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The Use of Information Technology on Gaining Competitive Advantage in Turkish Contractor Firms

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Abstract: A study has been carried out in order to determine the current extent of IT usage and highlight the importance of the use of IT at strategic level which plays an effective role on providing competitive advantage. Current use of IT, main objectives on the use of IT, benefits and obstacles arise from the use of IT and impacts of IT implementations are determined by undertaking a field survey of a large number of contractor firms in Turkey. With the help of the field survey, levels of IT usage, IT skill levels and IT training of Turkish contractor firms are evaluated. Moreover, it is demonstrated whether Turkish contractor firms use IT or not on gaining competitive advantage. It is found that IT have been using mostly at operational level works which create only technical and economic effects, not strategic ones. Although firms which compete in construction industry need to use IT at strategic level in order to gain competitive advantage; there is not much evidence that the firms are gained competitiveness by using IT.

Key words: Competitive Advantage · Construction Industry · Information Technology · Survey · Turkish Contractor Firms

INTRODUCTION

Technology has been continuously improving, causes high business pressures that affect organizations' current and future competitiveness. These pressures cause common and rapid changes on all industries. Construction industry is also affected by these changes and firms which operate in the construction industry are challenged with increased global competition. Hence, information technology (IT) becomes an issue to cope with the change; by means of adding, developing and competing with the modern business environment.

When analyzing the use of IT in the construction industry, it is seen that contractor firms mostly use IT at their operational level works. Therefore, they obtain only technical and economic impacts from the use of it. The missing point is obtaining strategic impacts which help them to gain competitiveness in the industry and to reach the set of objectives depending on their mission and vision.

The purpose of this paper is to do a research in the Turkish construction industry in order to find out the current level of IT usage and highlight the importance of the use of IT at strategic level which plays an effective role on providing competitive advantage. In order to achieve this purpose, a field survey has been conducted among Turkish contractor firms. By the evaluation of the field survey findings, Turkish contractor firms' current use of IT, their main objectives on the use of IT, benefits and obstacles arise from the use of IT and impacts of IT implementations are determined. Moreover, levels of IT usage, IT skill levels and IT training of Turkish contractor firms are also presented. Finally, it is searched whether they use IT or not in order to gain competitive advantage.

Information Technology in the Construction Industry: Construction industry is a project-oriented industry that produces unique products. Each project based on a long process from the initiation of the project, design, procurement, construction, operation to the disposal of it. The risk factor is really high in the construction industry, as the nature of the work itself is unpredictable. Many resources involved and many interrelationships existed in performing construction activities, many factors relating to environment and technology may affect the works in construction. Moreover, each project is almost unique and there are a large number of project participants with different specialties and multiple interrelated work flows

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in the construction industry. In this complex and fragmented process, information is an integral part of the construction process. In this context, various usage of IT can be seen in the construction industry.

Several studies have been done in order to put forward the usage of IT and its impacts in the construction industry. These studies have been done in different countries such as Taiwan [1]; New Zeland [2]; Scandinavia [3]; United Kingdom [4-6]; Austria [7, 8]; Canada [9, 10]; Australia [11, 12, 13]; South Africa [14]; Nordic countries [15]; Malaysia [16]; Thailand [17]; United States [18-20]; Singapore [21, 22]; China [23]; Jordan [24, 25]; Brazil [26, 27]; Nigeria [28] and Sweden [29].

There are also studies in Turkey in order to determine the importance of IT in the construction industry. One of these studies present different kinds of information system models such as ASAP – Automation System for Architectural Practices [30] and MITOS – Multi-phase Integrated Automation System [31]. Another information system analysis study is done in the case of a large construction firm [32]. The importance of IT in the Turkish construction industry is also emphasized by conducting several studies on the building product field [33, 34]. The use and needs of information and communication technologies (ICT) in the Turkish construction industry are explored with different field surveys [35, 36].

The Level of Information Technology Usage in the Construction Industry: To determine the level of IT usage is also very important in order to get maximum benefit from IT implementations in contractor firms. From this point of view, there exist three different levels [37]. These levels are classified bottom-up as operational level, tactical level and strategic level (Figure 1).

