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A Study of Turkish Construction Consultancies for the Applicability of Project Extranets

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Abstract
A group of construction consultancy services in Turkey were investigated for their existing information and communication technology policies and their attitude towards web-based project management systems (project extranets). Turkish construction sector has become very competent in overseas jobs during the last decade. There are many design offices in Turkey providing services for overseas construction jobs. One would expect them to utilize project extranets more extensively due to distance between the construction sites and consultancy offices. However, while a significant portion of Western construction consultancies have been enjoying project extranets, the most of the Turkish consultancy businesses are still using only email, instant messaging, and mobile phones for their communication needs. While the internet connectivity and extended use of computer aided design technologies have proliferated in consultancy services in Turkish construction industry, there is very little interest towards project extranets. The research work gives a short portrayal of Turkish construction sector, covers a concise literature review on project extranets, and exhibits a small empirical study of 5 Turkish construction consultancy businesses. The study investigates the existing capabilities and attitudes towards information management, both at employee and management levels. Several semi-structured interviews at each company were conducted. The results are mixed, with a scale ranging from a total rejection of the idea to a claim to have similar systems already in place.

Keywords
Information and communication technologies (ICT), Project extranets, Construction, Turkish construction sector

1. Introduction

While being one of the oldest and traditional labour intensive professions, construction sector deals with highly customised solutions. Construction projects are managed across dispersed offices and sites. Therefore, efficiency of communication has a key importance for the sector. This research study explores the applicability of a new information and communication technology (ICT) solution, project extranets, which aim to influence the way construction industry communicates and works.

Implementation of new IT systems has always been risky and problematic. A wrong choice can result loss of money, jobs, and reputation in the market (Love *et al.*, 2005). Therefore, the consequences of applying new technologies should be investigated extensively to reduce the chances of failures. The construction sector traditionally relies on paper based communication methods. This requires extensive delivery of information to all related parties, thus introducing costs of media, printing, distribution, and storage (Wager and Winterkorn, 1998). Besides these costs, version conflicts and increased delays impose

avoidable risks. Electronic communication solutions for construction projects are acknowledged as a potential solution by the leaders of the sector and software suppliers. Following the proliferation of personal computers by late 1990s, the society was transformed into a highly connected network, communicating and collaborating with each other (Wilkinson, 2005). The construction sector was not too late to join the crowd. However, electronic collaboration brought some problems with it. Scattered files all over the computers and network, non-standard file naming practices, software or licence requirements, and challenges with file versioning are among the major problems to mention about.

Timely flow of information is vital for the success of construction projects, thus efficient collaboration is essential. Nowadays most construction, design and engineering companies have international jobs (Liu *et al.*, 1996). These developments brought the challenges for collaboration among the related parties, rendering the traditional communication methods more difficult and expensive. While some companies developed their own solutions for communication tasks, others chose to purchase services from software suppliers. Among these solutions, this research study particularly focuses on project extranets. These systems are web based information exchange portals for project participants with integrated document security, view and mark-up tools. Project extranets allow advanced user management and integrate alerts, messaging, and requests into document management functionalities. As a result, users can track versions more effectively, comment and discuss an existing document, in a secure and coherent manner.

There are several research studies investigating the impacts of project extranets in the UK and American construction sectors (Alshawi and Ingirige, 2003; O'Brien, 2000; Thorpe, 2001). However, there are not many resources for identifying the readiness of their Turkish counterparts. This research study tries to find out how project extranets could perform in the Turkish construction sector. It is aimed to explore the existing methods of information exchange, technological infrastructure and skills, and the perceived benefits of project extranets. By the help of these findings it could be possible to analyse the applicability of project extranets in Turkish construction sector.

This research study was conducted to satisfy a part of requirements for the Master of Science in Construction Management degree at Reading University, United Kingdom.

2. Background

Construction sector utilises a diverse range of information types and formats, and heavily depends on information flow to operate (Deng *et al.*, 2001). Among these information sources there are architectural plans, engineering drawings, procurement documents, licences, permits, which have to be readily accessible to related parties. Delays or failures of access directly affect the work processes. Providing seamless information flow between offices and construction site is essential for the success of a project. Paper-based communication is slow and expensive and can cause both missing and duplicated information (Barton, 1985).

