

# **A SURVEY ON IT USAGE IN THE CONSTRUCTION, ARCHITECTURE AND ENGINEERING, AND CONSULTING INDUSTRY IN JORDAN**

**Mohammad El-Mashaleh<sup>1</sup>, Ayman Al-Momani<sup>2</sup>, Fadi Al-Sayyed<sup>3</sup>, and Nouredin Saleh<sup>4</sup>**

## **ABSTRACT**

This paper reports the findings of conducting a modified version of the IT barometer survey in the construction, architecture and engineering, and consulting industry in Jordan. The study collects data from 207 firms. Thirty-four percent of these firms are general contractors, 37% are architecture and engineering firms, 19% are consulting and architecture and engineering firms, and 10% are consulting firms. The participating firms are involved in the construction of buildings, roads and bridges, water and sewage projects, and electromechanical projects. The size of firms in terms of number of employees varies widely with some firms have only one employee, while other firms have over 150 employees.

The study shows that the industry average is 0.46 desktop computer and 0.026 laptop computer per employee. Among the top software utilized by the industry are Word, Excel, web browsers, and e-mail. AutoCad dominates the production of engineering drawings with most firms utilize the software almost 100% of the time. Sixty-two percent of the participating firms connect to the Internet via a dial up modem, 29% via an ADSL connection, and 9% do not connect to the Internet. Only 15% of firms have a web site, 48% are planning to have a web site in the next two years, and 37% do not plan to have a web site in the next 2 years. Among the top documents that are exchanged electronically by the industry practitioners are design drawings and calculations.

Eighty-two percent of firms have increased their IT investment in the last two years. Eighty-five percent are committing more dollars to invest in IT in the next two years. According to 92% of participants, demands from customers is a very important motivator for new IT investment. Forty-seven percent of firms report active involvement of their employees in IT deployment and implementation.

IT has a positive impact on the productivity of business activities. Over 80% of respondents believe that the introduction of IT has improved the productivity of design and project management. Two-thirds of the respondents agree that the productivity of general administration has improved as a result of IT introduction. The respondents indicated that IT has improved the quality of documents and increased the speed of work.

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<sup>1</sup> Assistant Professor, Department of Civil Engineering, Hashemite University, P O Box 150491, Zarqa 13115, Jordan, Phone ++962 5 390-3333 Ext. 4829, FAX ++962 5 382-6348, mashaleh@hu.edu.jo

<sup>2</sup> Professor, Department of Civil Engineering, Mutah University, Karak, Jordan

<sup>3</sup> Project Engineer, Modern Technology for Construction, Amman, Jordan

<sup>4</sup> Project Engineer, Al-Habtour Construction Company, Dubai, United Arab Emirates

The perceived benefits for IT adoption according to the respondents are better quality of work, work done more quickly, better financial control, better communications, faster and simpler access to common data, greater flexibility to satisfy customers, possibility of sharing common information, easier to use lots of data, and possibility of telecommuting. The main obstacles for IT use are investment costs too high and greater know-how required from staff.

In conclusion, this paper benchmarks current IT usage, availability, and perceived impact in the construction, architecture and engineering, and consulting industry in Jordan. Such benchmarking is of prime importance to both construction education and practice to understand current trends, forecast future directions, and conduct international comparisons.

### **KEY WORDS**

information technology, construction, benchmarking, survey, Jordan.

### **INTRODUCTION**

This paper reports the findings of conducting a modified version of the IT barometer survey in the construction, architecture and engineering, and consulting industry in Jordan. The IT-barometer survey was developed by Samuelson (1998). Since its initiation, the IT-barometer survey was conducted in several countries: Finland, Denmark, and Sweden (Howard et al., 1998); Canada (Rivard, 2000); and Singapore (Hua, 2005).

The current study collects data from 207 firms. Thirty-four percent of these firms are general contractors, 37% are architecture and engineering firms, 19% are consulting and architecture and engineering firms, and 10% are consulting firms. The participating firms are involved in the construction of buildings, roads and bridges, water and sewage projects, and electromechanical projects.

The study contributes a valuable benchmark to understand current IT trends in the construction industry in Jordan, forecast future directions, and conduct international comparisons. The paper unfolds as follows: research methodology, results and analysis, and conclusions.

### **RESEARCH METHODOLOGY**

The sample of the study was compiled from member lists of Jordan Contractors Association and Jordan Engineers Association. Two-hundred and fifty firms were randomly selected and contacted for potential participation in the survey. Two-hundred and seven firms agreed to participate in the interview questionnaire, while 37 firms declined participation.