In the operational level, necessary activities of the firm are carried out and this level concerns all the users in the firm. In this level, the main purpose of IT usage is supporting business operations and the role of IT is to gain efficiency which is measured by productivity. By the help of IT usage it is aimed to do things better.

Tactical level concerns middle level managers. The main purpose of IT usage is to support managerial decision making and find solutions to the problems arisen in the firm. The role of IT is to do better / right things and to gain effectiveness accomplished by broadening the scope of individual tasks, jobs or processes within organization [38].

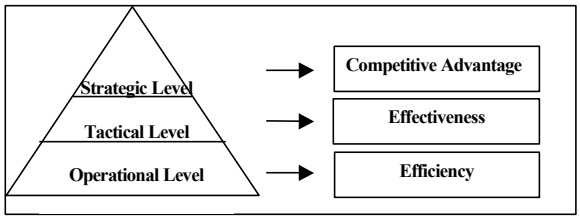

Fig. 1: The levels of IT usage in a firm

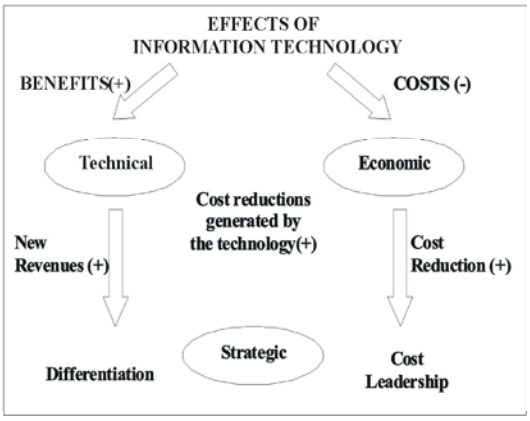

Fig. 2: The different impacts of IT on the firm

The top one is the strategic level which concerns senior management. The usage of IT at strategic level aims to support strategic management. The role of IT is to do better and new things and to gain competitive advantage. In this level, IT is the supporter of Porter's [39] three generic competitive strategies such as cost leadership, differentiation and focus [40]. Using IT at strategic level in order to gain competitive advantage supports the firm's competitive strategies. In this context, contractor firms can reach their set of objectives and can gain competitive advantage by providing long term success as only if they use IT at strategic level in the scope of these three main competitive strategies.

Impacts of Information Technology Usage in the Construction Industry: Usage of IT at different levels creates different impacts on the firms which are often difficult to identify. Because of the difficulties in analyzing the impacts of IT, it is necessary to define various effects of IT on the firms. Figure 2 describes a framework for describing the different effects of IT on a firm [40].

As it is shown in Figure 2, there are three types of impacts such as technical, economic and strategic. Technical impacts arisen from the use of IT are defined as positive effects. These effects are created by the use of IT

at operational level such as quick access of correct and up-to-date information, data storage, share of information, ease of communication, reducing costs and less use of paper. Hence, technical impacts provide new revenues, quality improvements, added value and less resource consumption for the firm.

Economic impacts are generally defined as negative effects such as expenditures on IT. These effects caused by the continual demand for upgrading, high investment costs and continuous training to employees.

Even if IT usage generates such positive impacts, this does not mean that it created competitive advantage for the firm. These impacts must be transformed into strategic ones in order to cope with change and support competitiveness. Strategic impacts are created, when IT is used at strategic level and supported strategic management such as determination of goals & objectives, formulating and implementation of strategies. By the help of using IT at strategic level and gaining strategic impacts, IT is going to create enhanced competitiveness and strategic advantages for the firm and then it has to create unique benefits to the firm that does not occur in any other firm [40]. As construction firms compete in the global marketplace, they recognize that the full benefits of IT can only be realized as part of an overall competitive strategy and they utilize IT to gain competitive advantage.