While the use of IT has increased within construction sector (Love and Irani, 2001), the integration is still not perfect and full benefits are not achieved as much as other industries (Marsh and Flanagan, 2000). Most professionals in the construction sector think that e-mail is the most useful application of IT (Johnson and Clayton, 1998). On one hand, e-mail drastically speeds up the information transfer processes; but on the other hand it can cause duplication of information and version conflicts. Misuse of e-mail, such as not adhering to file naming standards, or subject, body text conventions can cause rework, and extra cost. Most of the rework done by contractors result from conflicting and deficient information (Newton, 1998). In parallel, ubiquitously available instant messaging technologies don’t allow tracking changes or capturing comments; causing problems in long term. There is a need for specialised methods of information delivery with organisation and search functionalities (Thorpe, 2001). Improving

communication between members of the construction projects decreases mistakes and failures (Deng *et al.*, 2001).

Off the shelf simple communication tools, i.e., e-mail or instant messaging technologies, are not answering the needs of construction sector and cause failures and delays. That is why the sector needs customised tools supporting many aspects of the construction projects, and project extranets could be a useful solution for providing that.

2.1. Value of Information in Construction Sector

Information is the most valuable asset for construction organisations, and they are parallel efforts on using it more effectively (Wilkinson, 2005). Efficient transfer of information between distant company offices allows better utilisation of past experiences and current information resources, thus increasing success (Becerik, 2004). Maintaining information flow is a significant source of cost by itself, i.e., licences, software fees, hardware, training, downtime etc. Quantifying benefits is an even harder task since everything in a construction project is directly influenced by information flow; thus, minor issues might directly affect the final cost. There are several techniques used for measuring benefits of IT investment; however, there is no special method used for construction industry (Andersen *et al.*, 2000). Since profit margins are very low in the construction industry, every extra cost item is taken seriously and reconsidered (Marsh and Flanagan, 2000). Rework is a major source of cost overruns, which can be avoided by the provision of right information on time (Alshawi and Ingirige, 2003). Project managers spend their valuable time on maintaining communication between the parties in the project, thus losing focus on managerial and strategic tasks (Scanlin, 1998).

2.2. Turkish Construction Sector

Like other countries, construction is the largest industry in Turkey (4.5% of GNP in 2006 (Research Centre (YEMAR), 2006)). With its 200 subsidiary sectors, construction industry can be called a locomotive sector. In recent years the size of the sector has increased rapidly by the employment of both national and international projects. Turkish contractors have been present in large international projects for many years, with a significant increased in the number and size in the last decade. Turkish bids for international projects totalled a sum of £11.07 billion in 2007. Research shows Turkey at the 3rd place after USA and China in a list of the worlds biggest construction companies (ENR Editorial, 2008). A comparison of national and international construction project volume of Turkey immediately displays the importance of overseas works. For these, the distance between head office and project sites is a big problem. ICT can help to decrease the problems caused by the distance. A better implementation of these technologies is essential for project success.

Turkish construction consultancy businesses have already integrated computer aided design, analysis, and drafting tools into their practices. Almost all of them use internet to exchange information between project participants, with an exclusivity of e-mail and instant messaging. The use of these tools doesn't eliminate the need for printed and signed official drawings and documents due to existing laws and regulations. While there is much need for novel ICT applications in Turkish construction sector, contractual regulations prohibit their proliferation (Nielsen *et al.*, 2006). One can also count the costs for training and system implementation as barriers to application (Kumas, 2004).

2.3. Project Extranets

Project extranets are internet based document management systems with a set of specialised tools for construction sector. Most products in this market are provided in the form of software as a service (SAS) and priced on per licence basis. Service suppliers keep the software in their servers; therefore, users are not obliged to install anything on their computers but use their web browsers. Again, the service suppliers

are responsible for updating/upgrading the software, regularly backing up the users' data, and maintaining security. Project extranets connect the designers, construction managers, and contractors via a web portal where the activity occurs over schedules, documents, instant messages, and comments. This service allows the users to upload, view, and comment on native file formats (i.e., CAD, word processing, worksheets). A centralised messaging system informs the users about new comments, discussions, or changes made on a document.