The participating firms were interviewed during the period of June 2004 and January 2005. The interviewees are general managers, managers, architects, and engineers. As mentioned earlier, the interview questionnaire utilized in the study is a modified version of the IT-barometer survey.

### **RESULTS AND ANALYSIS**

This section presents the results and analysis of the survey. The study collected data from 207 firms. As shown in Figure 1, 34% of the participating firms are general contractors, 37%

are architectural and engineering firms, 19% are consulting and architectural and engineering firms, and 10% are consulting firms.

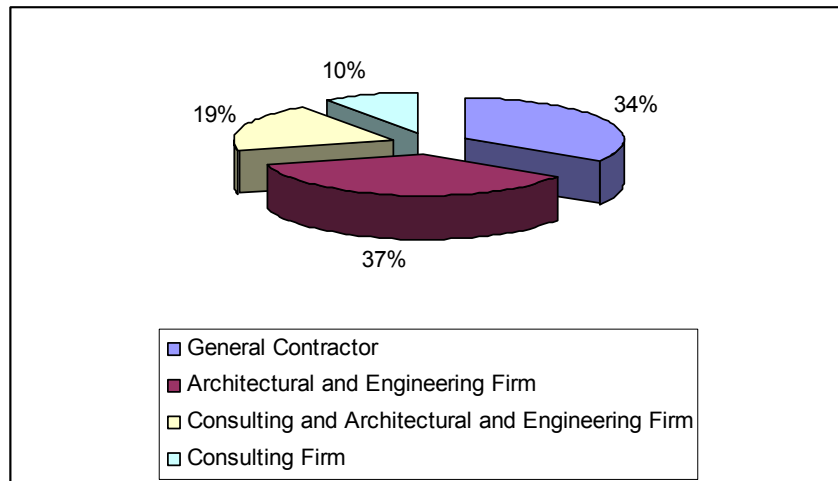


Figure 1: Types of Participating Firms

The size of the participating firms in terms of number of employees varies widely. Forty-seven percent of the participating firms have less than 5 employees, 37% have between 5 and 10 employees, 13% have 11 to 50 employees, 2% have 51 to 150 employees, and 1% has over 150 employees.

The respondents were asked to indicate the number of desktops and laptops at their firms. Only 3.2% of firms do not have computers. The study shows that the industry average is 0.46 desktop per employee and 0.026 laptop per employee.

Figure 2 shows software utilization by the industry. Over 85% of firms utilize Word and Excel. About two-thirds of the participating firms use web browsers and e-mail. Structural analysis software like Prokon and Staad are utilized by approximately one-third of firms. Primavera is utilized by more firms in the industry compared to MS Project. Thirty-one percent of firms use Primavera compared to 13% only use MS Project. Photoshop is the least utilized software by the industry with only 10% of firms report using it.

Respondents were asked to indicate method and/or software used to produce design drawings. The respondents were offered 4 choices: manually, AutoCAD, Microstation, and other. Almost all firms use AutoCAD to produce design drawings. The respondents were further asked to indicate the percentage every method/software was used to produce the drawings. Ninety-four percent of firms use AutoCAD (75-100%) of the time to produce design drawings.

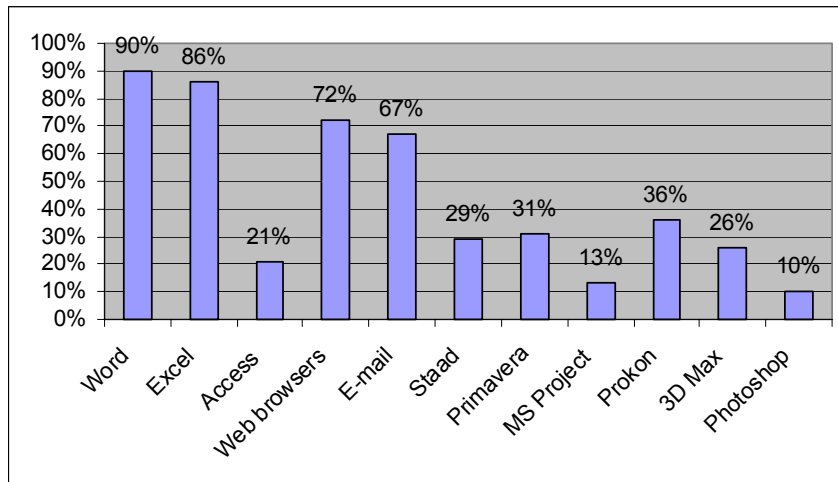


Figure 2: Software Utilization

The respondents were asked to indicate the type of connection used by their firms to connect to the Internet. As shown in Figure 3, 62% use a dial up modem, 29% use an ADSL, and 9% do not connect to the Internet.