Several authors have gone beyond examining the value of IT in reducing a firm's costs and / or increasing its revenues to suggest ways that IT can be a source of sustained competitive advantage. It is stated that IT can do more than enhance operational efficiency, it may change the way a business will compete [41]. Porter and Miller illustrated how IT can get integrated into the activities of the value chain and either improve or create competitive advantage [42]. IT has also been mentioned for its possible role in creating sustained competitive advantage for firms [43]. For the construction industry specifically, Betts *et al*. [21] and Betts and Ofori [44] suggested that IT offered opportunities as strategic weapons to gain competitive advantage, improve productivity and performance, enable new ways of managing and organizing and develop new business. It is determined that the use of IT on its own is not a source of competitive advantage, but the strategic use of IT can allow companies to stay competitive [45, 46]. Björnsson and Lundegard showed IT implementations impacts on three generic competitive strategies in construction firms [40]. Yetton *et al*., using a small architecture firm as case study subject, demonstrated how IT becomes an integral part of a firm's core business processes and helps gain competitive advantage [47]. Ahmad *et al*. stated that, the ability of design and construction organizations to seize the opportunities IT can offer and to plan for the changes IT can bring will become one of the most important indicators of their success in the era of information [48]. Tan studied the impact and linkage of IT and competitive advantage with using 13 leading engineering consulting firms in Taiwan [1]. Andresen *et al*. stated that construction firms are often slow to formulate strategies that recognize the role of IT and result in corresponding IT strategies [5]. Furthermore, research by Betts *et al*. [21], Betts [49], Tan [1] and Rockart *et al*. [50] all indicate that IT can offer many strategic advantages, facilitate new ways of managing work and develop new business opportunities.

In Turkey, the strategic impact of information technology on the Turkish construction industry is also discussed in the case of a large contractor firm [51]. Another study investigates the strategic role of ICT implementations and explores if organizations within the Architecture/Engineering/Construction (AEC) industry view ICT as a strategic resource for their business practice [52]. The study showed traditionally the AEC industry has approached investing in ICT with a lack of strategic focus and low level of priority to the business. This paper presents a recent study from Turkey that is focused on the theme of IT usage at strategic level in order to gain competitiveness in the construction industry.

Purpose and Methodology: The purpose of this paper is to emphasize the use of IT at strategic level in order to gain competitive advantage in the Turkish construction industry. In order to achieve this purpose a field survey has been conducted among Turkish contractor firms. This paper presents the most significant results from the field survey and focuses on the IT usage on gaining competitive advantage by describing the contractor firms' current use of IT, levels of IT usage, IT skill levels, IT training and impacts of IT usage.

The target of the field survey is contractor firms who are members of the Turkish Contractors Association[1]. The Turkish Contractors Association (TCA) is an independent, non-profit professional organization based in the capital of Turkey, Ankara. The association was founded in 1952 and represents 153 leading contractor firms in Turkey. The business volume of its members encompasses nearly 70% of all domestic and 90% of all international contracting work done by Turkish contractor firms so far.

[1] www.tmb.org.tr

A questionnaire has been set up in order to collect data from participants of the field survey. Firstly, an attempt was made to contact the firms via telephone. From the 153 registered firms, 99 of them were contacted. A response rate of 75 out of the 99, 75% contacted contractor firms responded. However, only 73 firms were evaluated as two responses were not found to be clear enough to include. 35 questionnaires were filled face-to-face and one-on-one with participants. The electronic mail included an explanation of the study objectives, instructions and the questionnaire itself were sent to the other participants who did not agree to a personal interview.

RESULT AND DISCUSSION

The Questionnaire Is Divided into Three Parts:

- The first part concerns the presentation of the firm. It aims to get general profile of the firms in terms of the number of employees, operating period and operating field.
- The second part of the questionnaire involves questions about the use of IT among the contractor firms. Their objectives on the use of IT, benefits of IT usage and obstacles to use of IT are evaluated. It is also aimed to get information about their IT skill levels, IT training to their employees and the impacts of IT implementations.
- The last part of the questionnaire consists of questions aimed to gather information on whether contactor firms use IT or not in order to gain competitive advantage.

