishing such papers on the site and downloading it for free, books related announcement and the possibility of buying it from the web site, and provide links to specialized web sites & Journal.

- **Second:** a survey on services provided by a similar leading web site:

This section will browse one of the leading AEC web sites and it's services that leaded to superiority:

Construction.com:

Construction.com is a leading Construction Industry Marketplace that enables the construction community to operate their businesses more effectively by providing access to real-time industry news, projects, building products, industry leading workflow applications and mission-critical data. (Fig [3-30]).

Construction.com is part of the McGraw-Hill Construction Information Group, along with its powerful, leading sister brands: F.W. Dodge, Sweet's, Engineering News-Record, Architectural Record, CAP and Design Build. Together these brands provide the design and construction community with the most comprehensive, timely and accurate sales, marketing, information and knowledge solutions available through a staff of over 1,700 employees throughout North America.

The Construction Information Group is part of The McGraw-Hill Companies. Founded in 1888, The McGraw-Hill Companies is a global information services provider meeting worldwide needs in financial services, education, and business-to-business information through leading brands such as Standard, Business Week, and McGraw-Hill Education. The Corporation has more than 300 offices in 32 countries. Sales in 2000 were $4.3 billion.

Construction.com -home page.
Fig [3-30]

The information structure of Construction.com is well organized; site navigation is divided in to six centers, each one has sufficient links to all related services:

1. Resource Center:
Users can find construction professionals and firms, Financial and business resources, and industry events.

2. Project Center:
This center gives users the ability to search for projects, bid a project, manage a bid, and manage a project.

3. Building Products Center:
In this center users can find, select, specify, compare, purchase products.

4. Equipment Center:
This center gives users the ability to search for equipment, manage equipment, find owner, and fleet services.

5. Career Center:
This center Contains job search facilities and information on continuing education.

6. News Center:
Users can find late breaking news, Headlines, top stories, and analysis.

By performing a quick navigation throw the different centers; it is found that most of the services are available for all users and few needs registration It is also noticed that, Construction.com has many partners supporting different services, for example:

- E-Builder is accessible through the construction.com Project Center. E-Builder supplements the tools allow owners to manage all aspects of their construction contract portfolio. E-Builder develops powerful business-to-business Internet applications for the commercial construction industry. Their suite of products enables and enhances the exchange of information among construction industry participants while helping projects come in on time and on budget. Additionally, the e-Builder open architecture supports the integration of desktop systems and other legacy applications." E-Builder project collaboration and document management tools have been utilized on major construction projects nationwide.

- Ironmax powers the construction.com Equipment Center, and allows construction.com users to buy, sell, and rent a wide array of construction equipment. Ironmax is an Internet-based business-to-business marketplace for the construction equipment industry. Through its web site, the company provides a number of services, including a marketplace to locate and rent or purchase all types of construction equipment. The company began operations in 1999. IronMax.com is designed to save time and money for those who buy, sell and rent construction equipment.

- The Blue Book of Building and Construction is the industries most comprehensive resource for finding trade professionals. The Blue Book is accessible through the construction.com Resource Center.

Construction.com is a good example to be guided by in its information architecture services provided. It is found that, RCCNET have some of construction.com services, but arranged differently and not fully integrated.

Listed below (table [3-2]) are some basic statistics on Construction.com usage:

Construction.com Statistics (as of April 1, 2001)
▪ 20% of ENR 400 companies
▪ Over 90,000 log ins in March
▪ Average log ins per business day for March: over 4,000
▪ Over 16,000 user seats sold
▪ Over 12,000 active users
▪ Over 14,000 projects managed by Construction.com totaling more than $150B
▪ Over 1,500 projects constructed or under construction totaling more than $18B of construction

Table [3-2]

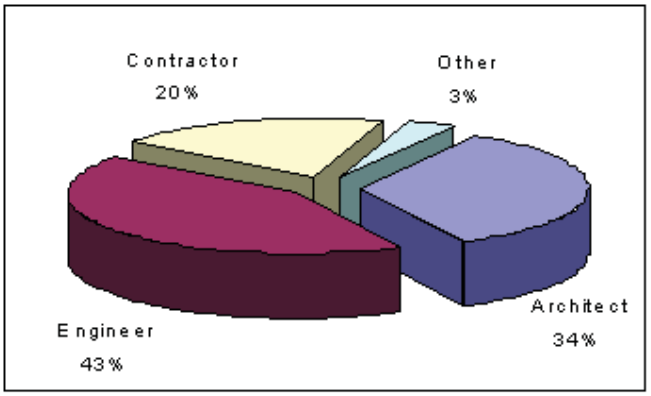
- **Third:** Survey on Users:

The purpose of the survey presented here is to investigate the AEC filed needs, and to reveal users opinion of current RCCNET web site and it's services, to investigate wither the site fulfills user goals and expectations or not and How users rate their level of satisfaction, as well as to determine the impact on architectural firms, engineering firms, and contractors in Egypt.

In addition to questionnaires answered by personal contact trough friends and colleagues, the questionnaire was sent by e-mail to architects and engineers working in different firms in the AEC industry across Egypt. This sample of firms was split in three equal categories: architectural firms, engineering firms, and construction contractors. The mailing list was assembled with registers obtained from the Egyptian association of exhibitions.

The findings presented here are based on an overall 42%return rate. In general, a mail survey cannot be considered statistically significant under a 50% return rate [10]. Even though a low-response was obtained, the findings of the survey still present useful information about the respondents and show tendencies within the industry.

The distribution of responses with respect to the three categories of firms surveyed is shown in Fig [3-31] the category "Other" consists of manufacturers and distributors. The position of 65% of the respondents was in senior management and only 15% obtained a master degree.



Distribution of responses among the three categories of firms surveyed.
Fig [3-31]

Survey Findings:

➢ *Computer Availability:*

It is clear from Table [3-3] that the main workhorse is the desktop computer since there is only one portable computer per five employees in engineering firms and one per ten employees in architectural firms. In another question, it was found that architectural, engineering firms have the same high proportions of staff that use computer, and that have a computer assigned to them. Nine out of ten employees use computers in their work and eight out of ten employees have their own computer on which to do their work. These findings clearly indicate that architects and engineers have come to rely heavily on computers in their work. Contractors, on the other hand, have only half these proportions because of the proportion of staff working on site.

Categories of Firms	Desktop Computers	Portable Computers
Architects	1.2	0.10
Engineers	0.9	0.18
Contractors	0.3	0.06

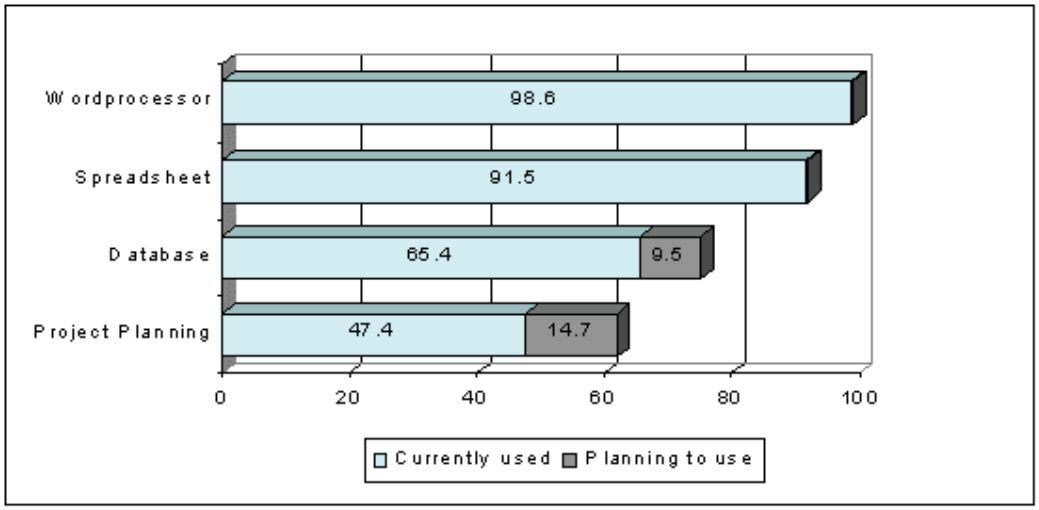
Number of computers per employee.
Table [3-3]

➢ ***Computer Usage:***

Computers are versatile and can be used for many purposes. This section considers the type of operating systems and office software used among the surveyed firms as well as their usage of computers in specific business processes.

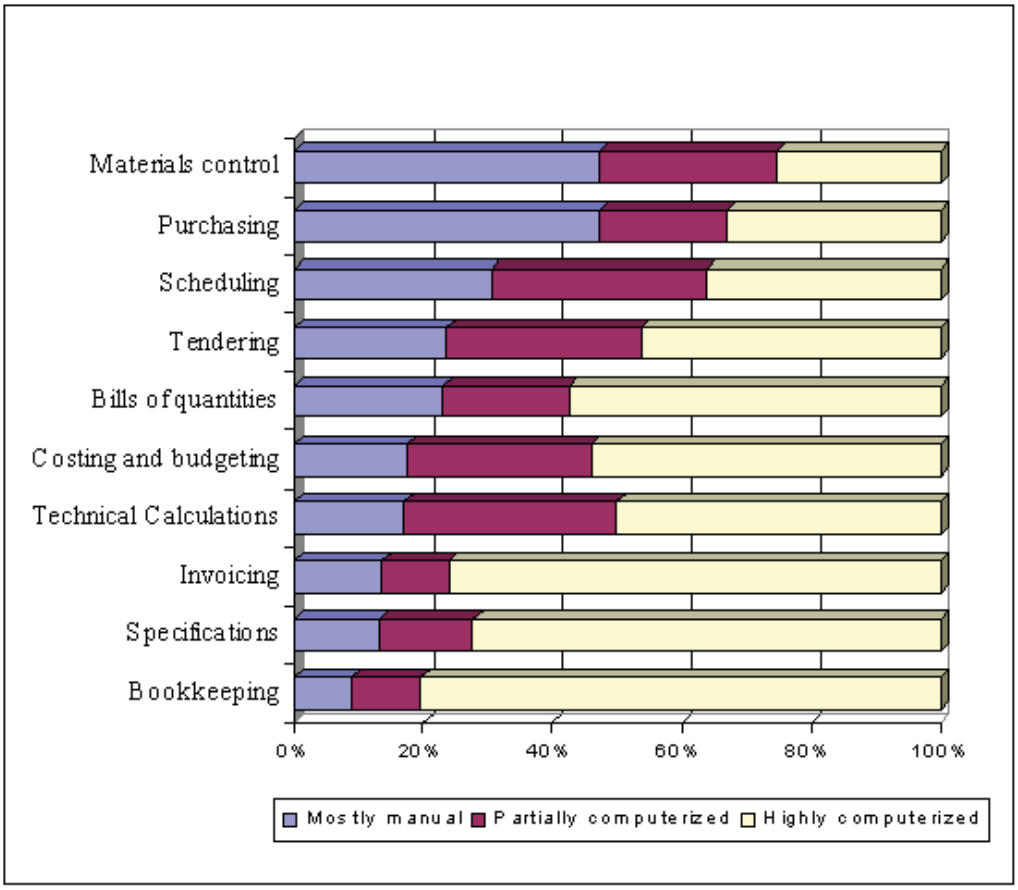
The operating system on a computer is the software responsible for controlling the allocation and usage of hardware resources such as memory, central processing unit (CPU) time, disk space, and peripheral devices. The operating system is the first software installed on a computer and is the foundation on which applications run. Microsoft is the dominant brand of operating systems used in the construction industry since it sold almost 90% of all operating systems installed. The next contender is the Mac OS with 8%.

Office software consists of general-purpose applications such as word processors and spreadsheets. The survey also looked at the types of office software used in the industry. Fig [3-32] shows that almost all companies surveyed that have computers use word processors and spreadsheets. On the other hand, database systems and project planning packages are not as prevalent but their use is increasing.



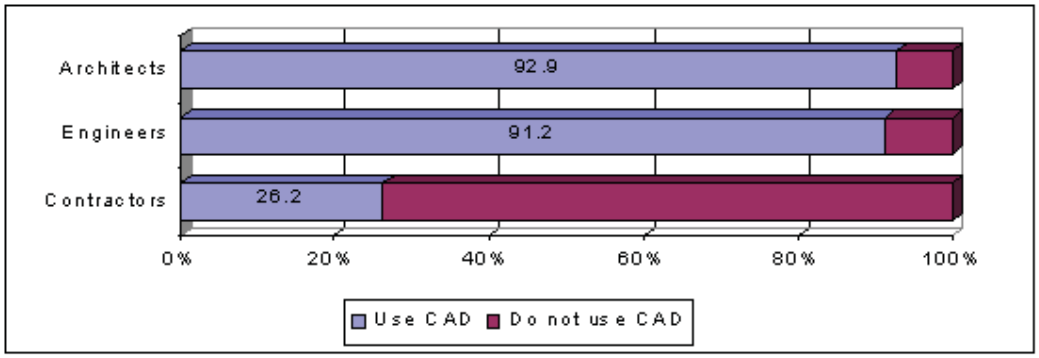
Percentage use of office software in the construction industry.
Fig [3-32]

The survey evaluated the extent of computerization of some business processes and the results are shown on in Fig [3-33], it is clear that the tendency is toward a greater computerization of the processes shown since the "highly computerized" category is extensive in most of them.



Extent to which processes are computerized.
Fig [3-33]

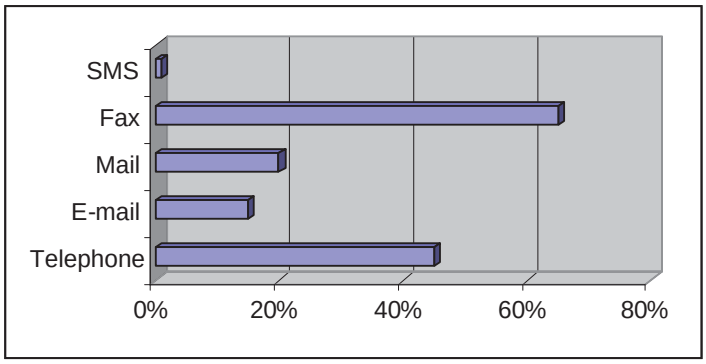
The main output of any architectural and engineering firms is drawings and these drawings are now mostly generated on computers. Computer-aided drafting (CAD) is used in 76% of the firms surveyed that have computers. Fig [3-34] shows that almost every architectural and engineering firm surveyed use CAD. On the other hand, an only one out of four contractor uses CAD.