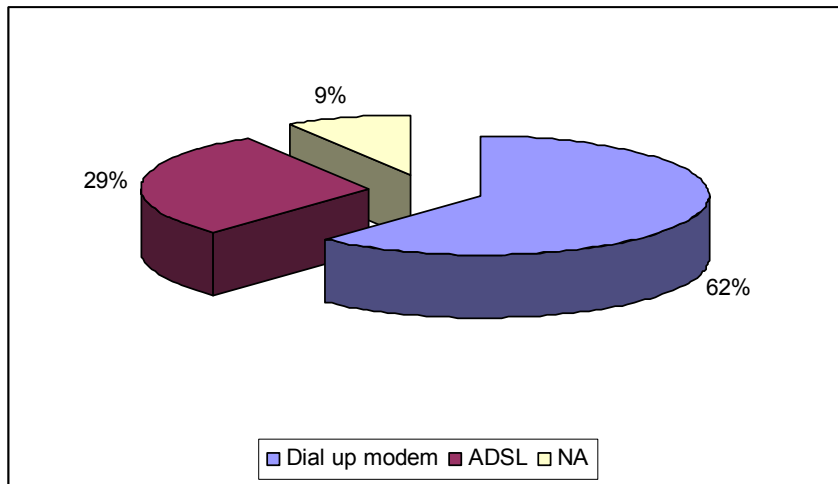


Figure 3: Connecting to the Internet

The survey showed that only few firms have a web site and that more firms are planning to launch a web site in the next 2 years. Figure 4 shows that only 15% of firms currently have a web site, 48% are planning to have a web site in the next 2 years, and 37% do not have a web site and are not planning to have one in the next 2 years.

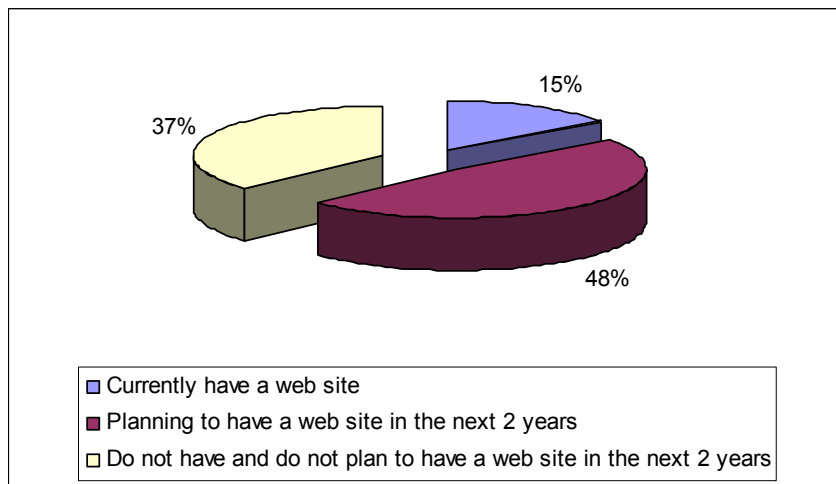


Figure 4: Availability and Plans Regarding Web sites

Access to e-mail is not available to all employees as indicated by the survey. Figure 5 shows that only 32% of firms provide e-mail access to over half of their employees, while 68% of firms provide e-mail access to less than half of their employees. The survey shows similarity of availability of Internet access to that of e-mail access. Sixty percent of firms provide Internet access to less than half of their employees compared to 40% of firms offer such access for over half of their employees.