General Profile of the Firms: Firms represented in the field survey have a work force that varied from 1-10 employees to over 500 employees. Figure 3 shows the size distribution of the firms according to the number of employees. Firms are also categorized according to their size such as small, medium and large. Firms which have 1-50 employees are categorized in small firms; which have a work force between 51 and 100 are medium; firms which have more than 100 employees are classified large. According to this categorization 25 of them are small, 20 of them are medium and 28 of them are large scaled firms. Thus, there is an equal distribution in terms of the numbers of firms which represent each scale.

Firms show rather extensive dispersion about the period that they have been in operation in the industry. The oldest responding firm that is still in operation was established in 1938, and in contrast, the youngest

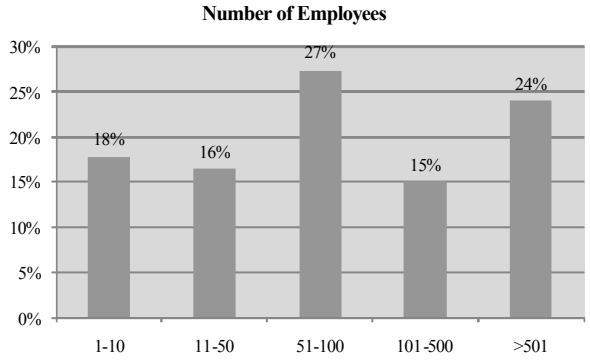

Fig. 3: Size distribution of all the firms in terms of number of employees.

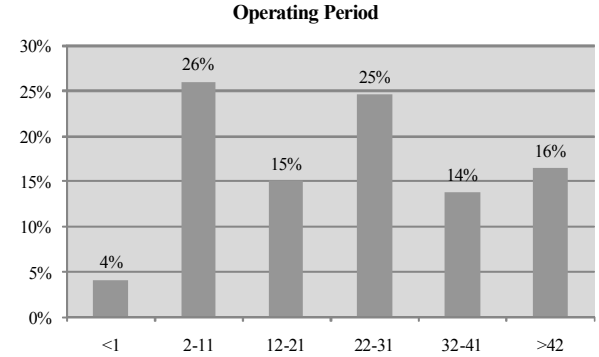

Fig. 4: Distribution of all the firms in terms of operating period.

operating one was established in 2009. Figure 4 shows the percentage of firms in terms of their operating period. From another perspective, it can be said that most of the firms in the survey was established before computers became such dominant tools in the local construction industry.

As the firms analyzed in terms of fields which they are operating in, it is seen that they are working not only in domestic, but also in international contracting works. 35% of the firms are operating only in domestic, 10% of them only in international and 55% of them are operating in both domestic and international field.

The Use of Information Technology: Firms have different objectives on the use of IT. In the survey, a list of objectives is given with a table and the respondents are asked to specify them which of them they consider as an objective on the use of IT. Table 1 shows the number and percentage of firms on what objectives they are using IT in their works.

Almost all respondents determined that they are using IT on the objective of quick access of correct and up-to-date information (89%) and providing to do activities correctly and in time (89%). On the other hand,

Table 1: IT usage objectives of the firms

OBJECTIVES	Number of firms	Percentage of firms
Quick access of correct and up-to-date information	65	89%
Provide to do activities correctly and in time	65	89%
Continuous and permanent communication	54	74%
Increase quality of activities	48	66%
Provide support for making right decision	43	59%
Provide efficiency in decision making by supporting management	35	48%
Provide competitive advantage	30	41%
Other	10	14%

Table 2: Number of objectives indicated by firms

Number of objectives	Number of firms	Percentage of firms
1	2	3%
2	8	11%
3	15	21%
4	12	16%
5	9	12%
6	4	5%
7 or more	23	32%
Total	73	100%

Table 3: Benefits of IT usage for the firms

Benefits of IT usage	Mean scores
Ease of communication	2.92
Share of information	2.75
Data storage	2.59
Quick access of correct and up-to-date information	1.93
Cost reduction	1.25
Provide better planning, controlling and management	1.12
Ease of management of concurrent projects	1.05
Provide standardization	0.77
Less use of paper	0.48
Possibility of reducing the staff	0.14

less than the half of the firms use IT in order to provide efficiency for decision making (48%) and competitive advantage (41%). As it is shown, the main objectives are used for operational level works which create only technical and economic effects to the firms. Other objectives specified by the respondents are keeping all records in an electronic medium and offering optimum solutions to the difficulties that have been confronted with.