When used effectively, project extranets reduce version conflicts by keeping everyone up-to-date and increase information accessibility by allowing instant access to documents, schedules, and discussions. These systems also have the capability to integrate sign-off processes into the portal. By using project extranets, construction teams exchange information in a quicker, cheaper and more accessible way. The data kept in this system is very secure since it is backed-up regularly, immune to virus/malware attacks, and provided to only users with access rights. Project extranets provide reductions at overheads, administrative processes and mistakes (Rojas and Songer, 1999).

In certain situations, project extranets may cause more trouble than the benefits they promise. Increased flow can cause information overload, which may hinder the efficiency of people (Thorpe, 2001). Users may become overwhelmed with the notifications from the system, particularly if they were included in the list rather unnecessarily. Therefore, training the users and encouraging an 'extranet etiquette' is essential. Another issue is the fact that every project has different needs for communication, and it is not very easy to customise project extranets (O'Brien, 2000). Employing project extranets incurs costs, not only for individual user licences, but also for training and adaptation.

Implementation of project extranets is a challenging task and requires collaboration of all parties from the beginning (Thorpe, 2001). An important barrier to using collaboration technologies efficiently is not understanding worker's psychology (Wilkinson, 2005). Training the staff is essential to familiarise them with the system and benefit effectively. For a seamless integration of project extranets to all levels, provision of fast and reliable internet connectivity is essential (Doherty, 1999). Another issue is the intellectual property (IP) rights and reluctance to release ownership of information (Alshawi and Ingirige, 2003). Construction companies need to consider legal advice on making information easily accessible before implementing project extranets to prevent suffering from IP rights conflicts. Licence fees and implementation costs should be considered in the light of overall project budget, i.e., using project extranets may not be appropriate for projects below a budget of £2 million (Wilkinson, 2005).

3. Research

This research study aims to explore the issues that can potentially impact the implementation of project extranets in Turkish construction consultancy businesses. The study targets general contractors, design offices and subcontractors based in Istanbul, Turkey. Three objectives were determined to achieve the main aim of the study:

- To explore existing work practices for information exchange
- To explore existing IT infrastructure and end-user skills
- To explore end-users' perceptions on benefits and costs of using project extranets

Due to the limitations on time, the study focused on only five companies representing a small sample of the construction businesses in Istanbul. The sample set had architectural practices, a major contractor, a specialist trade contractor and a project management company. While some of these are well known and large companies, some of them are new ones with young managers. This contrast was helpful for identifying the viewpoint differences between two ends of the spectrum.

For data collection, semi-structured interview method was chosen. A list of strategic probes was created around the research objectives. While it was aimed to receive an answer for each probe, interviewees were not questioned for all of them. In certain cases, the interviewee would give an answer for a probe during the course of conversation. Every interviewee was allocated 30 minutes and questioned with the guidance of a template question sheet. In most cases only half of the questions in these sheets were used since the interviewees gave elaborate answers without the need of an explicit request. Sessions were recorded by note taking.

4. Findings

A series of 19 interviews were completed with professionals from five construction consultancies in Istanbul. Findings from these interviews are grouped and discussed under seven themes.

4.1. Companies

Company A is one of the biggest general contractors in Turkey, with an existing intranet investment for managing their information processes. Company B is a small architectural office focusing on interior decoration projects. Company C is a famous architectural design office with intensive digital work processes. Company D is a project management company undertaking the project management tasks of an important petrol station chain. Company E is a well-known steel manufacturing company in Turkey; designing and manufacturing steel members for buildings.

4.2. Themes

Seven themes of issues regarding the application of project extranets in Turkish construction sector were identified. While some of these were pointed out by all interviewees, some others were mentioned only by smaller companies. These themes are clear representatives of the major issues on applicability of project extranets in Turkey.

4.2.1. Initial cost of project extranets

With hardly any exception, first remarks received from the interviewees were about service costs of project extranet products. Competitive market and shallow profit margins force Turkish companies to controlling their spending, therefore they are very sensitive to any extra costs implied by a new system. Costs of project extranets vary with the project size, period, location, and the system provider. Implementation costs are beyond initial service costs since the time and money spent on training and adaptation constitute a significant amount. The interviewees expressed concerns over the related costs since there was no readily available method for calculating the benefits from the system.