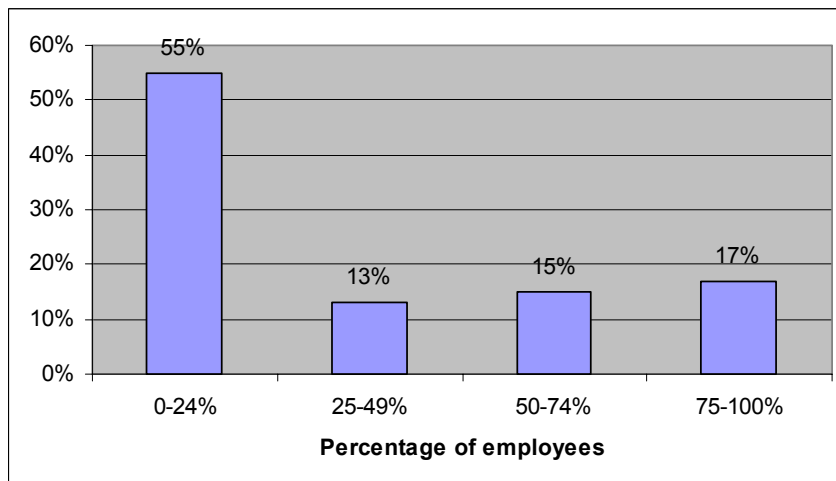


Figure 5: Percentage of Employees that Have E-Mail Access

IT utilization has offered the opportunity to exchange documents electronically. Figure 6 shows that meeting minutes, design documents, and calculations are sometimes exchanged electronically by over 40% of the industry. Both construction documents and specifications are never exchanged electronically by over 50% of the industry.

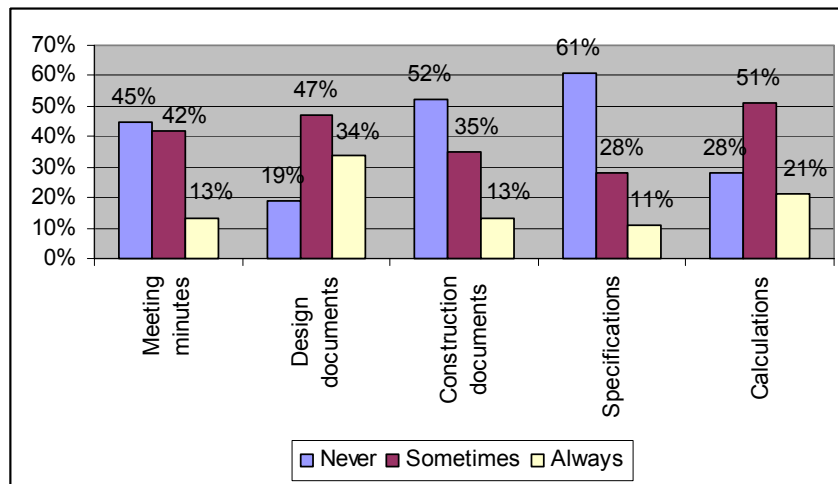


Figure 6: Electronic Exchange of Documents

The industry is investing more dollars in IT. Eighty-two percent of firms have increased their IT investment in the past 2 years compared to merely 1% who have decreased their investment. Figure 7 shows that the industry will continue to increase its IT investment. Eighty-five percent of firms are planning to increase their IT investment in the next 2 years compared to only 15% who plan to keep their investment unchanged.

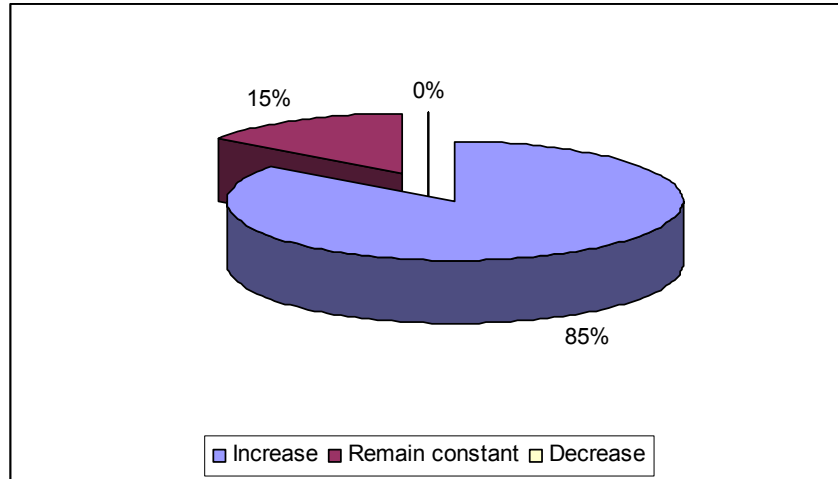


Figure 7: IT Investment in the Next 2 Years

A successful deployment of IT requires acceptance on the part of the employees of the industry. As shown in Figure 8, 47% of firms reported active involvement of their staff, 43% experienced quick acceptance, 9% indicated slow acceptance, and only 1% faced resistance by their staff for greater IT use.