Firms have different numbers of objectives on their use of IT. Table 2 shows the number and percentage of firms in terms of the number of objectives they indicated. According to the table, only 2 firms (3%) indicate that they use IT on only one objective. However, 32% of firms indicate that they use IT on all the objectives which are given in the list in Table 1.

IT provides various benefits for the firms. Firms surveyed are asked to determine the main important benefits achieved by the adoption of IT. Their responses are evaluated together with their grades of importance on a scale from 1 to 5 and their mean scores are given in Table 3. According to the results, the main benefits provided by a greater use of IT are ease of communication with the mean value of 2.92, share of information 2.75 and data storage 2.59. Providing standardization 0.77, less use of paper 0.48 and possibility of reducing the staff 0.14 are not considered as important benefits by most respondents. Likewise, all the benefits provided by the use of IT are operational level ones which create technical and economic effects, not strategic ones.

Although firms gain lots of benefits by taking advantages of using IT, there are some obstacles to greater use of IT. The main effective obstacles of IT usage are evaluated together with their grades on a scale from 1 to 5 and their mean scores are given in Table 4. The two main obstacles are providing continuous training to employees with the mean value of 3.15 and continual demand for upgrading hardware and software 3.12.

Table 4: Obstacles of IT usage among the firms

Obstacles to IT usage	Mean scores
Provide continuous training to employees	3.15
Continual demand for upgrading	3.12
High investment costs	2.71
Security problems	1.93
Unnecessary data input	1.37
Resistance to the change	0.95
Make employees unproductive	0.90
Lack of standards and coordination problems	0.86

Table 5: IT skill levels of the firms

	It Skill Levels							
	LOW		MEDIUM		HIGH			
Scale of Firms	Frequency	Percent	Frequency	Percent	Frequency	Percent	Total	
SMALL (n=25)	6	24%	12	48%	7	28%	25	100%
MEDIUM (n=20)	4	20%	11	55%	5	25%	20	100%
LARGE (n=28)	3	11%	17	60%	8	29%	28	100%
Total (n=73)	13	18%	40	55%	20	27%	73	100%

Table 6: Firms providing IT training to the employees

	IT TRAINING							
	YES		MAYBE		NO			
It Skill Levels	Frequency	Percent	Frequency	Percent	Frequency	Percent	Total	
LOW (n=13)	3	23%	4	31%	6	46%	13	100%
MEDIUM (n=40)	17	42%	13	33%	10	25%	40	100%
HIGH (n=20)	13	65%	4	20%	3	15%	20	100%
Total (n=73)	33	45%	21	29%	19	26%	73	100%

Resistance to the change 0.95, making employees unproductive 0.90, lack of standards and coordination problems 0.86 are not considered an important obstacle to the use of IT by the respondents.

Another issue on the usage of IT among the firms is concerning the level of importance attached to IT skills. Firms are asked to define their employees' training and practice level on the use of IT. Skill levels are categorized as low, medium and high in the questionnaire. Respondents are asked which category describes best their employees' training and practice level. It is also searched whether there is a relationship between IT skill levels and the firm scale. The results are shown with a cross tabulation in Table 5. According to the table, 24% of small scaled, 20% of medium scaled and 11% of large scaled firms have low IT skilled employees. On the other hand, 48% of small scaled, 55% of medium scaled and 60% of large scaled firms indicated that their employees have medium level IT skills. Firms which consider their employees' IT skills level as high have percentages of 28%, 25% and 29% respectively in small, medium and large scaled firms. As it is seen, majority of each scale of firms defines the level of IT skill of their employees' as medium level. This shows that IT skill level does not change according to the firm scale. In other words, there is not any relationship between IT skill level and the scale of firms.