Percentage of firms that use CAD.
Fig [3-34]

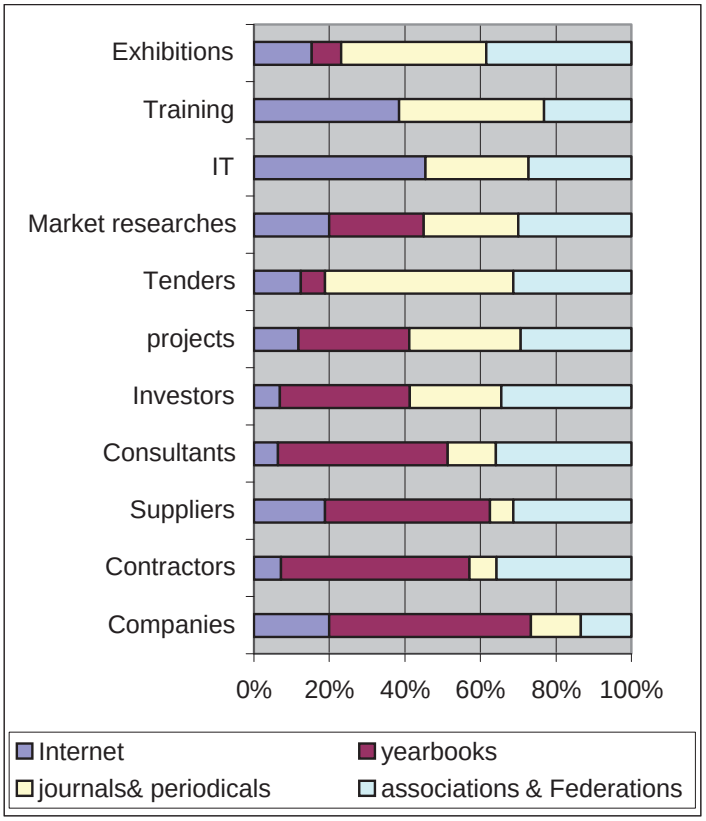
- ***Communication Method:***

An important capability provided by IT is the instant transfer of documents in electronic forms; But Fig [3-35] shows that most communication method in the industry are still by traditional means.



Communication method in the industry
Fig [3-35]

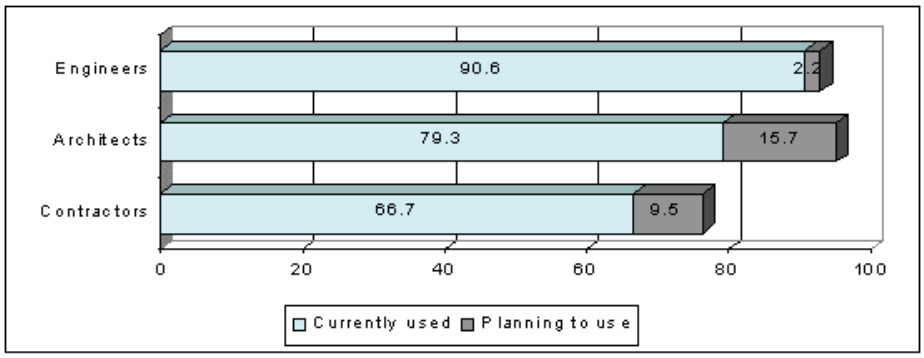
In another question, it was found that most firms in AEC industry still depend on traditional ways in gathering information for developing operations and decision-making. (Fig [3-36]).



Method of gathering information in AEC firms.
Fig [3-36]

- ***The Internet Usage:***

Fig [3-37] shows the adoption of WWW browsers in the three different categories of firms surveyed. The use of the Internet seems ubiquitous in engineering firms. A large proportion of the architectural firms have also adopted the Internet, but at a lesser extent than engineering firms. On the other hand, a large proportion of the contractors surveyed have adopted the Internet but there are still many that have not. It was also found that most of Internet usage is restricted to browsing WWW and e-mails.



Percentage use of Web browsers with respect to the three types of firms surveyed.
Fig [3-37]

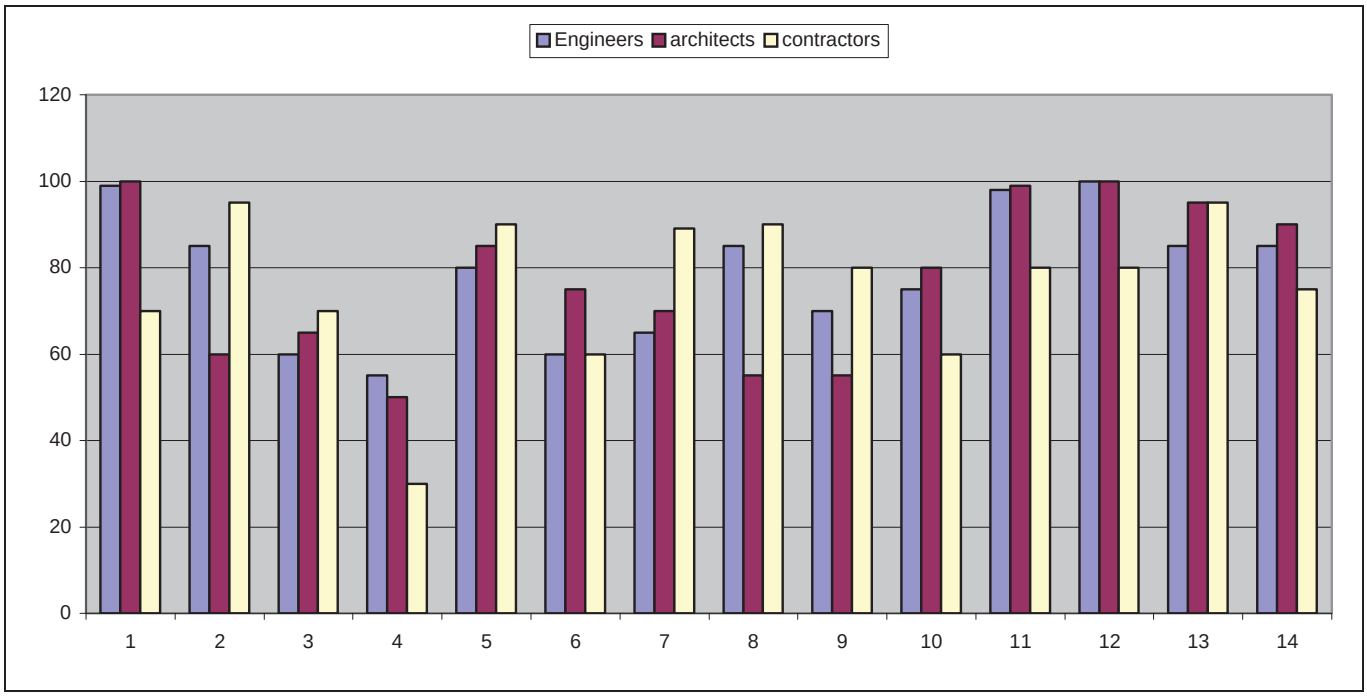
- ***RCCNET Web Site:***

35% of firms surveyed visited RCCNET before, and this indicates that the web site still needs good marketing. Large proportion of firms surveyed (95%) agreed on developing the web site; most justifications where indicating to improve services provided and re-designing the web site.

A suggestion of adding new services to RCCNET web site was present, large proportion of firms surveyed strongly agreed on adding the services of buying AEC books & software and next comes publishing AEC researches.

Fig [3-38] shows the Percentage of agreement on new services suggested with respect to the three types of firms surveyed.

1. Publishing researches.
2. Purchasing products.
3. Banking.
4. E-mail.
5. Managing projects through the web site.
6. Weather.
7. Tender announcements on mobile phone.
8. Fleet services.
9. Bourse.
10. Building type study design.
11. Buying books
12. Buying software.
13. Egypt maps.
14. Online Groups. (To encourage communication among members).



Percentage of agreement on new services suggested with respect to the three types of firms surveyed.
Fig [3-38]

3.4. Conclusion:

Evaluation is the systematic collection and analysis of data needed, to assess the extent of the system's functionality. Also assess the effect of the interface on the user, and identify any specific problems with the system.

Getting a good understanding of what is happening in a web-based business requires moving beyond simple frequency counts and basic questions. Central to obtaining a deeper understanding is the notion "Visit". Visits are not directly captured in log files or other websites data. They must be reconstructed from the data. The reconstruction process necessarily involves making a number of assumptions and analysis.

This chapter, focused on investigating the usage of web-based solutions in Egyptian AEC industry, based on surveying the field and evaluating RCCNET web site as the first AEC industry information services provider in Egypt, and captured lots of problems and failures of implementation and reviewed solutions.

This evaluation leads to set general recommendations for implementing web-based solutions and improve the current RCCNET web site.

Chapter 4

Recommendations.

The primary focus in this chapter is on setting general recommendations for improving web-based solutions usage in AEC industry in Egypt, based on the evaluation done in chapter 3.

4.1. Introduction:

The creation of the WWW is revolutionizing the way people receive, send, and process information. Users can process information from all around the world anytime of the day, quickly and inexpensively. This has raised productivity in most business processes, over the last few years, and resulted in an increase in the quality and in the speed of work, betters financial controls and communications, and simpler access to common data.

However, the majority of the AEC corporations operating in Egypt are still dependent on the more traditional means in both marketing and service delivery, leaving out the new technology that, if implemented, would facilitate communication means in recognizing foreign market needs and international tenders in this field. Success depends on progressive development of the information provided, and a complete knowledge of the end users needs, to reach a user-centered system design.

The evaluation conducted in chapter 3, has given the opportunity to study the Egyptian experience in using web-based solution to support the AEC industry, and to set general recommendations for implementing such approach and improve the current RCCNET web site, theses recommendations are necessary for RCCNET continued successful existence.

4.2. Recommendations:

Web sites are developed for the long term, but understanding why users come and what they expect out of the site is the first step in a successful implementation with web-based solutions. Then, how to drive return traffic to the site? What differentiates and “value adds” will be available for the user to take advantage of over the long term. This is the survival challenge.

Recommendations are set according to failures detected during the evaluation processes, with respect to the three evaluation directions used in chapter 3:

1. Web Information Architecture.
2. Web Usability.
3. Web Services.

4.2.1. Information Architecture:

The organization of information and transactions in the web must be in the most logical manner possible; "engaging customers" could reach this.

Web Customer Engagement grows from providing customers with the content that they need in a way that helps to frame a suitable information structure that furthers the web site business objectives.

Practically, Begin to turn the focus to the use of website and customers data to connect the business directly with the needs of individual customers. The popular general term for such connection is personalization. The term is by now a full-fledged buzzword. As such, it confuses a good idea that of connecting to customer with a rapidly expanding set of technologies and product offers that claim to enable the connection. [5],[18]

Personalization is a set of approaches and techniques for engaging the customer more directly. It is not a single product or technology, but a combination of activities that needs to make sense for your business and your customers. Websites providing business-to-business information and products are particularly well suited to investments in personalization because the high value of each customer relationship makes it easy to justify the expenditure on acquiring and keeping that customer. [5]

Understanding customers as members of groups is an essential part of engaging them as individuals. The group identity provides a context for identifying customer needs and preferences. It makes one-to-one engagement more efficient and is often the basis for cross selling and up selling. There are different tools and approaches for identifying groups of customers and for putting the group identities to use. The approaches can often be combined. Selecting the right combination depends on understanding how they connect with the particulars of the business.

- One approach, depending on software tools known as recommendation engines, works well if customer preference is an important component of the purchase process. Recommendation engines automatically use groups formed from within customer population, to individuals. Their focus is on providing automated interaction with the customer. They may be relatively ineffective in providing useful insights for marketers.

- Market segmentation is another approach to grouping customers. It depends on group definitions that come from outside the customer population. The value of the approach is its ability to connect the customers to the larger market. Such connection, for example, to a particular vertical market, can be an important part of identifying customer needs. It can also help in knowing where to look to find more customers.

- Customer segmentation, unlike market segmentation, looks inside the customer base for groupings. In this regard, customer segmentation is like recommendation engines. It differs from recommendations engines in that the focus is explicitly on defining the customer groups in a way that provides insight for the marketer. It is particularly valuable for identifying the characteristics of the most valuable customers.

Most businesses can usefully deploy a combination of these approaches. [5]

From the evaluation conducted in chapter 3, it was found that customer in AEC industry could be grouped as following:

- Engineers.
- Architects.
- Contractors.

Web customer engagement means providing customers with the content they need, in a way that furthers the business objectives. There are three parts to that formula: customers, content, and business objectives. (Table [4-1]). Developing a successful web customer engagement program requires paying attention to all three parts. [5]

	Customer	**Business**	**Content**
Individual Engagement	Registration and profiles- basic usage data.	Objectives and benefits of engagement	Classification by use and profile preferences
Group Engagement	Simple segmentation and groupings	Cross-selling and up-selling objectives	Finer granularity to reflect segment focus
Engagement over the time	Records over time to identify life cycle stage	Life cycle – overall picture and benefits	Yet finer granularity- multiple delivery channels.

Staged development for customer engagement.
Table [4-1]

The Personalization effort is critically important, when using the web to support web business, it is the interactions with the end customer that often tie together the different goals and functions of the web site. Practically it will lead the site to a good site map, which provides a fast and easy navigation schema, and also suitable labeling.

Customer information, gathered through log file data and through closer kinds of customer engagement, becomes the central resource that should be managed.

4.2.2. Usability:

In chapter 3, a practical usability evaluation on RCCNET web site was conducted; several problems and solutions were reviewed. The experience of evaluating RCCNET has given the opportunity to study the conception of usability in AEC web services providers, and based on it general guiding principle had to be set.

Generally, websites should make the main things users want to do very simple. People are extremely goal-driven on the web. They have something specific they want to do, and their don't tolerate any thing standing between them and their goal. So, the guiding principle for web design must be to get out of the way and make users successful as fast as possible.

According to J.Nielsen, [13] It is extremely easy to get a high count of unique visitors by running a big promotion, but it dose the site absolutely no good if these visitors take one look at the home page and turn away in disgust, never to return. The only real success criterion for a website is repeat traffic from loyal users.

He defined four main reasons users return to some websites and not to other websites. These four criteria are the foundation of good web design because they are the four things users wants the most. They can be summarized by the acronym "**HOME**":

- **H**igh-quality content.
- **O**ften updated. (Depends on the topic and the goals of the site.)
- **M**inimal download time.
- **E**ase of use.

If a web site provides these four elements, users will be happy and it will be considered a good site.

Giving users the four "HOME" qualities will ensure the popularity of a web site. But it is not enough to simply give users what they want. You need to go beyond the four basics to have a truly stellar site. To move from a "HOME" design to a "**HOME RUN"** design, add the three extras:

- **R**elevant to users' needs.
- **U**nique to the online medium.
- **N**et-centric corporate culture.