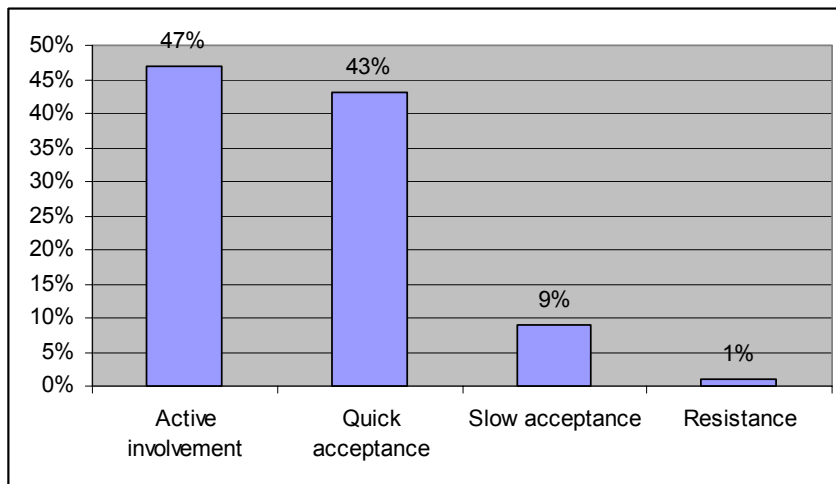


Figure 8: Staff Attitude Towards Greater IT Use

The industry believes that IT has impacted the productivity of business activities. Figure 9 shows that 67% of respondents believe that productivity of general administration has increased as a result of IT use compared to 33% of respondents who believe that the productivity of general administration has not changed. Ninety-seven percent of respondents believe that the productivity of design has increased compared to 3% only who believe that such productivity is unchanged. The productivity of project management has increased according to 81% of respondents, while 19% believe that such productivity remains unchanged. None of the respondents believe that the productivity of general administration, design, or project management has declined as a result of IT use.

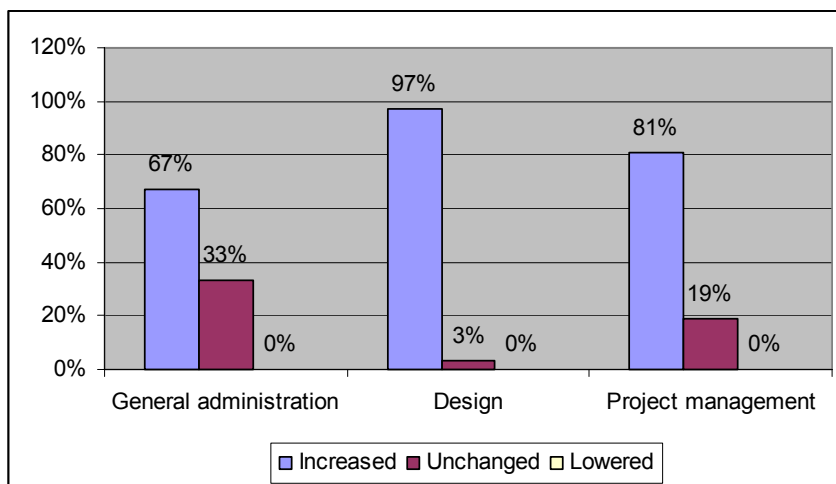


Figure 9: IT Impact on the Productivity of Business Activities

Figure 10 shows the importance of motivations for using IT. Ninety-two percent of respondents rate demand from customers as a very important motivation for using IT. Efficiency of technical work, means of competition, demands from employees, boost the image of the company are rated very important motivations for using IT by over 60% of the respondents.

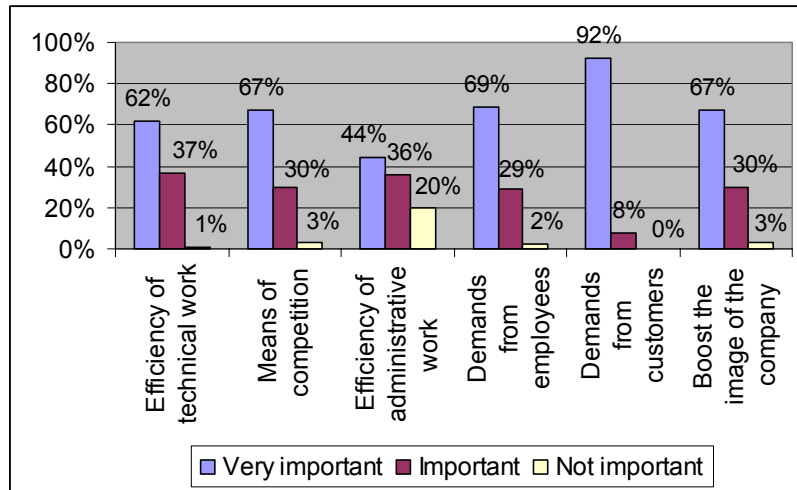


Figure 10: Motivations for Using IT

Almost all respondents indicated that the introduction of IT has improved both document quality and speed of work. About half the respondents believe that proportion of new operations and cost of doing business are higher as a result of IT introduction.