Surveyed firms are also grouped into three different categories according to the IT skill levels as low, medium and high. This categorization is made in accordance with the answers which are tabulated in Table 5. Firstly, surveyed firms asked to qualify themselves as low, medium and high level according to their IT skills. Then, they are asked whether they provide IT training to their employees in order to improve their IT skill levels. A cross tabulation is given in Table 6. According to the table, 23% of low IT skilled, 31% of medium IT skilled and 46% of high IT skilled firms indicated that they provide IT training to their employees. On the other hand, 42% of low IT skilled, 33% of medium IT skilled and 25% of high IT skilled firms stated that they do not provide, but they think to provide IT training to their employees in the

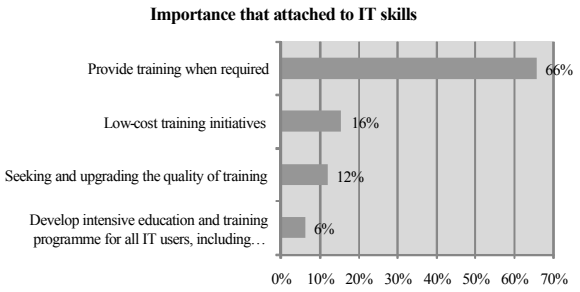

Fig. 5: Importance that attached to IT skills among the firms.

future. Furthermore, 46% of low IT skilled, 25% of medium IT skilled and 15% of high IT skilled firms do not provide any IT training to their employees. When the table is analyzed, it is seen that firms which qualify themselves as high IT skilled level have the largest percentage in providing IT training. However, the case is totally opposite in low IT skilled firms. Although firms qualify their IT skill level as low, the majority of them still do not consider providing any IT training to their employees.

Another question is asked to the surveyed firms in order to examine the importance that attached to IT skills. Firms are asked to represent their effort in order to improve IT skill level in their firms. As it is shown in Figure 5, a large majority of firms provide IT training when it is required with the percentage of 66. 16% of them provide low-cost training initiatives, 12% of them seek and upgrade the quality of training. Only 6% of them develop intensive education and training program for all IT users, including senior management.

Moreover, a different question is asked to the respondents in order to find out at what level IT usage has impacts on their business. A list of implementations is given to the respondents and they are asked to state how often they take advantage of using IT. Respondents are asked to state their answers with their grades of frequency. The responses are grouped according to the scale of firms and tabulated in Table 7. According to the responses, small, medium and large scaled firms stated that they always take advantage of IT usage on data collection and developing databases. IT has also a common usage on operational support for repetitive works in medium and large scaled firms. Although medium and large sized firms stated that they often use IT as a strategic support in decision making process, strategic aspects do not seem as they have impacts on small firms. On the other hand, small and medium scaled firms never use IT in order to gain competitiveness and formulate competitive strategies such as cost leadership, differentiation and focus. Likewise, large scaled firms rarely use IT on these strategies in order to gain competitiveness. It is clearly seen that firms take advantage of using IT on their operational works and IT has only impact on technical aspects. In other words, firms do not use IT strategically and IT usage has the least impact on strategic aspects.

The Use of Information Technology on Gaining Competitive Advantage: The last part of the field survey aimed to gather information on whether contactor firms use IT or not in order to gain competitive advantage. To achieve this purpose, contractor firms were given a set of questions concerning competitive advantage gained by the use of IT. These questions are adapted from the survey instrument; "Health Check of the Strategic Exploitation of IT" developed by the UK Centre of Excellence for Construct IT [53] which has been used with a range of UK companies.

Each question contains four possible choices that are indicated by letters A, B, C and D. Firms are asked to select the choice that reflects their firm from every question.