The R in HOME RUN implies that it is not sufficient to provide high-quality content. The content must also be relevant to your users and the specific things they want to do. Furthermore, the site must provide this relevant high-quality content in a way that's unique to the online medium's special characteristics.

4.2.3. Services:

"*Businesses with different objectives and revenue models need different kinds of information in order to measure success*". [5]

4.2.3.1. Identify Web Businesses Models:

AEC industry has different kinds of business, as reviewed in chapter 3. And the Internet has provided fertile soil for the growth of new kinds of businesses. It is literally true that most interesting approaches to Internet business being developed today were not even visibly on the horizon just a couple of years ago.

To identify a web's different kinds of suitable businesses, the categorization effort is critically important. Businesses with different objectives and revenue models need different kinds of information in order to measure success.

According to B.Zoellick [5], The way around the problem of coming up with a workable classification is to keep the classification at a high level. One approach that works well is to "follow the money." In web businesses, money typically comes from one of three places:

1. Completing sales of goods or services on the web.
2. Selling access to web visitors ("eyeballs"). The revenue here is usually from advertising or payment for lead generation. Portals, for example, make their money by providing access to potential customers.
3. Closing sales of goods or services through non-web channels. The web is used to support the primary business (e.g., lead generation for a company's own products, customer support for your products, and so on).

These different revenue sources provide a workable framework for categorizing web businesses.

Detailing, the first model, the business depends on closing sales on the website, the web provides are primarily interested in understanding what differentiates lookers from buyers and in how to turn lookers into buyers. Also want to figure out how to make the buying process fast and as simple as possible. Making buying easy is partly a matter of looking at the steps that buyers must take and then streamlining that process. It can also build off of knowing more about what buyers want. Pursuit of some of these questions requires keeping track of visitor identity, at least anonymously, and so requires the use of cookies or some other way to identify a user throughout a session on the site. It can also be helpful to tie the log file information into a registration database.

In the second model, the businesses that depend on advertising or other revenue from generating leads or linking visitors to other sites have a set of concerns that are, in some ways, just the opposite of the issues facing sites that sell directly on the web. Here, the focus is on getting people to the site and keeping them for as long as possible.

The most common form of web business, the third model, is one that supports another non-web business operation. Support functions typically include promotional activities, lead generation, sales and channel support, and customer relationship management. Companies that have developed capabilities in each of these areas find that they support one another and that the connective tissue between the operations is built up from customer information. Website activity data is one of the key inputs into the store of customer information.

4.2.3.2. Customer Information:

The data in log files can be a big help in understanding what people value about the website by looking at where they spend their time and at how much time they spend with particular pages. It is equally interesting to know how people move through the sit and whether there are departure points away from the site that could be changed in some way to lead people back into the site. Log file data, once again, can help with such questions. However, it is probably interesting to knowing when customers return to the site. This question requires use of cookies or a registration database to answer. Cookie information can also be used to develop demographic profile information for the site. [5],[18]

4.2.3.3. AEC Webs Hybrid Course:

AEC businesses mix together the different web business models, selling some product directly, supporting a non-web business, and building a community of users. In pursuing such a course, it is critically important to be able to clearly identify which parts of the web business are working with which models and to be able to clearly state the intended way in which the different business models will support one another.

In practice, there are logical distinctions among the three business models, discussed before, most AEC portals currently available on WWW, approach the web through a mix of the business models, they sell some products directly on the web site, they use the web to support their traditional non-web based, and they may also sell some advertising or generate leads for partners, Such mixed models can work just fine, but they can also be a significant source of difficulty and confusion. One of the leading AEC hybrid portals is Construction.com, Reviewed in chapter 3.

4.2.3.4. AEC Virtual Net Marketing:

An interesting class of web business model hybrid that is emerging rapidly enough to deserve special treatment is the business that creates net markets (Virtual Market Place). [5] The key to these businesses is that they address product information and distribution problems in fragmented markets, where it is difficult to compare information from different suppliers. Cost and timesaving would be the biggest advantages of such approach, which could be designate as an AEC e-commerce.

4.2.3.5. Towards Egyptian AEC Virtual Market Place:

- **Now:**

Unfortunately According the evaluation, (Chapter 3), the Egyptian AEC industry trial, censuring construction net marketing, is still limited and hesitating.

The industry has adopted various forms of technology, project-management, extranets, accounting and estimating software, and wireless devices, to name a few, it has been hesitant to embrace e-commerce. There are several reasons for the reluctance but chief among them is the fact that e-commerce does not offer immediate, tangible benefits.

Apparently, while builders and contractors may often be portrayed as technology laggards, they're shedding that image. They've shown that they are willing to implement proven technology tools that can save them time and money without being difficult to implement or use.

So, the question is: will e-commerce eventually play a role in the Egyptian AEC industry? Industry experts think so [25], but only if the advantages if offers outweigh the drawbacks.

Globally, according to B.Rakow [4], There are other significant hurdles standing in the way of industry wide adoption of e-commerce:

- **First**, the implementation of existing e-commerce solutions is too slow and expensive, "Most enterprise-based solutions require armies of consultants, upgraded infrastructure, and extensive training. Time-to-implementation is measured in months.
- **Second**, current solutions are too complicated. Adding that the solutions often are hard to use and require extensive training. *"It's hard to get professional buyers to change the way they do business,"* .Of course, it becomes nearly impossible to convert them if ease-of-use isn't a solution's primary feature.
- **Finally**, recouping the investment in e-commerce takes too long. The high initial cost plus the considerable amount of time needed for full adoption means a longer wait for bottom line impact. In addition, transaction and consulting fees continue for the life of the program.

- **The Future:**

The future of AEC e-commerce lies in improving process efficiencies. Technology that can help builders reduce risks, improve record keeping, and analyze costs and schedules would be widely accepted in the industry.

B.Rakow [4] believes that e-commerce will be phased into the construction marketplace, but maintains that the appropriate infrastructure must be put in place first. *"The first thing that has to happen is you have to get the technology in place to drive adoption,"*

But technology is only one piece of a multifaceted puzzle. A marketplace is essential for e-commerce to get off the ground. *"To get true e-commerce, you have to build a marketplace. And a marketplace requires real-time data. Until information is real-time, it doesn't do any good,"* B.Rakow [4].

Clearly, a marketplace and real-time data are not necessary for some forms of e-commerce such as a one-to-one model. But, real-time data is critical for a many-to-many construction marketplace to succeed because buyers must be able to determine what products are in stock as well as their price.

One example of e-commerce that is already occurring in the construction market is the ordering of plans or specifications online. No elaborate marketplace is required because plans and specs are only available from a limited number of sources. Yet another example is purchasing workers' compensation and bond insurance via the Web. [4].

"I do not believe that one marketplace can meet everybody's needs. So we will eventually see three or four major marketplaces. The question is, what is a sustainable business model for such marketplaces. The companies that can answer that question will succeed in AEC e-commerce". B.Rakow [4].

- **Marketing Tactics:**

Success in AEC e-commerce is likely to become a reality sooner or later. But builders and contractors must be convinced that e-commerce is worth it and learn how to integrate it with their existing technologies and business plans, So a marketing tactics are needed.

And, from the evaluation in chapter 3, and according to the conducted questionnaire, it was found that a large proportion of the engineers and the architects firms brows the web frequently, so depending on web marketing tactics will help in gaining their trust and visits to the AEC market places projects:

1. **Search engines** the first marketing tactic involves registering with the major search engines and web directories yahoo, Lycos, Alta-vista, Webcrawler, Metacrawler, Excite, Hot bot, Info Seek, and America Online Netfind. Registering is easy and free, and with the proper integration of some keywords in the "meta" tags of the home page can be a very successful way of promoting the new web site online.

2. **Cross-marking**: Swap links and banner ads with suppliers and other constituents the new web site does business with, Cross-marketing can be an effective means of driving traffic to the sites of both parties involved.

3. **Targeted e-mails:** Send targeted e-mails promoting the new web sit to existing customers or people who have visited the site in the past. Several sites have employed automatic e-mails and news services to people who have visited a site and subscribed to

it. This approach can be very effective in keeping past customers and potential customers informed of any promotions and company news.

4. **Banner advertising:** Unless the new web site has a decent sized marking budget, online banner advertising may be an expensive option .The cost of banner advertising is based upon cost per thousand impressions, For example, for every 1000 viewing of a banner ad, a cost will be applied to the advertiser. Web sites that employ banner advertising base their rate on number of visitors per page and how much business the site generates. Sites can also track the number of hits an advertiser's banner receives to measure its effectiveness and adjust future advertising prices.

4.3. Conclusion:

This chapter has reviewed a number of important determination, on the basis of the three direction evaluation processes done in chapter 3, concerning recommendations for developing the use of web based solutions in the AEC industry in Egypt. They are summarized as follows:

- Web customer engagement means providing customers with the content they need, in a way that furthers the business objectives. There are three parts to that formula: customers, content, and business objectives. Developing a successful web customer engagement program requires paying attention to all three parts.

- The guiding principle for in AEC services providers web designs must be to make users successful as fast as possible, this could be achieved by using "HOME RUN" rule of web design: **H**igh-quality content, **O**ften updated. , **M**inimal download time, **E**ase of use, **R**elevant to users' needs, **U**nique to the online medium, **N**et-centric corporate culture.

- There are actually a small number of basic ways to make money on the web (businesses models), They include selling goods and services directly, selling access and leads for others with goods and services, and using the site to support operations that produce revenue off the web. AEC portals should mix business models to some degree.

- Creating a world wide AEC supply network, coupled with powerful searching, addresses a real problem for investors in AEC industry in Egypt.

Conclusion.

The evaluation of the current Egyptian AEC web-based solutions is very important for the Egyptian AEC industry, as it defines recommendations that will provide a roadmap to guide future AEC e-commerce and net markets. Especially because, there are inadequate linkages between the different branches of the AEC industry in the region at the present time,

Evaluation is the systematic collection and analysis of data needed, to assess the extent of the system's functionality. Also assess the effect of the interface on the user, and identify any specific problems with the system.

Web evaluation techniques are only beginning to be developed. Technology is outpacing ability to create standards and guidelines. Establishing evaluation procedures will be an ongoing evolutionary process, so the evaluation methodology was set based on available experience in evaluating other phenomena, this methodology set the evaluation plan used.

This evaluation leads to set general recommendations for implementing web-based solutions in AEC web-based solutions and improve the current RCCNET web site. All involves users,
Getting a good understanding of what is happening in a web-based business requires moving beyond simple frequency counts and basic questions.

Success depends on progressive development of the information that you have about your customers, of your understanding of what works for your business, and of the organization of your content. [5]

It is possible to frame up this progressive development effort in a series of stages, progressing from meeting the needs of the individual customer, to responding to the customer as a member of a number of groups, to responding to the customer in different ways over time.

Evaluation.

This project is mainly evaluated on three aspects

- The Evaluation Methodology.
- The Evaluation Processes.
- The Recommendations.

In terms of effectiveness and usefulness, this project should be very useful for the AEC industry firms , as well as , to RCCNET web site providers .

It must be noted, that there were extra ordinary circumstances that prevented the completion of some additional steps for evaluating process. Unfortunate, The supervision on this thesis had to be changed during the work, for alteration of working place.

Appendix [A]:

Report on Construction Industry in Egypt.

Industry Background:

Construction has been one of the most profitable industries in Egypt and is now even more so. Ever since Ancient Egyptians built the pyramids, construction has transformed into a multi-billion pound industry. Attached by such lucrative business, individual and institutional contractors jumped on the bandwagon. Today, construction is resurfacing as a major driving force in Egypt's economic growth going into the new millennium.

The modern construction industry in Egypt began this century with Egyptian and Swiss capital. Contracting activities picked up in Egypt in the 1950's, especially with construction of the high Dam in Aswan. However, the Egyptian government took over virtually all industries under Abdel-Nasser's " nationalization" Policy in the 1950's, which stifled greater economic growth. Sadat's " Open-Door" policy may have brought back a lot of business into Egypt, yet still was not enough to take Egypt a step further towards economic prosperity. Since construction is a capital – intensive industry that needs long-term commitment, the state-run Egyptian economy was in desperate need for capital inflows. So much needed to be done in terms of adopting market-oriented policies and practicing laissez-faire-like policies in steering the economic wheel.[23]

Industry Structure:

Construction, a multi-billion-pound industry, cannot be considered a monopoly for the existence of many competitors. There are at least a dozen multi-million-pound companies in Egypt that can be grouped into two main categories:

I. *Constructors:* including companies that own the land and pay for its development for sale later on.
II. *Contractors:* including companies that are hired by constructors to help develop the land.

In general, all market participants offer a combination of contracting and construction services that vary in scope depending on the respective company. Some companies specialize in industrial, residential, civil, infrastructure, or touristic construction, while others cover more than one area. Hence, some companies fall under one of the two categories, while others can be included in both. Within each category, companies would fall under one of the following four subcategories:

A. *Multinational Companies*, which include multinational powerhouses such as ABB, Bechtel, John Laing, and Costain.

B. *Local Private Sector,* which includes private contracting companies such as Alexandria real Estate Investment (AREI.CA), and Allam Sons.
C. *Newly privatized public sector,* which includes newly privatized public companies such as Egyptian Contracting Company (Mokhtar Ibrahim), Industrial & Engineering Enterprises Co. (IEEC.CA), and El-Mahmoudia.
D. Local Public Sector, which includes public construction companies such as Arab Contractors Company.[6]

Generally speaking, construction companies require a great amount of capital to invest in long-term projects. Although acquiring such capital is not an easy task, it is not impossible. Looking at the market as it stands today, well-established local private companies with distinguished track records, such as aic, rank higher than most competitors in the market, yet they still compete against multinational powerhouse that have greater access to capital, technology and expertise. The main competitive advantage of local companies may be the fact that other multinationals are somewhat reluctant to invest in regions they do not know much about, such as the Middle East. In addition, labor cost can be lower for local companies versus multinationals. On the other hand, public sector and newly – privatized companies represent a good chunk of competition, but their inefficient operations under perform those of private companies, which have gone a long way to acquiring the industry's know-how and upgrading their technical cadres. [25]

Growth Drivers:

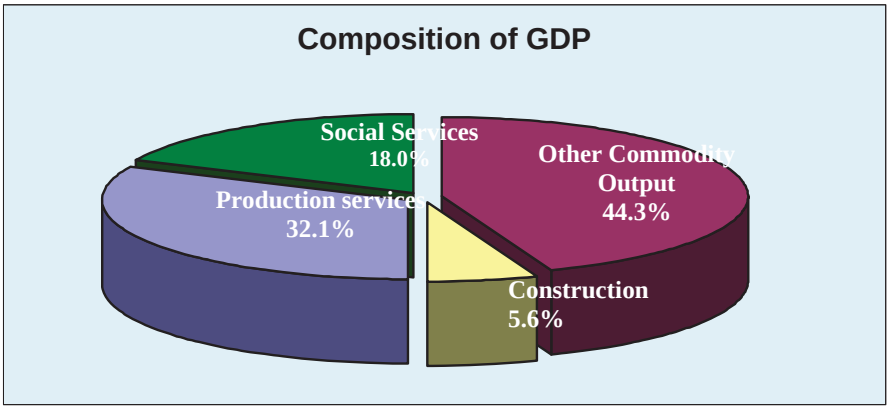
The industry has been growing since the beginning of 1990's when the government kick-started its economic reform agenda. For example, investments implemented in the contracting sector have grown by 16.9% and 50.5% in FY 96/97 and FY 97/98 to reach LE 0.9 billion and LE 1.4 billion, respectively. Highlighting the private sector's importance, its share in such investments increased from 81.8% in FY 96/97 to 83% in FY 97/98. Meanwhile, capital expenditures rose from LE 10.1 billion in FY 93/94 to LE 13.4 billion in FY96/97.