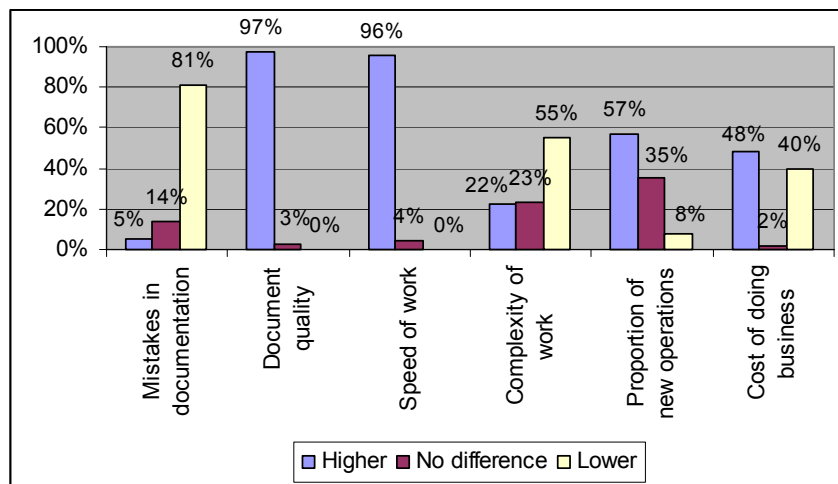


Figure 11: Changes Caused by the Introduction of IT



Respondents were asked to indicate their view of the main benefits of IT adoption. Table 1 shows that over 80% of respondents agree that the main benefits of IT adoption are the following: better quality of work, work done more quickly, better financial control, better communications, faster and simpler access to common data, greater flexibility to satisfy customers, possibility of sharing common information, easier to use lots of data, and possibility of telecommuting.

Table 1: Main Benefits of IT Adoption (%)

Main Benefits of IT	Strongly Disagree	Slightly Disagree	Slightly Agree	Strongly Agree
Better quality of work	1	3	26	70
Work done more quickly	0	5	34	61
Better financial control	1	13	53	33
Better communications	0	6	61	33
Faster and simpler access to common data	0	13	57	30
Greater flexibility to satisfy customers	0	3	36	61
Possibility of sharing common information	1	13	62	24
Easier to use lots of data	1	16	62	21
Possibility of telecommuting	1	11	67	21
Possibility of reducing staff	15	34	45	6
Less use of paper	22	28	40	10

Main obstacles for greater use of IT include continual demand for upgrading, investment costs too high, greater know-how required from staff, risk that IT leads to inefficiency, the old ways work well, and lack of commitment from management. Table 2 shows the responses to those obstacles. Approximately half the respondents strongly agree that one of the obstacles to greater use of IT is that investment costs too high. The majority of the respondents slightly agree that greater know-how required from staff is one of the obstacles to greater use of IT.

Table 2: Obstacles to Greater Use of IT (%)

Obstacles to greater use of IT	Strongly Disagree	Slightly Disagree	Slightly Agree	Strongly Agree
Continual demand for upgrading	4	10	4	39
Investment costs too high	2	8	41	49
Greater know-how required from staff	2	17	68	13
Risk that IT leads to inefficiency	10	30	50	10
The old ways work well	24	47	24	5
Lack of commitment from management	14	39	42	5

## CONCLUSIONS

This paper reports the findings of conducting a modified version of the IT barometer survey in the construction, architecture and engineering, and consulting industry in Jordan. The study collected data from 207 firms. The participating firms were interviewed during the period of June 2004 and January 2005. The interviewees are general managers, managers, architects, and engineers. Thirty-four percent of the participating firms are general contractors, 37% are architecture and engineering firms, 19% are consulting and architecture and engineering firms, and 10% are consulting firms. The participating firms are involved in the construction of buildings, roads and bridges, water and sewage projects, and electromechanical projects.

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