According to the health check matrix, each choice has its own interpretations [54]. These interpretations are briefly summarized as follows:

- If the firm has mainly selected choices in this category they are clearly utilizing IT as a support tool for operational efficiency. It appears that IT is not viewed as an important part of their business and IT applications are mainly directed at support and functional systems with very little in terms of integration.
- If the firm mainly relates to the choices in group B, they are aware of some of the strategic opportunities provided by IT, but their bottom-up approach has formed a barrier to their progress. Whilst it is encouraging to learn that IT is used to reduce costs and increase the overall business efficiency, they are not fully benefiting from the opportunities provided by IT.
- If the firm mainly placed their company in choice C, they are probably among the best-practice companies when considering the use and management of IT. Whilst they are benefiting from some of the strategic opportunities provided by IT, the conditional commitment of senior management, limited involvement of IT users, the low levels of IT skills in

Table 7: Impacts of IT implementations and their usage frequencies

	SMALL (n=25)	MEDIUM (n=20)	LARGE (n=28)
ALWAYS	- Data collection - Develop databases	- Data collection - Develop databases - Operational support for repetitive works	- Data collection - Develop databases - Operational support for repetitive works
OFTEN	- Operational support for repetitive works	- Strategic support in decision making process	- Strategic support in decision making process - Strategic support in reengineering
SOMETIMES		- Strategic support in reengineering	- Provide competitive advantage
RARELY	- Strategic support in decision making process - Strategic support in reengineering	- Provide competitive advantage	- Cost leadership strategy - Differentiation strategy - Focus strategy
NEVER	- Provide competitive advantage - Cost leadership strategy - Differentiation strategy - Focus strategy	- Cost leadership strategy - Differentiation strategy - Focus strategy	

Table 8: What is the impact of IT on your competitiveness?

CHOICES	Number of firms	Percentage of firms
(A) IT has no impact	24	32.9%
(B) IT has some positive impact	22	30.1%
(C) IT supports our competitiveness through business efficiency and cost reduction	14	19.2%
(D) IT is critical to business efficiency, financial gains, engineering excellence, R&D and innovation	13	17.8%

Table 9: How do you currently use IT in your firm?

CHOICES	Number of firms	Percentage of firms
(A) IT is not seen as an important part of the business	24	32.9%
(B) Use IT but let the technology find its own way within the organization	19	26.0%
(C) Use IT after proven and satisfactory results from users and other companies	16	21.9%
(D) Proactively seek to use IT as part of a well-thought-through strategy for achieving competitive advantage	14	19.2%

Table 10: How would you describe the relation between IT and your competitiveness?

CHOICES	Number of firms	Percentage of firms
(A) They are completely separate entities	28	38.4%
(B) IT is indirectly address through its supportive role	26	35.6%
(C) IT plays a central role in our competitiveness	17	23.3%
(D) IT is a critical success factor for our competitiveness	2	2.70%

some departments and partial commitment to R&D activities may slow down the rate progress of IT in their organization.

- If the firm can relate to the majority of choices in group D they are almost the very few and best-practice companies that are truly exploring IT for their strategic opportunities. They are also in a position to benefit from the IT culture they have developed and maintain IT on the urgent agenda of concern of top management.

The first question concerns the impact of IT on the firm's competitiveness. Firms are asked to determine the impact of IT on their competitiveness. According to Table 8, 24 of them (32.9%) stated IT has no impact; 22 of them (30.1%) stated IT has some positive impact; 14 of them (19.2%) stated IT supports their competitiveness through business efficiency and cost reduction; 13 of them (17.8%) stated IT is critical to business efficiency, financial gains, engineering excellence, R&D and innovation.

Another question is asked to get information about how they currently use IT in their firm. As it is shown in Table 9, 24 of them (32.9%) do not see IT as an important part of the business. 19 of them (26.0%) use IT but let the technology find its own way within the organization. 16 of them (21.9%) use IT after proven and satisfactory results from users and other companies. 14 of them (19.2%) proactively seek to use IT as part of a well-thought-through strategy for achieving competitive advantage.

In the last question, firms are asked to describe the relation between IT and their competitiveness. In Table 10, 28 of them (38.4%) described IT and competitiveness are completely separate entities. 26 of them (35.6%) stated

IT is indirectly address through its supportive role. 17 of them (23.3%) stated IT plays a central role in their competitiveness and only 2 of them (2.70%) considered IT as a critical success factor for their competitiveness.