Going into the 1990's the construction industry was experiencing slow growth for several reasons. For example, the limited supply of public funds and the regulations restricting the private sector's participation in infrastructure development all hindered construction activities in general. However, The government recently started promoting privatization as the way to economic salvation. Laws and regulations have been, and still are being, changed to attract local and foreign private investments in different industries. As a result, the private sector sensed great opportunities in the construction sector.

In this way, The Egyptian government realized the important role construction could play in solving some of Egypt's social problems. Overpopulation and unemployment are two problems that have found some solutions with the revival of the construction industry. According to the government plan of increasing habitable areas from 6% to 24% in the next 20 years, new urban areas should help attract people away from big cities such as Cairo, thereby reducing density per square Kilometer. [23]

In addition, new construction contracts are creating jobs every day and absorbing some of Egypt's unemployed. To be sure, the number of workers in the construction and building sector has grown 28.5% from FY 92/93 to FY 69/97, the highest growth experienced in all sectors within the same period. The number of construction workers in Egypt is also the highest in the Middle East. Moreover, the sector's percentage of Egypt's GDP has increased from 5.14 % in FY 91/92 to 5.55% in FY 97/98. It is worth noting that the construction sector grew 8.5% in FY 96/97, higher than GDP growth that year. Furthermore, The private sector represented about 74.4% of GDP in FY 97/98, compared to 70.8% in FY 91/92.[6]

In the last three years, the Egyptian Construction industry has recorded a compound growth of 9.6% annually, in real terms, outpacing the annual compound GDP of 5.3% for the same period.



Composition of GDP
Source: Ministry of Economy …Nov.1998

In view of the afterward demand analysis, Ministry of Economy believe this hyper performance should pursue growing with approximately 1.5x of GDP in the coming few years. Thus, increasing the sector contribution to total Egyptian GDP from a low 5.6% to a proximal of the norm in other developing countries (10-20%).[25]

Appendix [B]:

Report on MCBI company.

The Company:

Misr for Construction and Building Information (MCBI) is a Cairo- based company providing information services to businesses working in the Egyptian construction and building industry. Headquarters office is located at Trade Center- Misr Le al-tammer Buildings- Masaken Sheraton, Cairo–Egypt, in addition to one branch at the Arab Contractors Building 34 Adly ST. Downtown Cairo.

The Company's Mission:

Misr for Construction and Building Information (MCBI) is dedicated to provide high quality information services to the construction and building industry, devoting information technology to best serve the clients, and pave their way towards globalization.

Company Objectives:

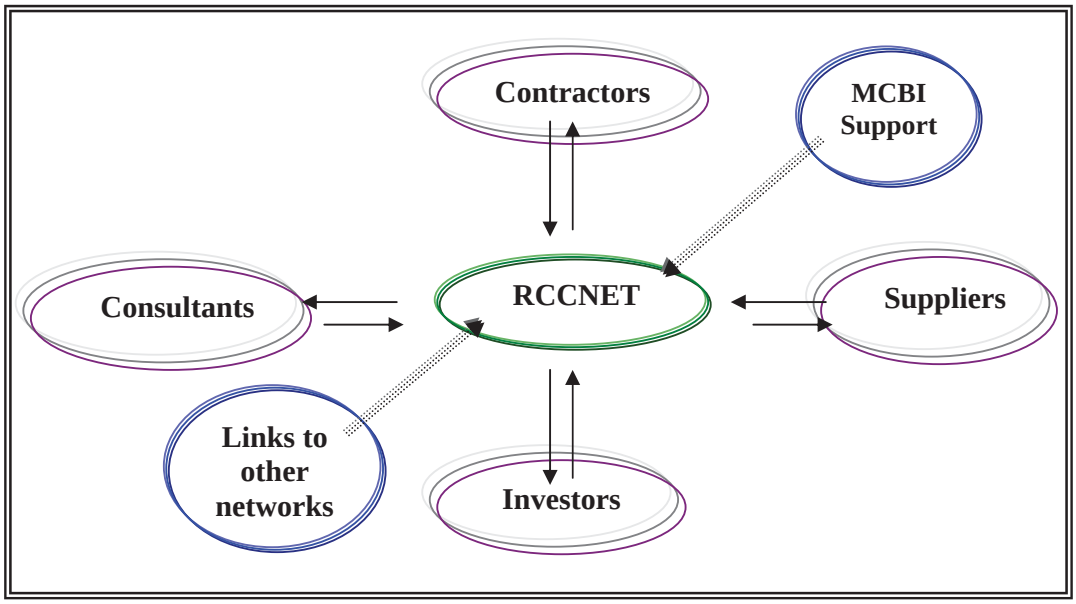
- Supporting companies operating in the construction and building industry, with the latest trends of business processes and efficient management.
- Assisting the clients in developing their internal operation and decision-making systems through the use of information technology.
- Utilizing the computer and communication technologies to create efficient marketing vehicles and communication channels, for the construction industry.
- Developing a knowledge base, that contains information about companies' experiences in various areas of the industry on a specialized international network.
- Promoting the use of information technology to support the exchange of business transactions between enterprises.

Recognizing the essentiality of forming an Internet dynamic network responsible for building information highways between all ends of the industry was the motive for establishing the Regional Construction & Contracting Network (RCCNET).

Products and Services:

The Regional Construction & Contracting Network (RCCNET) http://www.rccnet.net is the main service offered by the company aiming at developing communication channels between all ends of the construction industry. This network contains a large database of construction companies working in this field, consultants, suppliers, training centers, price of materials, tenders and opportunities of investments, in addition to a help desk supporting the network by answering our clients inquires. The company offers other services in order to support RCCNET and meet the subscribers' requirements:

- Web Site production.
- Design and implementation of computer networks.
- Geographical Information Systems.
- Tailored management information systems.
- Software licensing.
- Business advisory services.
- Contracting companies' directories.
- Training services.

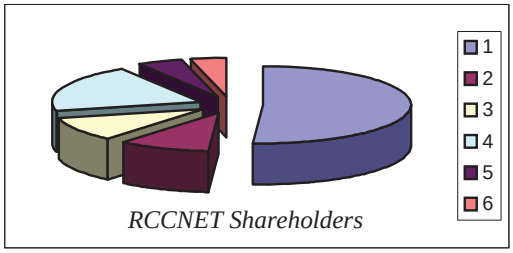


RCCNET services diagram.

"Recognizing the essentiality of forming an Internet dynamic network responsible for building information highways between all ends of the industry was the motive for establishing the Regional Construction & Contracting Network (RCCNET)."

Shareholders:

1. Egyptian Federation for Construction & Building Contractors.
2. The Arab Contractors Employees Fund.
3. The Arab Contractors Company for Investments.
4. IT Investments.
5. Legislation and Development Information Systems (LADIS).
6. Regional Information Technology & Software Engineering Center (RITSC).



RCCNET Shareholders

The Competition:

Currently, there are no developed networks competing with RCCNET in offering similar services (database, tenders, economy analysis.... etc) to the construction and building industry in Egypt. On the contrary, web site production and other services face competition especially from Internet Service Providers.

However, MCBI's strategy in focusing on selling its services to the construction and contracting companies enabled it to possess the largest market share in web site production within this industry.

Target Market:

MCBI targets companies that operate in the construction and building industry. The company will focus on generating almost 75% of its revenue from contracting companies working in the 12 specializations as defined by the Egyptian Federation for Construction and Building Contractors. The remaining 25% of MCBI revenue will be changeably generated from engineering consultants, construction materials and equipment suppliers as well as international companies that are interested in investing in the Egyptian construction industry.

Management

Chairman Dr. Ismail Osman brings a significant network of connections and experience in the construction and building industry to MCBI. In addition of being the Chairman of MCBI, he is also the Chairman and Chief Executive Officer of the Arab Contractors, the biggest contracting company in the Middle East region with an annual turn over in the year 1998/99 of L.E 6 billion. The Managing Director Eng. Laila El Maghraby is an asset to the company, with her information technology management experience and connections within the target market. El Maghraby served for almost ten years as the Information and Quality Division Manager in the Arab Contractors and managed to establish a reliable information technology system that serves almost 70,000 employees.

Operations:

The company currently has its headquarters in Heliopolis and a branch in downtown. Most of the operation is outsourced to the Arab Contractors that supports the company with human resources and equipment. The company is planning to limit outsourcing according to a time-phased plan.

Development and Long Term Objectives:

The ultimate objective of MCBI is to create an Internet dynamic network that provides all levels of data and information needed by our targeted companies as well as enhancing electronic commerce within the Egyptian construction industry.

MCBI's Strategy for Achieving its Goals:

Although RCCNET has potential, it is a project that has to be accurately planned and efficiently implemented, for it to succeed and meet MCBI's mission. MCBI will be harmonically moving in three directions to achieve its ultimate goal as mentioned above.

Direction one: developing and implementing an action plan to complete the structure of RCCNET.

Direction two: Preparing MCBI's target market to utilize RCCNET as their main source of information as well as their channel of trade and communication. Paving the way will be through building the target companies internal information technology systems and Internet necessities (hardware, software, networks, web sites etc….), accompanied with an intensive awareness campaign illustrating the benefits of the network. The company will depend on its shareholders to assist it in this task chiefly that the Egyptian Federation for Construction and Building Contractors has a large access to our target companies, while the Arab Contractors possess valuable market connections and resources.

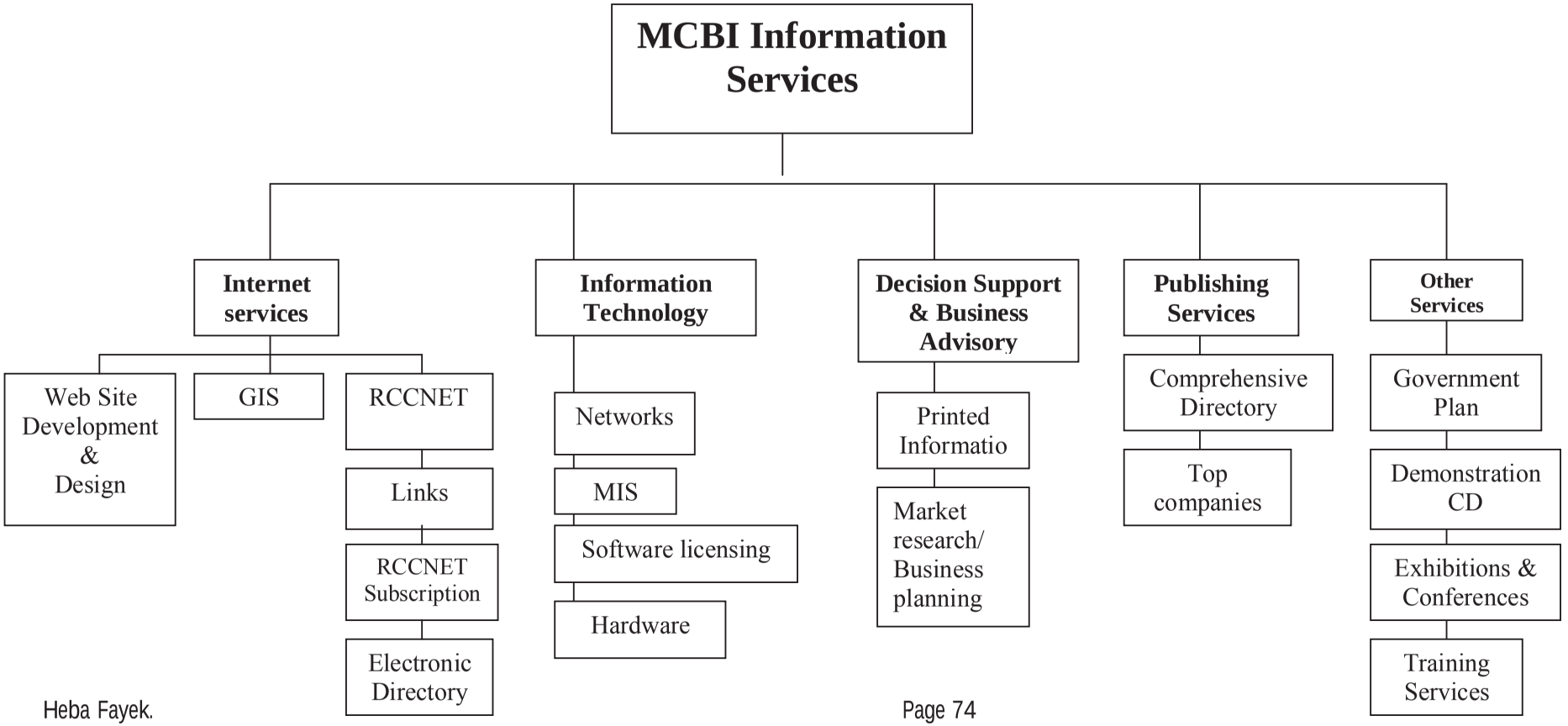
Direction three: MCBI is aware of the accelerated rate of change in the information technology business community that demands organizations to continually empower workers with the right development and knowledge in order to succeed. Accordingly, MCBI will develop for itself an internal fluid system that embraces a culture and a desire to constantly learn, innovate and advance its ability to meet customer demands.

Internal development for the coming two years will focus on developing:

- An efficient costing system.
- Administrative Procedures.
- Financial Procedures.
- Performance Appraisal Procedures.
- Recruitment and Employment Procedures.
- Annual Training plans.