4.2.2. Existing law and regulations in Turkish construction industry

Most of the interviewees expressed their concerns over the limitations imposed by the legislation on the use of digital documents. Turkish companies have already been using digital document creation methods for over a decade; yet, they still need to print paper based copies for legal compliance. Company A and E were not confident on the legal standing of the information exchanged through the project extranets. It was mentioned that Turkish law does not accept electronic records as a proof in courts.

4.2.3. Not being applicable to pre-tender period

Architectural offices engage in intense activities during the pre-tender period; i.e., preparing for design competitions. Interviewees from Company C thought that project extranet applications could be more effective if they were initiated before the pre-tender period. In many cases the information generated during the pre-tender period is essential for the whole project phases. However, it was also pointed out that the cost of implementing the system should be under client's responsibility since the pre-tender

period doesn't guarantee the job. Another concern related to the pre-tender period is the existence of competing companies for the same task and intellectual property matters. Currently project extranets don't address this issue.

4.2.4. Informal and spontaneous communication

Most of the communication across project participants in Turkey happens through informal and spontaneous channels. Studies show that 85% of the information is exchanged via telephone calls or face to face meetings (Nielsen and Ozbay, 2000). Companies B and D particularly were concerned about risks associated with changing their habits while they have to deliver at a competitive and hectic sector. As proven by earlier studies, the construction sector has significant informal and spontaneous communication. Particularly in Turkey this is more common, and project extranets were challenged at this front.

4.2.5. Companies providing same benefits with their system inside the company

Larger companies in Turkey have their own IT strategies for improving their information processes. Company A invested a central information flow system where an intranet is utilised for file exchange and repository purposes. Employees are obliged to use the file naming and versioning conventions and the whole system is backed up everyday after work hours. The company already conducts online meetings and web-based file sharing with project partners. Managers expressed interest towards extended functionalities of project extranets, i.e., easy organisation of files, commenting tools, and easy, web-based access from anywhere in the world.

4.2.6. Companies being unwilling about change

While Turkish people are very interested in new technologies, they are also unwilling about changing their habits. The same applies for the businesses, too. It is not easy for construction companies to change their information processes abruptly. Company B is unwilling about such a change because they think it will decrease their close relationship with clients. They see informal and spontaneous conversations as a key part of their relationships with their clients. Company C is also hesitant about change since the manager thinks they are already doing well with their current processes. Adaptation to a new system costs money and risks current projects.

4.2.7. Ease of use & easy organisation of files

All companies that were interviewed have suffered from version conflicts or a missing file at least once. Therefore, they all welcomed the file organisation structure and backup functionality of project extranets. Even Company A, with the most advanced information management system among all, found project extranets useful. The ease of use and minimised user skill requirements made project extranets particularly attractive. All companies acknowledge that compulsory file organisation, keyword assignment and user-access controls are opportunities for improving their existing information management processes. Most companies have issues with information transfer between the offices and construction sites. Therefore, the capability to access information any time through any internet browser from any location is a groundbreaking advance according to them.

5. Discussion

A group of construction consultancy businesses in Istanbul, Turkey were investigated for their existing information and communication technology policies to analyse the applicability of project extranets in Turkey. The need for better information management is explained, evolution of new ICT tools are portrayed. Issues related to the application of project extranets are described. The research scope, methodology and findings are presented. Findings are summarised under seven theme headings.

Turkish construction sector has become very competent in overseas jobs during the last decade. There are many design offices in Turkey providing services for overseas construction jobs. Increasing number and scale of jobs require more strategical approaches to the management of information. Current attitude of Turkish construction sector towards application of new ICT tools is a conservative one. This attitude stems from the existing legal obligations, cultural relationships, and the lack of willingness to change. It is apparent that current management processes impose significant damages due to lost and inaccurate information. It is also understood that there are particular capabilities of project extranets that could be implemented despite the existing barriers. There is a need for further research and trials to be conducted within the sector.

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