When the responses are analyzed, it is seen that category A is the mainly selected choice among respondent contractor firms. Summarily, contractor firms are stated that IT has no impact on their competitiveness and IT is not seen as an important part of their business. Contractor firms also stated that IT and their competitiveness are not related and they are completely separate entities. If the answers are interpreted according to the health check matrix which is developed by Betts [54], it is clearly said that contractor firms are clearly utilizing IT as a support tool for operational efficiency. It appears that IT is not viewed as an important part of their business and IT applications are mainly directed at support and functional systems with very little in terms of integration.

CONCLUSION

This paper investigated the use of IT at strategic level on gaining competitive advantage in Turkish contractor firms. In order to achieve this, a field survey was conducted among Turkish contractors. The conclusions drawn from the survey are significant because of the contribution they can make to better understanding on the strategic use of IT.

The survey respondents are the leading contractor firms who are members of the Turkish Contractors Association. These firms are the dominant and most experienced ones that operating in the construction industry regarding their operating periods. Furthermore, as they are operating not only in domestic but also internationally, they are holding the largest market share in the Turkish construction industry.

With the help of the field survey, the review for the current IT usage in Turkish contractor firms has been put forward. It is observed that contractor firms mostly use information technology for their operational level purposes in support of activities at the low and medium level. The main purpose of IT usage is providing support to the activities on operational level works such as data collection, developing databases and operational support for repetitive works. By means of using IT on operational level works, contractor firms can only take advantage of technical and economic effects from the use of IT. In spite of this, IT is not effectively used at strategic levels and on activities which create strategic effects such as ensuring efficiency, providing support in decision making process, formulation / implementation of strategies and providing competitive advantage on the industry. Contractor firms do not transform technical and economic effects of IT to strategic ones. Furthermore, using IT at strategic level for supporting the firm's competitive strategies such as cost leadership, differentiation and focus is not as common as at the operational level devoted to increase the efficiency of activities.

The survey results showed that contractor firms are qualified in different levels according to their IT usage and IT skills. Turkish contractor firms have different IT skilled level employees and this case does not change according to the scale of firms. In other words, firm scale does not affect the employees' IT skill levels. Contractor firms do not attach much importance to IT training. They provide IT training only when required. Although a big majority of contractor firms stated that their IT skill level is not satisfying, they still do not provide necessary IT training to their employees. In order to maximize the benefits of IT, contractor firms need to focus on IT training and provide continuous training programs to their employees.

In the last part of the survey various questions are asked adapted from the health check matrix in order to search the relation between IT usage and competitive advantage. It is found that many of the firms are clearly utilizing IT as a support tool for operational efficiency. They do not view IT as an important part of their business and IT applications are mainly directed at support and functional systems. In spite of this, there are also some firms which are aware of some of the strategic opportunities provided by IT. However, they use to reduce costs and increase the overall business efficiency, they are not fully benefiting from the opportunities provided by IT usage. Very few of them are truly exploring IT for their competitive advantage and benefiting from some of the strategic opportunities provided by IT. However, firms need to benefit from the use of IT on strategic aspects in order to protect and improve their competitive position in the construction industry.

As it is proven in the literature, there is a common understanding of the importance of IT usage at strategic level, but providing strategic impacts by using IT implementations are not well-developed. Although there are many studies concerning the strategic use of IT and its impacts on the construction industry; there is not much evidence that contractor firms in Turkey are aware of using IT from strategic aspects of it in order to gain competitive advantage.

To conclude, this study helps to understand the current situation of the use of IT among contactor firms in Turkey. Although there is recognition in the importance of IT on gaining competitive advantage, the use of IT is very much towards supporting operational level works rather than achieving competitive advantage. This study can be a useful tool for contractor firms which need to be aware of the importance of strategic use of IT in today's strict competitive environment. Consequently, the survey findings may provide a valuable instrument for contractor firms planning to formulate new strategies in terms of IT implementations. Furthermore, findings obtained in this study can be regarded as a preparatory research for the other developing countries that have similar IT related studies. In this respect, this study can provide an interactive tool for both academic and practical comparisons on an international basis.

This study was conducted only on Turkish contractor firms which operate in the construction industry. For further research, another study can be done for architectural firms. Furthermore, different proven instruments can be used in order to measure the strategic use of IT in order to gain competitiveness in the construction industry.

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