Appendix [C]:

MCBI Services chart



Appendix [D]:

Interviews

Interview No. 1

Subject : RCCNET.

Date : 23-Nov-2000.

Attendance: **Mr.Ahmed Samir (Business Development Manager of MCBI).**

Agenda : Discuss the following points:

1. Company's background, Motivation & Objectives.
2. Clients:
   - Different kinds of users.
   - Member's percentage (how many renew, requests& needs, comments).
3. Old version of website:
   (What is new, why had to change, problems faced with the old version).
4. Advertising issues:
   (How to persuade clients with RCCNET services).
5. Similar web sites:
   (Competition - Locally & Globally)
6. How do RCCNET help in decision-making?
7. How can RCCNET help in enhancing e-commerce in construction and building industry?
8. Future Plans.

Minutes:

- The project was introduced clearly to Mr.Ahmed .
- All agenda points were disscussed .

Interview No. 2

Subject : The Egyptian Construction.

Date : 19-Dec-2000.

Attendance: **Ms. Hala Gidamy**
(Market Research Manager at W.H.S.'s Research Division.)

Agenda : Discuss the following points:

1. The Egyptian Construction Market.
2. The Egyptian Construction Growth .
3. GDP.

Minutes:

- The project objectives were introduced clearly to Ms.Hala .
- All agenda points were disscussed .
- Ms. Hala recommended two reports as a good resources :

    1. CIBC's report on The Egyptian Construction Market
    2. OCI's report on Costruction Industry .

Interview No. 3

Subject : RCCNET.

Date : 4-Jan-2001.

Attendance: **Mr.Ahmed Samir (Business Development Manager of MCBI).**

Agenda : Discuss the following points:

1. Official paper: From RITI.(proof ing that I'm in my final stage of thesis)
2. Clients:
    a. Log Files.
    b. Questionnaires and interviews (contacting information).
3. How can RCCNET services be improved?
4. Problems?

Minutes:

- All agenda points were disscussed .
- Mr.Ahmed Samir noted that they are studing the avalibility of making a complete construction **Virtual Market Place** .
- A few recommendations were discussed .

Interview No. 4

Subject : RCCNET.

Date : 8- Feb -2001.

Attendance: **Eng.Osama Gad (System Administration at MCBI).**
Eng.Yaser A. Kira (System Developer at MCBI).

Agenda : Discuss the following points:

1. site structure .
2. Log Files.
3. Questionnaires.
4. How can RCCNET web site design be improved?
5. How can RCCNET services be improved?
6. Problems.

Minutes:

- All agenda points were disscussed .
- A special account with a new user name & password was prepaired ,to make me able to navigate through the web site freely during the research time .
- An FTP account with the same user name & password was set to make me able to download RCCNET logfiles from the server to my home pc to be able to analyse the logfiles .
- A few recommendations were discussed .

Appendix [E]:

Questionnaire

SECTION 1: Personal Information:

1. How many years of working experience do you have? _____Years.

2. Which best describes your current job position?
   - □ Top Management
   - □ Middle Management
   - □ Supervisory Management
   - □ Administrative Staff
   - □ Professional Staff
   - □ Others (please specify)_____

3. Education
   - □ University Bachelor's degree
   - □ Masters
   - □ Ph.D.

4. Field of specialization: _____

5. Employer/Organization: _____

SECTION 2: Computer Availability & Usage:

6. Do you use computer for work? (If no, please skip this section and go to section 3)
   - □ Yes.
   - □ No.

7. What kind of computer do you work on?
   - □ Desktop computer.
   - □ Portable computer.

8. What type of operating system is installed in your computer?
   - □ Microsoft.
   - □ Mac.

9. What type of applications do you use computer for? (Check all that apply).

   - □ Word processing. (Word, Word perfect, etc.)
   - □ spreadsheets. (Excel, Delta Graph, etc)
   - □ Database. (Access, Oracle, etc)
   - □ Graphics. (Corel Draw, Photoshop, etc)
   - □ Drawing. (CAD)
   - □ Project planning. (Primavera, Microsoft project, etc)
   - □ Internet. (Netscape, Explorer)
   - □ other. (Please specify)_____

10. Please indicate your view about rating the computerization of the following business processes at your work:

Processes	Computerization
Materials Control	Highly computerized ◆——◆——◆——◆——◆——◆ Mostly manual 0% 20% 40% 60% 80% 100%
Purchasing	Highly computerized ◆——◆——◆——◆——◆——◆ Mostly manual 0% 20% 40% 60% 80% 100%
Scheduling	Highly computerized ◆——◆——◆——◆——◆——◆ Mostly manual 0% 20% 40% 60% 80% 100%
Tendering	Highly computerized ◆——◆——◆——◆——◆——◆ Mostly manual 0% 20% 40% 60% 80% 100%
Bills of Quantities	Highly computerized ◆——◆——◆——◆——◆——◆ Mostly manual 0% 20% 40% 60% 80% 100%
Costing and Budgeting	Highly computerized ◆——◆——◆——◆——◆——◆ Mostly manual 0% 20% 40% 60% 80% 100%
Technical Calculations	Highly computerized ◆——◆——◆——◆——◆——◆ Mostly manual 0% 20% 40% 60% 80% 100%
Invoicing	Highly computerized ◆——◆——◆——◆——◆——◆ Mostly manual 0% 20% 40% 60% 80% 100%
Specifications	Highly computerized ◆——◆——◆——◆——◆——◆ Mostly manual 0% 20% 40% 60% 80% 100%
Bookkeeping	Highly computerized ◆——◆——◆——◆——◆——◆ Mostly manual 0% 20% 40% 60% 80% 100%

SECTION III: Communication Method:

11. When you communicate professionally what's your method of communication?

 Telephone. Fax.
 E-mail. Mail.
 SMS (Mobile massages)

12. What kind of information do you communicate?

_____

_____

13. Where do you find information about the following:

- Companies' experiences in various areas of the industry.

_____

- Contractors.

_____

- Suppliers.

_____

- Consultants.

_____

- Investors.

_____

- New Projects & Tenders.

_____

- Market Researches.

_____

- IT (Information technology).

_____

- Training.

_____

- Exhibitions.

_____

14. When you have a technical question related to your work, where do you find the answer?

_____

_____

15. Have you ever used the Internet? (If no, please skip the following).
□ Yes □No

SECTION II: The Internet Usage:

16. Do you use the Internet for work?
□ Yes □No

17. How often do you brows the Internet?
□ 1-3 times a day. □1-3 times a week.
□1-3 times a month.

18. What is your favorite web site and why?

_____

19. What information do you regularly retrieve from this web site?

_____

20. Which is the reason you access a particular web site regularly?

□Because it provides information I want easily and quickly?
□Because it has cool graphics and lots of banner ads for products I want.

21. Have you ever used the Internet for any purpose other than browsing the WWW?
□ Yes □No

If yes, please check all that apply.

□ e-mail. □file transfer. □other. _____
□telnet. □newsgroups.

SECTION II: RCCNET Web Site:

22. Have you visited RCCNET before? (If no, please visit: www.rccnet.net)
□ Yes □No

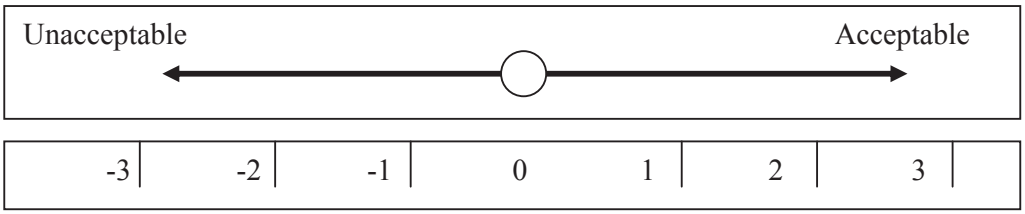
23. In your opinion, what is the most useful information supplied by the web site?

_____

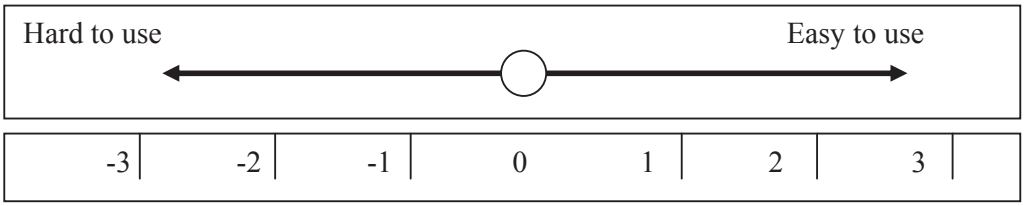
24. Is your company member in RCCNET?
☐ Yes ☐No

25. Please indicate your view about RCCNET on the followings:

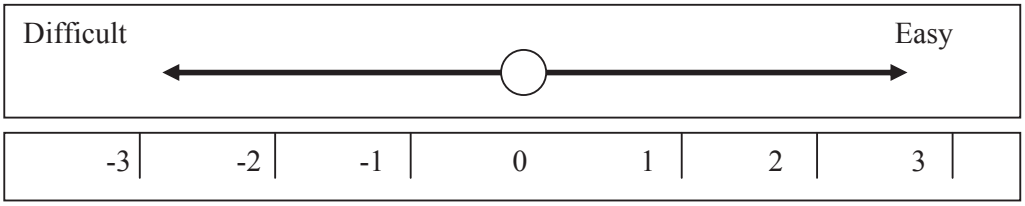
- *Acceptability of the information provided:*



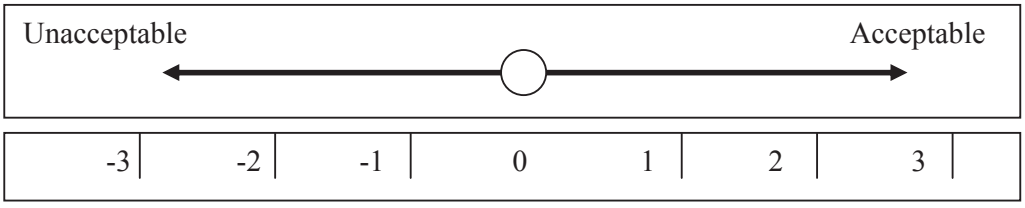
- *Usability of the interface design:*



- *Accessibility of different information:*



- *Acceptability of the topics organization in the site structure:*
(Easiness of navigation & following topics)



26. Do you think that RCCNET needs to be developed?
□ Yes (why?) □ No

_____

_____

27. Do you agree on adding the following services to RCCNET web site:

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Publishing Researches					
Purchasing Products					
Banking					
E-mail you@rccnet.net					
Managing Projects (through the web site)					
Weather					
Tenders Announcements (On mobile phone) (WAP).					
Fleet Services					
Bourse					
Building Type Study Designs.					

Buying Books					
Buying Software					
Egypt Maps					
On-line Groups (To encourage communication among members)					

28. Do you think the current RCCNET membership-pricing scheme is reasonable?
□ Yes (why?) □ No (why?)

_____

_____

Thanks for Collaboration.

Appendix [F]:

Log File Analysis Technical Reports

- **Introduction:**

Log analysis is only one of several such mechanisms. Qualitative methods of data collection, such as user surveys, focus groups, and other feedback mechanisms, can gather user opinions on site content, navigation, or look-and-feel, as well as assess user satisfaction and the reasons that users visited the site or navigated as they did. A site's usability--which will affect both rate and manner of use--can be evaluated through various methods to reveal whether the site is accessible, easy to navigate and appealing to users.

- **What's in a Log File?**

Every communication between a client browser and a Web server results in an entry in the server's log recording the transaction. A busy Web site, such as that of the National Library of Canada, generates hundreds or thousands of log entries per hour and compiles them in a log file. The data captured in a log file vary according to the type of server used and the log file format(s) it supports. Most widely employed are the common log file formats and the combined or extended log file format. In general, a log file entry contains:

- The address of the computer requesting the file
- The date and time of the request
- The URL for the file requested
- The protocol used for the request
- The size of the file requested
- The referring URL
- The browser and operating system used by the requesting computer. [5],[27]

- **What Can You Learn From a Log File?**

Data available from a log file can be compiled and combined in various ways, providing statistics or listings such as:

- Number of requests made ("hits")
- Total files and kilobytes successfully served
- Number of requests by type of file, such as HTML page views
- Distinct IP addresses served and the number of requests each made
- Number of requests by domain suffix (derived from IP addresses)
- Number of requests for specific files or directories
- Totals and averages by specific time periods (hours, days, weeks, months, years)
- URLs from which user came to the site (referring pages)
- Browsers and versions making the requests.[27],[24]

➢ **What Can't You Learn from a Log File?**

The shortcomings of log files as usage indicators fall into three main categories: certain types of usage data are not logged; the data that are logged may be incomplete; and it is tempting to draw unsound inferences from some of the data.

➢ **Data not captured in the logs:**

- Individuals' identities: Except for transactions that have required authorization (passwords), no data recorded in server logs reveal an individual user's name or any other individual identifier, an e-mail address, for example.
- Number of users: A "user", as reflected in a log, is an IP address--a computer. This does not necessarily correspond in a one-to-one ratio with an individual person. An IP address can represent:

  - A spider or other agent--not a person at all but an automated browser;
  - A cache, a proxy server such as a firewall, or an Internet Service Provider--all of which may represent the use of multiple individuals;
  - An individual PC user executing commands on his browser.

- Qualitative data: Log file data shed no light on the reasons requests were made, user motivations for visiting a site, reactions to site content, actual use made of files served, and all other qualitative aspects of use.
- Files not viewed: Log files have no record of files in which no activity occurred. Thus, a log analysis report "Least used pages" will not reflect unused pages.
- Where the user went next: This transaction would be recorded only in the log of the subsequent site visited. [5],[27],[15],[24]

➢ **Log Analysis Software:**

Many log analysis packages containing a variety of features are on the market. Some vendors include log analysis as part of an overall Web management software suite that also performs link analysis and performance. Log analysis tools typically provide the following features:

- User-friendly interface.
- Variety of output formats (HTML, Word, Excel, text, e-mail).
- Robust reporting capabilities.
- Support for a variety of log file formats.
- Many filtering options.
- Real-time analysis.
- Zipped log file processing.
- Built-in summary database.
- Remote access to the software.
- Proxy analysis reporting.
- Automatic report scheduling.[24]

- **The importance of log file analysis**:

Currently, log file analysis is perhaps best viewed as an art disguised as a science. The limitations of log file data, Web log analysis software, and the inherent nature of the Web mean that log file statistics should be scrutinized closely and interpreted extremely cautiously. In the future, as the use of caches and agent software within the network increases, the accuracy of log files as use indicators will diminish further. On the other hand, increasing use of cookies and/or new communications protocols and servers may shed more light on users and usage.

For now, it is essential to remember that the true extent of use, and the true number of individual users of the site, remains unknown. However, properly compiled and knowledgeably interpreted, Web server log files can still provide some meaningful statistical indicators of Web site usage.[5]

- **The practical analysis of RCCNET web site:**

In appendix D – Interview No.4 , Eng.Osama Gad (System Administration at MCBI) & Eng.Yaser A. Kira (System Developer at MCBI) agreed on using log file technics to explore the users behaviours in RCCNET users surveys as a part of the complete evaluation of RCCNET web site.

An FTP account with my user name & password was set to make me able to download RCCNET logfiles from the server to my home pc to be able to analyse the logfiles .

I started testing several Web Log Analysis Softwares , and finally decided to use two reports generated,

- one generated by : **OpenWebScope Web Statistics** v1.00 [Shareware Edition], http://www.openscope.com

I downloaded the WebScope software and linked it to the RCCNET log files located in my pc, and it utomatically generated the analysis report as HTML web pages .

- And the other generated by : **Funnel Web** [Demo] http://www.activeconcepts.com/

I regestered at their free demo service, and send an e-mail with the log files attached, an hour later I received a reply email with a complete set of reports generated by Funnel Web as HTML web pages , but they where in zip format ,but it was easy viewing it in my local browser after un-ziping it .

Both Reports were generated on [06:00PM, Thu 04-12-2001].

I studied the two generated reports , and chosed the most helpful & interistig points for RCCNET web site evaluation methodology used , and presinted the results in a summary report. [See summary report next page]

Summary Report

Summary of Reports generated on [06:00PM, Thu 04-12-2001] by OpenWebScope Web Statistics v1.00 [Shareware Edition], and Funnel Web [Demo].

Comments are disscussed in details in chapter 4 .

Website Visitor Traffic and Usage Statistics

www.rccnet.net
Egypt Online
Cairo, 11111 EGYPT

Report Period

From 04-01-2001 01:48
To 04-12-2001 12:32

11 days, 10 hours, 44 mins

Summary:

Requests

Total Requests	5,424
Total Cached Requests	1,905
Total Failed Requests	1,548
Invalid Log Entries	2
Average Daily Request	10,447
Average Request/Hour	435

Sessions Info

Total Sessions	203
Total Unique Visitors	131
Total Repeat Visitors	40
Total One time Visitors	91
Average Daily Sessions	391
Average Session Length	05:36
Average Pages/Session	3.85
Average Requests/Session	26.72

Pages Info

Total Pages	782
Average Pages/Day	782

Bandwidth Out

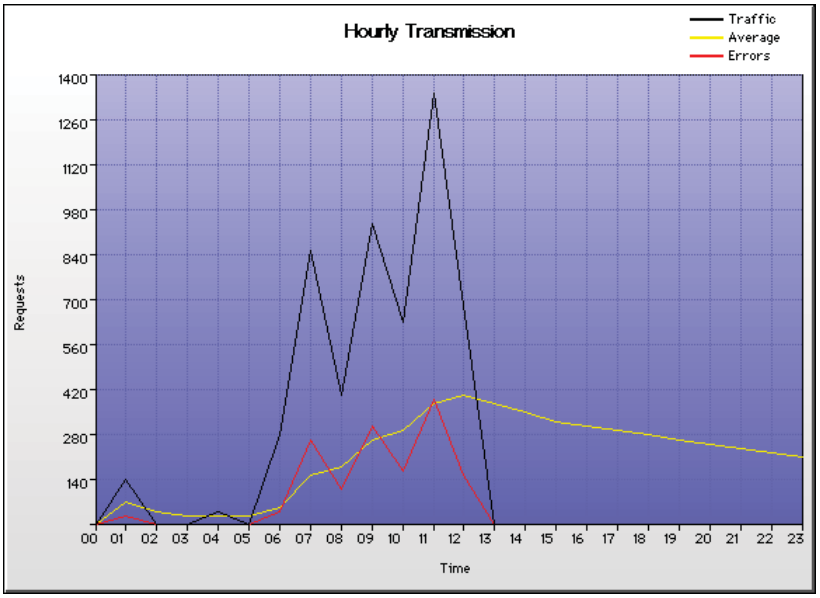
Total Megabytes	20.58
Average Daily Megabytes	39.65
Average Bits/Sec (bps)	3,849.19
Percent of 64Kbps	6.01%

Bandwidth In

Total Kilobytes	83.12
Average Daily Kilobytes	160.10
Average Bits/Sec (bps)	15.18
Percent of 64Kbps	0.02%

1.Traffic:

1.1. Hourly Transmission:



Hourly Transmission

	Time	Requests	%	Bytes	%	Sessions	Pages	Errors
1	00:00 - 00:59	12	<1%	318.5K	1.51%	6	7	0
2	01:00 - 01:59	149	2.75%	1000.8K	4.75%	12	18	36
3	02:00 - 02:59	7	<1%	65.5K	<1%	5	6	3
4	03:00 - 03:59	2	<1%	28.2K	<1%	2	2	0
5	04:00 - 04:59	44	<1%	338.2K	1.60%	14	25	10
6	05:00 - 05:59	9	<1%	47.7K	<1%	5	6	2
7	06:00 - 06:59	284	5.24%	3.0M	14.40%	10	28	48
8	07:00 - 07:59	867	15.98%	2.5M	12.33%	17	103	274
9	08:00 - 08:59	419	7.72%	724.5K	3.44%	12	66	122
10	09:00 - 09:59	951	17.53%	2.2M	10.87%	31	129	320
11	10:00 - 10:59	639	11.78%	2.1M	10.02%	24	96	175
12	11:00 - 11:59	1,353	24.94%	4.8M	23.17%	40	195	396
13	12:00 - 12:59	688	12.68%	3.5M	17.24%	25	101	162
14	13:00 - 13:59	0	<1%	0	<1%	0	0	0
15	14:00 - 14:59	0	<1%	0	<1%	0	0	0
16	15:00 - 15:59	0	<1%	0	<1%	0	0	0
17	16:00 - 16:59	0	<1%	0	<1%	0	0	0
18	17:00 - 17:59	0	<1%	0	<1%	0	0	0
19	18:00 - 18:59	0	<1%	0	<1%	0	0	0
20	19:00 - 19:59	0	<1%	0	<1%	0	0	0
21	20:00 - 20:59	0	<1%	0	<1%	0	0	0
22	21:00 - 21:59	0	<1%	0	<1%	0	0	0
23	22:00 - 22:59	0	<1%	0	<1%	0	0	0
24	23:00 - 23:59	0	<1%	0	<1%	0	0	0
	Average	226	4.17%	878.2K	4.17%	8	32	64
	Totals	5,424	100%	20.6M	100%	203	782	1,548 of 1,548

1.2. Weekly Transmission:

day	hits
Sunday	7648
Thursday	7224
Tuesday	6538
Wednesday	5617
Saturday	5524
Monday	5046
Friday	1269

Weekend (33.9%), Weekdays (66.1%)

1.3. Monthly Transmission:

month	hits
March 2001	126067
April 2001	83271
February 2001	13035
October 2000	19
September 2000	16

2.web pages:

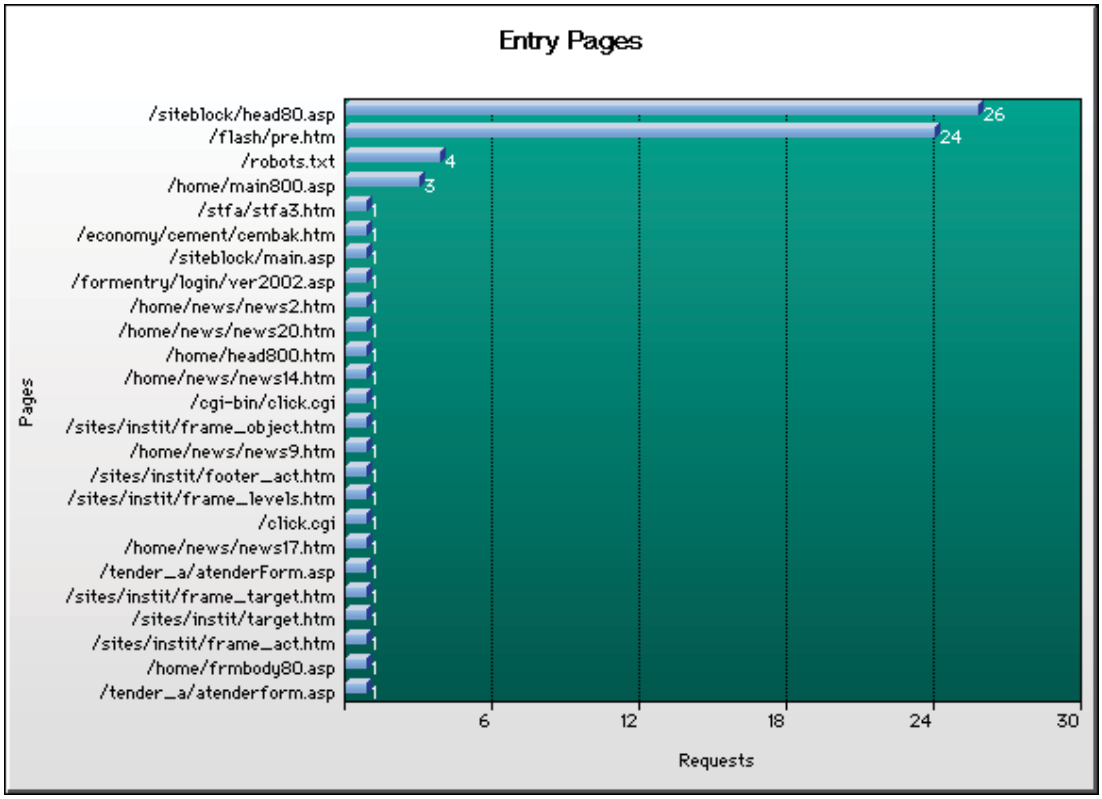
2.1. Most Accessed Pages:

document	views
/flash/pre.htm	1941
/siteblock/head80.asp	1860
/siteblock/frmbody800.asp	1676
/home/main800.asp	1250
/siteblock/main.asp	989
/formentry/login/ver2002.asp	924
/home/frmbody800.htm	737
/home/head800.htm	699
/suppliers/data/suppAction.asp	676

2.2. Least Accessed Pages:

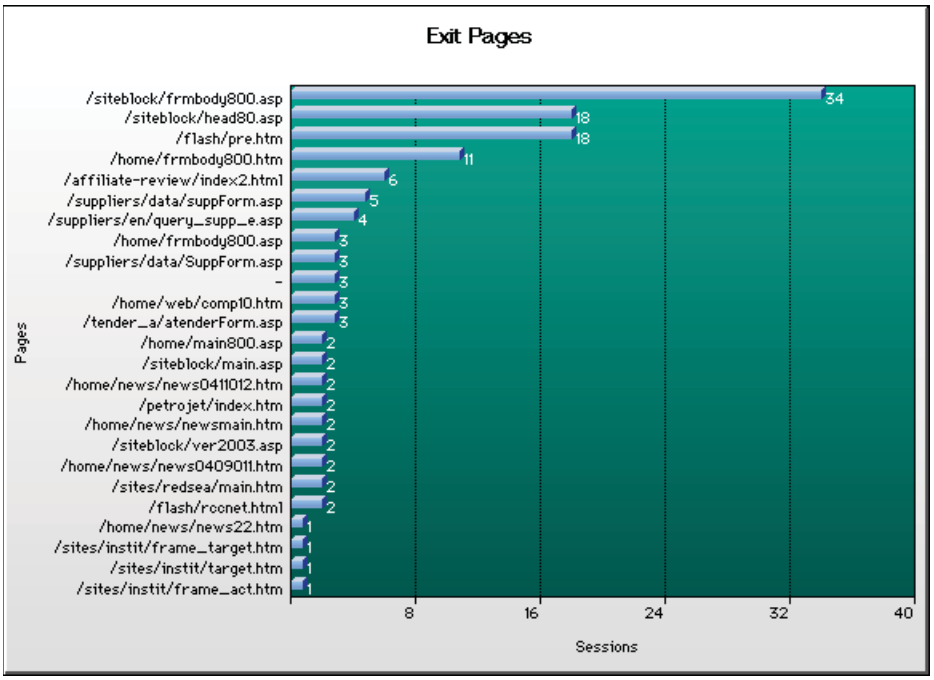
document	views
/epm/ee-cont.htm	1
/home/market/projects/worbank/jordan3_det.htm	1
/home/market/projects/worbank/bosnia2_det.htm	1
/sites/fujitec/products.htm	1
/sites/epm/up.htm	1

2.3. Top Entry Pages:



Entry Pages			
	Pages	First Sessions	Errors
1	/siteblock/head80.asp	26	0
2	/flash/pre.htm	24	0
3	/robots.txt	4	4
4	/home/main800.asp	3	0

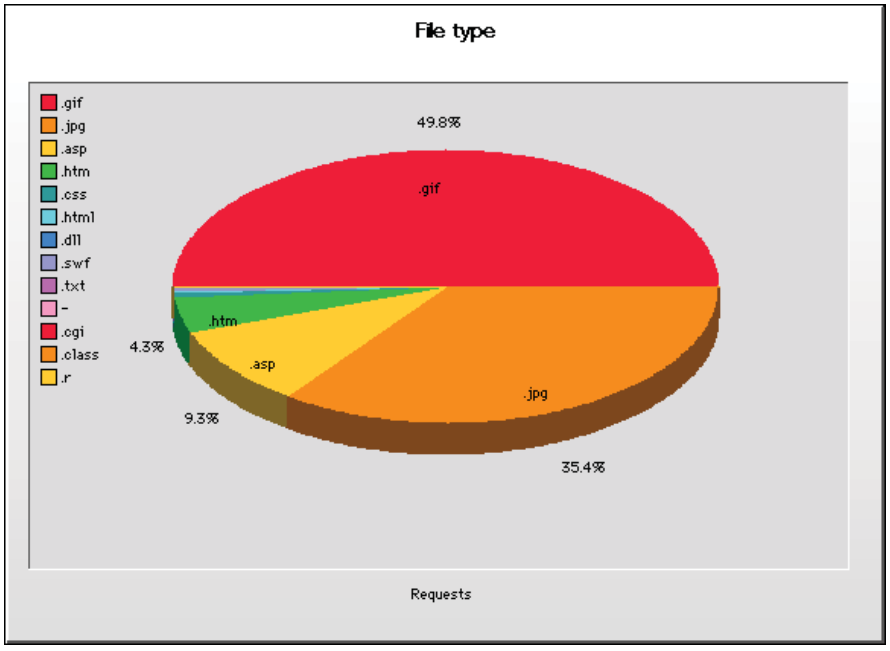
2.4. Top Exit Pages:



Exit Pages

	Pages	Last Exit Sessions	Errors
1	/siteblock/frmbody800.asp	34	0
2	/siteblock/head80.asp	18	0
3	/flash/pre.htm	18	0
4	/home/frmbody800.htm	11	0
5	/affiliate-review/index2.html	6	6
6	/suppliers/data/suppForm.asp	5	0
7	/suppliers/en/query_supp_e.asp	4	0
8	/home/frmbody800.asp	3	0
9	/suppliers/data/SuppForm.asp	3	0
10	-	3	3
11	/home/web/comp10.htm	3	0
12	/tender_a/atenderForm.asp	3	0
13	/home/main800.asp	2	0
14	/siteblock/main.asp	2	0
15	/home/news/news0411012.htm	2	0
16	/petrojet/index.htm	2	5

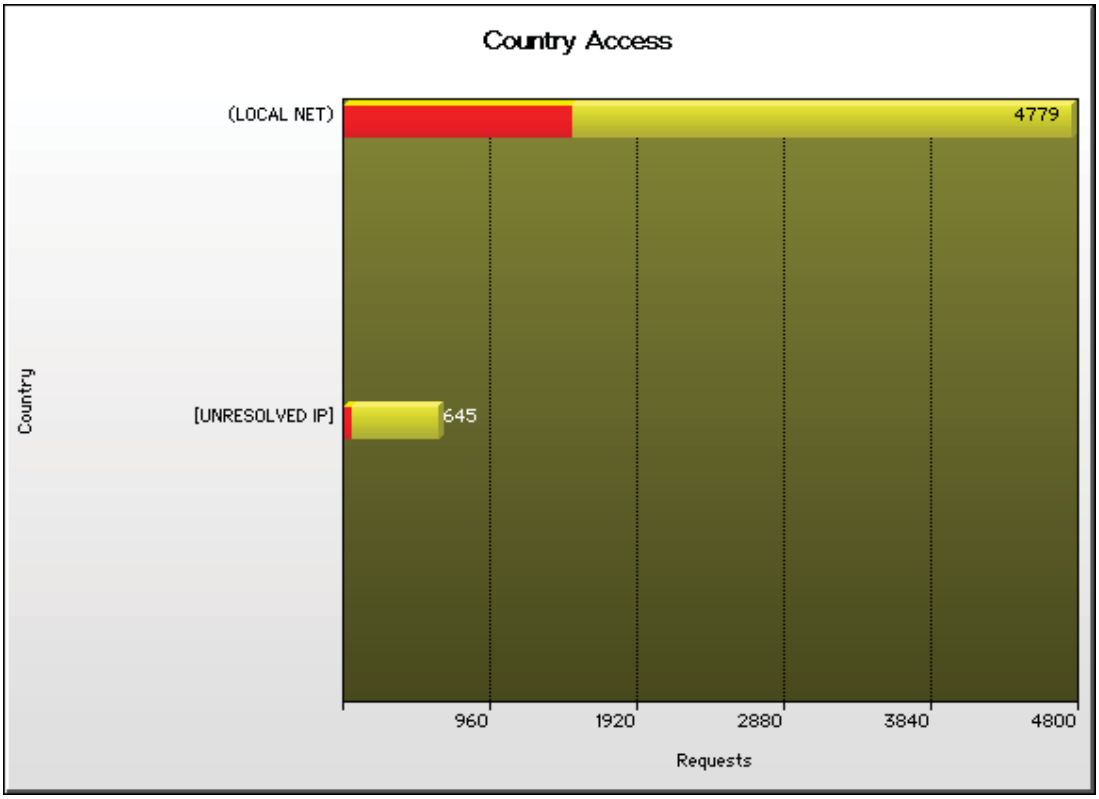
2.5. File type:



File type						
	Type	Requests	%	Bytes	%	Errors
1	.gif	2,694	49.76%	10.7M	52.00%	1,322
2	.jpg	1,915	35.37%	5.7M	27.65%	181
3	.asp	506	9.35%	0	<1%	0
4	.htm	231	4.27%	1.3M	6.10%	18
5	.css	25	<1%	3.4K	<1%	0
6	.html	15	<1%	434.7K	2.06%	7
7	.dll	11	<1%	0	<1%	0
8	.swf	6	<1%	2.5M	12.01%	0
9	.txt	4	<1%	13.2K	<1%	4
10	-	3	<1%	0	<1%	3
11	.cgi	2	<1%	6.6K	<1%	2
12	.class	1	<1%	12.1K	<1%	0
13	.r	1	<1%	3.3K	<1%	1
	Average	416	7.69%	1.6M	7.69%	118
	Totals	5,414	100%	20.6M	100%	1,538 of 1,548

3.Demographics:

3.1. Country Access:

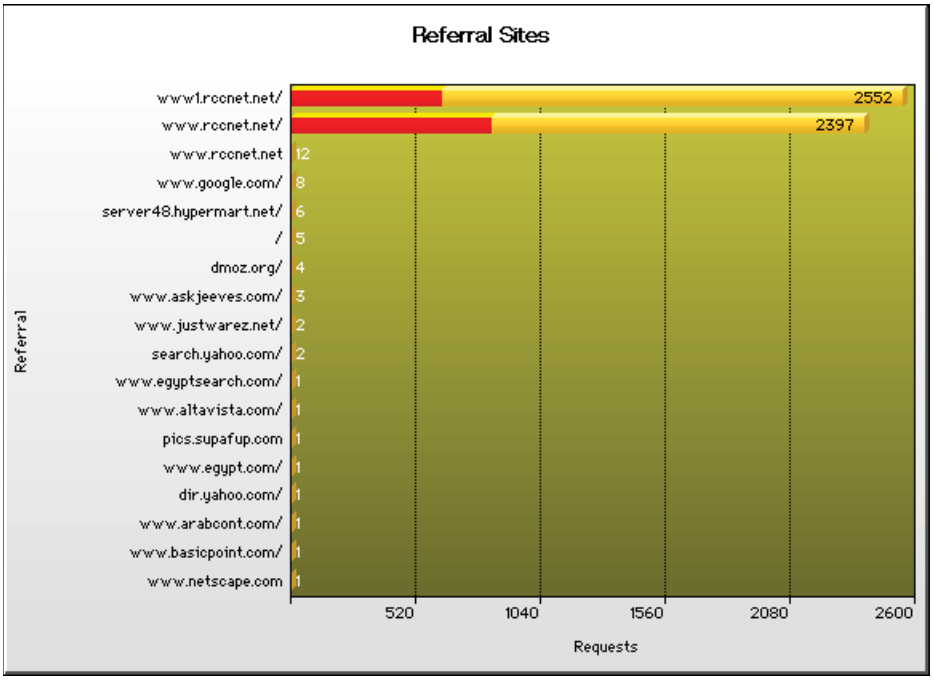


Country Access

	Country	Requests	%	Bytes	%	Sessions	Visitors	Pages	Total Time	Errors
1	(LOCAL NET)	4,779	88.11%	12.8M	62.09%	96	69	546	12:35:25	1,499
2	[UNRESOLVED IP]	645	11.89%	7.8M	37.91%	107	62	236	02:30:48	49
	Average	2,712	50.00%	10.3M	50.00%	101	65	391	04:27	774
	Totals	5,424	100%	20.6M	100%	203	131	782	15:06:13	1,548 of 1,548

4. Referrals:

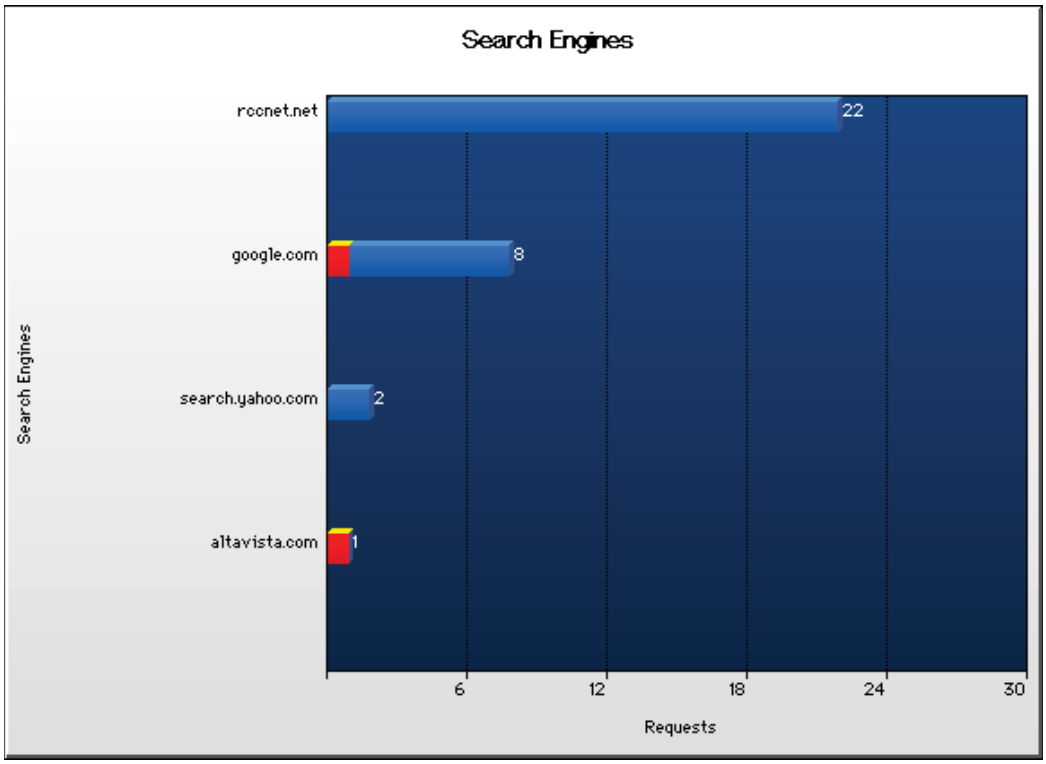
4.1. Referral Sites:



Referral Sites

	Referral	Requests	%	Bytes	%	Sessions	Pages	Errors
1	http://www1.rccnet.net/	2,552	51.05%	6.3M	39.84%	37	160	636
2	http://www.rccnet.net/	2,397	47.95%	9.0M	56.84%	58	395	852
3	http://www.rccnet.net	12	<1%	419.7K	2.59%	0	3	0
4	http://www.google.com/	8	<1%	38.5K	<1%	1	1	1
5	http://server48.hypermart.net/	6	<1%	19.8K	<1%	6	6	6
6	/	5	<1%	1.2K	<1%	1	5	4
7	http://dmoz.org/	4	<1%	13.3K	<1%	2	4	4
8	http://www.askjeeves.com/	3	<1%	21.7K	<1%	1	3	2
9	http://www.justwarez.net/	2	<1%	6.6K	<1%	2	0	2
10	http://search.yahoo.com/	2	<1%	1.4K	<1%	1	2	0
11	http://www.egyptsearch.com/	1	<1%	725	<1%	1	1	0
12	http://www.altavista.com/	1	<1%	3.3K	<1%	1	1	1
13	http://pics.supafup.com	1	<1%	3.3K	<1%	1	1	1
14	http://www.egypt.com/	1	<1%	725	<1%	1	1	0
15	http://dir.yahoo.com/	1	<1%	725	<1%	1	1	0
16	http://www.arabcont.com/	1	<1%	725	<1%	1	1	0

4.2. Search Engines:



Search Engines						
	Search Engines	Visitors	%	Bytes	%	Errors
1	rccnet.net	22	66.67%	277.4K	86.52%	0
2	google.com	8	24.24%	38.5K	12.00%	1
3	search.yahoo.com	2	6.06%	1.4K	<1%	0
4	altavista.com	1	3.03%	3.3K	1.03%	1
	Average	8	25.00%	80.2K	25.00%	0
	Totals	33	100%	320.6K	100.00%	2 of 1,548

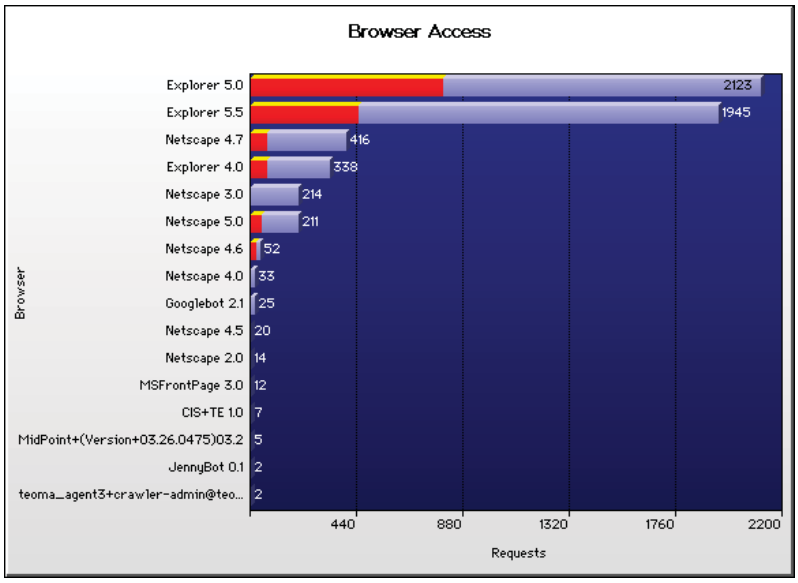
4.3. Search Engines Keywords:

keyword / search phrase	found	keyword / search phrase	found
fatih sultan mehmet	22	al bostan	2
petrojet	21	medecom	2
moraco	11	power projects egypt	2
cement industry	9	lng project	2
juffra	7	%e1%c7%c9 %e1%e3%ed	2
bussines plan	6	cement industry egypt	2
rccnet	6	joseph tito	2
egyptafrica	6	construction companies middle east	2
boot projects	6	sabbour associates egypt	2
egypt industry	5	mass housing	2
dar al handasa	5	reservoirs in malawi zomba	2
bahrain power projects	4	petrojet egypt	2
power projects bahrain	4	nasser egypt -lake	2
sabbour	4	nagib sawiras	2
internationalconstructioncompanies	4	fatihsultanmehmetbridge	2
din 19531	4	sharm el shaikh airport	2
bussines for sale	4	egyptian construction industry	2
international construction companies	4	bosphorus bridge	2
contracting	4	basic hydrolic	2
industry in egypt	4	egypt health reform wagida	2
arab contractors	4	africa egypt	2
helwan portland cement co	3	construction contract	2
realstate egypt	3	national bank of uzbekistan for foreign activity	2
sabbour associates	3	khossous	2
cost managment analysis case studies	3	arabcementcompany	2
egyption stock market	3	%cf%d1	2
industry of egypt	3	qassim cement company	2
construction in egypt	3	makram gis	1
toshka project	3	surveyors lazer	1
south valley cement	3	%cd%cf %ed%e6	1
galata bridge	3	amoun contracting	1
saudi telecome	3	alexandria cement	1
construction companies egypt	3	sandcrete blocks	1
diesel welding machine	3	chinaoppertunities	1
overhead transmission line	3	egypt third operator telecom	1
siac	3	power station projects lebanon	1
construction in developing countries	3	lectricit et rurale	1
whitecase	3	archirodon	1
egyptian industry	3	transmission lines	1
helwan portland cement	3	ahmed rida	1
pipe dimensions	2	egypt cement	1
construction contracting	2	egypts industry	1
equipment maintenance case or study %22quality improvement%22	2	sindbad beach	1
companies operating in egypt	2	construction benchmarking	1
somitomo	2	pvclining italy concrete	1

adwea	2	developing countriesconstruction	1
related:www.arabcont.com/activity/house1.htm	2	concrete compressive strengh	1
technical vocational institute	2	dubai oppertunities	1
archyology	2	rodeco germany	1
construction egypt	2	taha hussien	1

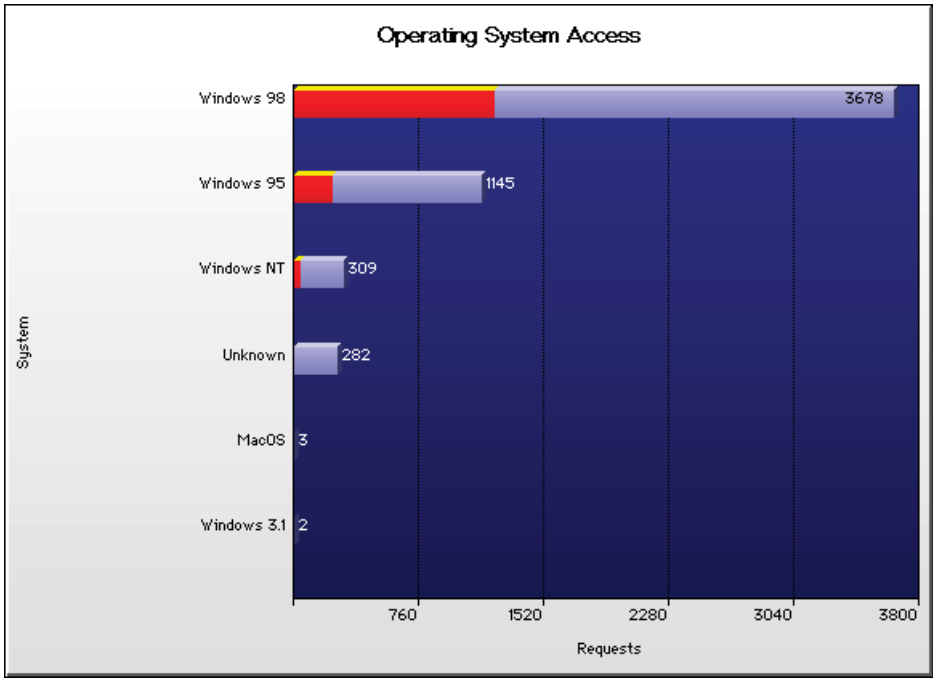
5.Systems:

5.1. Browser Access:



Browser Access								
	Browser	Requests	%	Bytes	%	Visitors	Pages	Errors
1	Explorer 5.0	2,123	39.18%	5.8M	28.25%	111	378	807
2	Explorer 5.5	1,945	35.89%	6.4M	31.10%	62	198	456
3	Netscape 4.7	416	7.68%	1.2M	5.67%	9	22	80
4	Explorer 4.0	338	6.24%	3.0M	14.56%	34	58	78
5	Netscape 3.0	214	3.95%	2.5M	12.38%	31	18	14
6	Netscape 5.0	211	3.89%	193.7K	<1%	11	13	52
7	Netscape 4.6	52	<1%	215.4K	1.02%	10	11	26
8	Netscape 4.0	33	<1%	56.2K	<1%	9	19	17
9	Googlebot 2.1	25	<1%	245.8K	1.17%	16	24	4
10	Netscape 4.5	20	<1%	697.3K	3.31%	8	10	0
11	Netscape 2.0	14	<1%	203.2K	<1%	4	3	0
12	MSFrontPage 3.0	12	<1%	0	<1%	4	12	1
13	CIS+TE 1.0	7	<1%	2.6K	<1%	3	7	4
14	MidPoint+ (Version+03.26.0475) 03.2	5	<1%	66.2K	<1%	3	0	0

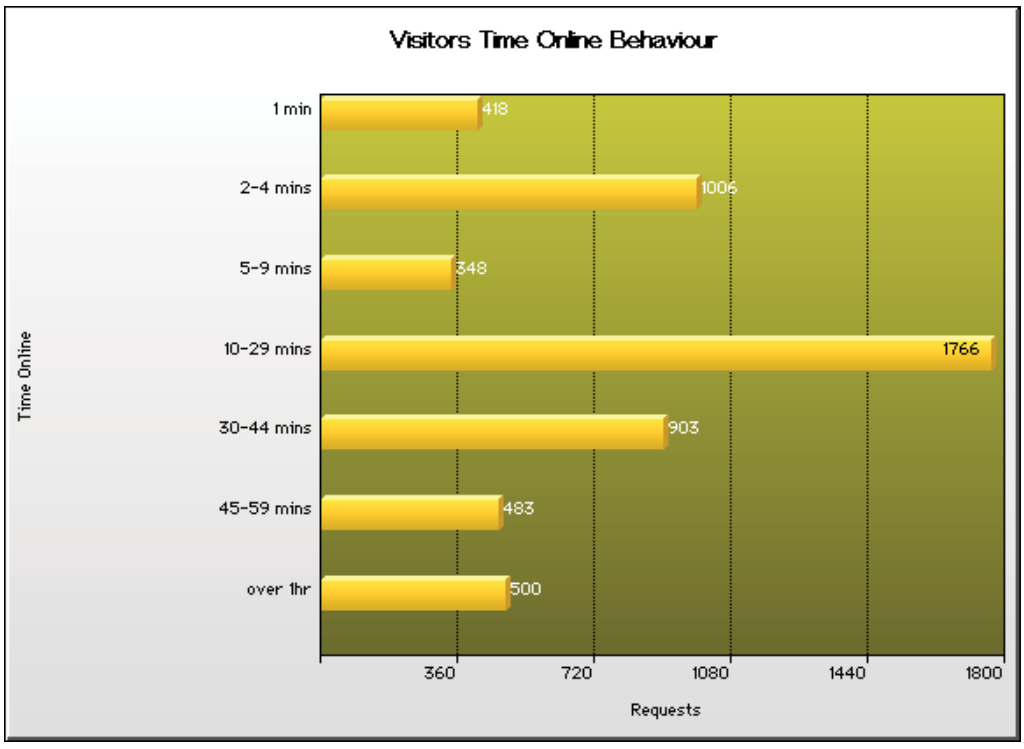
5.2. Operating System Access:



Operating System Access								
	System	Requests	%	Bytes	%	Visitors	Pages	Errors
1	Windows 98	3,678	67.87%	13.0M	63.05%	174	544	1,227
2	Windows 95	1,145	21.13%	3.0M	14.47%	35	115	232
3	Windows NT	309	5.70%	1.5M	7.38%	31	48	56
4	Unknown	282	5.20%	3.1M	14.90%	52	69	27
5	MacOS	3	<1%	25.1K	<1%	2	1	0
6	Windows 3.1	2	<1%	15.4K	<1%	3	0	1
	Average	903	16.67%	3.4M	16.67%	49	129	257
	Totals	5,419	100%	20.6M	100%	297	777	1,543 of 1,548

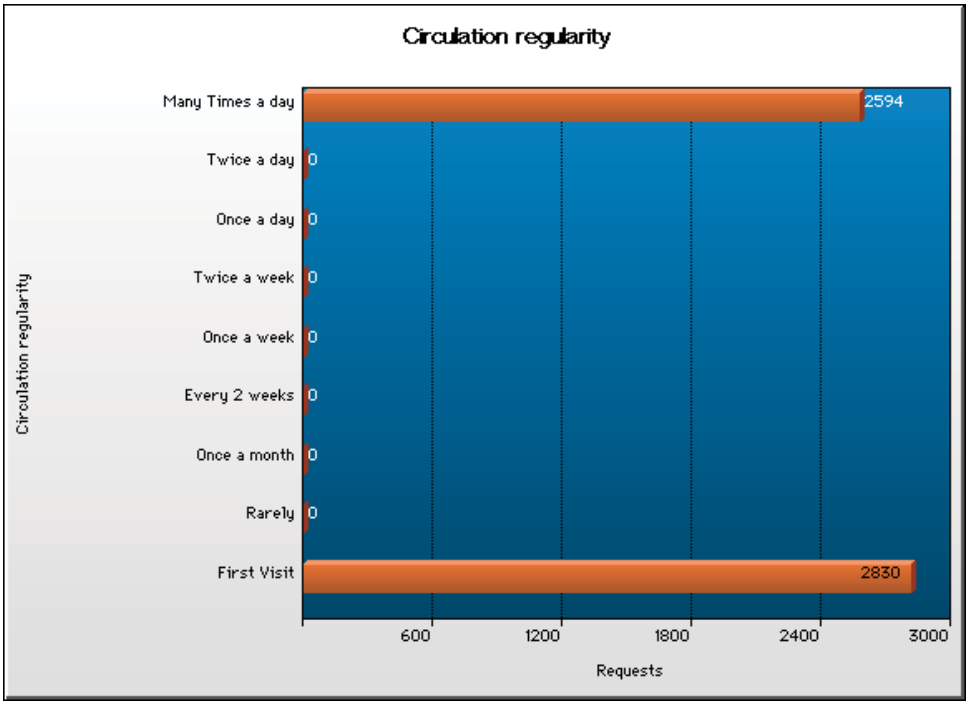
6.Visitors:

6.1. Visitors Time Online Behaviour:



Visitors Time Online Behaviour						
	Time Online	Requests	%	Bytes	%	Visitors
1	1 min	418	7.71%	1.4M	6.80%	52
2	2-4 mins	1,006	18.55%	4.5M	21.81%	40
3	5-9 mins	348	6.42%	2.4M	11.54%	12
4	10-29 mins	1,766	32.56%	9.7M	46.88%	20
5	30-44 mins	903	16.65%	1.6M	7.56%	3
6	45-59 mins	483	8.90%	902.6K	4.28%	2
7	over 1hr	500	9.22%	235.6K	1.12%	2
	Average	774	14.29%	2.9M	14.29%	18
	Totals	5,424	100%	20.6M	100%	131

6.2. Circulation regularity:



Circulation regularity

	Circulation regularity	Requests	%	Bytes	%	Visitors
1	Many Times a day	2,594	47.82%	11.3M	54.83%	40
2	Twice a day	0	<1%	0	<1%	0
3	Once a day	0	<1%	0	<1%	0
4	Twice a week	0	<1%	0	<1%	0
5	Once a week	0	<1%	0	<1%	0
6	Every 2 weeks	0	<1%	0	<1%	0
7	Once a month	0	<1%	0	<1%	0
8	Rarely	0	<1%	0	<1%	0
9	First Visit	2,830	52.18%	9.3M	45.17%	91
	Average	602	11.11%	2.3M	11.11%	14
	Totals	5,424	100%	20.6M	100%	131

Appendix [G]:

Glossary of Terms

This appendix gives brief explanations of the main terms and abbreviations used throughout this document.

- **AEC:**
  Architecture, Engineering, and Construction.

- **ASP:**
  Application service provider.

- **CBE:**
  Central Bank – Egypt.

- **CIBC:**
  Commercial International Bank Chamber – Egypt.

- **Construction:**
  Is a collaborative activity involving a multi-disciplinary team including client, architect, engineer, consultant, contractor, etc. Each member of this team is responsible for certain aspects of the project.

- **E-commerce:**
  Electronic Commerce: The automated transaction of business – including the transfer of both information and funds – via computers.

- **EFCBC:**
  The Egyptian Federation for Construction and Building Contractors.

- **Egyptian pound (£E):**
  Consists of 100 piasters. In early 1990, the pound was worth between US$1.00 and US$1.50 depending on the exchange rate that applied; the informal market rate was £E=US$0.40.

- **FTP:**
  File transfer protocol.

- **FY:**
  Fiscal year.

- **GDP:**
  Gross domestic product: is a value measure of the flow of domestic goods and services produced by an economy over a period of time, such as a year. Only output values of goods for final consumption and investment are included because the values of primary and intermediate production are assumed to be included in final prices. GDP is sometimes aggregated and shown at market prices, meaning that indirect taxes and subsidies are included; when these have been eliminated, the result is GDP at factor cost. The word gross indicates that deductions for depreciation of physical assets have not been made.

- **HTTP:**
  Hyper text transfer protocol.

- **HTML:**
  Hyper text markup language.

- **IT:**
  Information technology: software or hardware tools used for the capture, storage, exchange, and presentation of information.

- **MCBI:**
  Misr for Construction and Building Information.

- **OCI:**
  Orascom Construction Institute.

- **PC:**
  Personal Computer.

- **RCCNET:**
  The Regional Construction & Contracting Network. URL: http://www.rccnet.net

- **RITI:**
  Regional Information Technology Institute-Cairo, Egypt.

- **URL:**
  Uniform resource locator.

- **Web Browser:**
  Client software that requests and displays HTML documents and other Internet or Intranet resources.

- **W.H.S.:**

  WHITE HOUSE SECURITIES: Egyptian Company licensed to conduct three major activities, namely: Portfolio Management, Corporate Establishment, and Securities Underwriting. WHS' mission is twofold: Identify the optimum investment opportunities to a wide base of institutional investors, strategy and viability, likewise available at the Egyptian market place. And Render quality corporate finance solutions to project formations through the proper "match making" debt/equity rising to ensure the optimum business success pre-requisites for its institutional investor clientele base. E-mail: whsec@link.com.eg

- **Workflow:**

  A set of formal rules for a specific process, defined to improve efficiency**.**

- **WWW:**

  The World Wide Web: is a client – server application that provides a graphical user interface for information presentation and interactive communication.

Appendix [H]:

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