Electronic communication systems effects on the success of construction projects in United Arab Emirates

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ABSTRACT

This research investigates the use of modern electronic communication management systems, and how these systems affect the success of construction projects in the United Arab Emirates (UAE). The research starts with a literature survey, and a brief background on how the communication mechanism works; how using these systems influence relationships amongst the project stakeholders, and consequently the projects success. Two case studies are introduced, followed by an analysis of results and conclusions.

The first case study, based on action research, employs interactive tools to collect the evidence, including interviews, surveys, document review, and feedback on progress. The study uses success criteria from construction projects in the UAE, previously identified by the authors. This case study has revealed an organisational transformation trend, from functional, towards matrix and project structures. These types of change are taking place after the implementation of project electronic communication management systems into the client organisation, and are enhancing chances of project success.

The second case study takes into consideration the co-existence of the new modern project electronic communication systems with the other traditional communication media. It has been shown that such an arrangement works both for the strategic benefit of the projects, and the projects stakeholders.

In the areas of improvements to schedule and project control, the current research results are in agreement with pertinent published literature and research findings. However, the benefits for quality control during the design and construction phases of the project, in addition to potential improvements in the health safety and environment (HSE), remain debatable.

1. Introduction

Good communication, during all phases of a project lifecycle, is an important success factor that connects all the other factors of project success. For many reasons, construction projects can suffer from the lack of effective communication between the project stakeholders, and the construction project parties. Using electronic communication is becoming increasingly effective in enhancing effective and efficient project communication. Many projects in UAE are now using various formats of electronic communication systems, which raise the need to investigate their effects, particularly in view of the recent construction boom in UAE.

Electronic communication in project management needs to be researched on a strategic level [1,2 and 3]. Dent and Montague [4], in a CIRIA publication, in 2004, addressed the challenge of the relationship between the knowledge management, and strategic business objectives of the organisation. This can be attributed as the link between knowledge management and project success, as perceived by the stakeholders. Many researchers focused on the integration of IT system in the AEC industry [5], projects like; WISPER project [6], Gallicon project [7], and others. Collaboration is found to be the highest score factor among the most effective four factors that affect project success [8]. Recent research has emphasised the role of computer-integrated construction into collaboration. [9], and Craig and Sommerville [10], 2006 claim, “within any construction project the exchange of information is perhaps the principal component/function in ensuring success”.

NIST report [11] in 2004 and Coleman andJun of AISC [12], 2004 stated, “Inadequate interoperability prevents digital communication between software programs used by designers, contractors, specialty contractors, as well as building owners/operators.”

Ongoing research is addressing a series of case studies, which aim to realise the strategic benefits of implementing electronic communication in the project management of construction projects in UAE, and enhance chances of construction project success. The kind of IT applications used in the case studies, is simple and easy to use, starting with the email which was used during the first case study which is for a construction project that started in 1999. The second case study has been for using web-enabled documentation and a communication package prepared specifically for the

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AEC market. Both cases need to be looked into on a strategic level. The same thing, to a lesser extent, could be said about process issues, at least at this stage of implementation. Document management and communication has most recently been the fastest growing e-business application in construction [13].

Therefore it can be said that, compared with the previously mentioned research in the same field, this paper is investigating the same subject of electronic communication in the construction industry but from different angles, and for a different environment with reference to the following points:

- It investigates the effects of the use of e-communication on the project success criteria. Success is considered as a strategic issue by the Association for Project Management [14] and [15].
- To achieve this success at a strategic level, senior executives within the construction industry must support its implementation [16], therefore this point has been emphasized during interviews with this group, amongst other users.
- This research is industry initiated from within a client organisation. It is need oriented from the very beginning, and therefore it is for the purpose of satisfying the success criteria requirement, and not to study the effect of a particular IT solution.
- The basic need of communicating the essential dynamic (day to day) information of the construction project has been addressed.
- Accordingly a rather simple off-the-shelf IT product, which deals with this need, has been selected in the case study.
- Due to the fact that such research into the success criteria is very much context oriented and industry related, the construction projects in UAE have been considered as the domain. An earlier research by the authors has targeted the question of project success identification in this environment [17], the results of which are being investigated during the interviews for this current research.

The research into project success criteria shows that they are subjective [18], context oriented [19], and time dependent [20] and [21], accordingly the adoption of soft system methodology in a series of interviews has identified success criteria in UAE environment [17] which has been used as a tool for measuring the success after the IT implementation.

The approach used has been soft and systemic [22], and mainly qualitative case studies [23], which renders most of it as being phenomenological, at the same time following up and comparing with the more empirical and positivist research done by other researchers [24,25], and [26]. Nitithamyong research has quantified some of the areas about people and processes related to using slightly different systems (Application Service Providers; ASP’s), therefore it addressed areas like IT readiness of users, training needed, etc., and some of their effect on “hard” success of projects.

Comparatively speaking, the domain of the current research is the entire content of the cases that are visited and considered. It applies soft system thinking and aims at defining the effect on the overall success of the project as perceived mostly by the client and his team. The first author is part of a client organisation (first case study), through which he has access to project documentation and capable of making daily contacts with project participants. Extensive interviews have been the base for data collection in the second case study. Hence the main objective in both case studies during data collection has been to ‘listen’.

Alshawi and Ingrigirge [27] addressed using electronic communication during different phases of the project lifecycle. On the other hand, during the current investigation in ‘our’ first case study, the focus has been mainly on systems suited and used for the construction stage with an extension of its effect in the preceding tendering stage, while the following operation and maintenance stage have been considered in the second case study. Simple tools have been used in the first case study for the communication management of the construction project, while the second case study used more recent tools, including web based solutions (based on the project manager local server, and not through ASP) in order to manage the construction projects. This technology is also simple but is more tailored to the needs of the construction industry. Both projects are major building projects in the UAE. Two fold objectives are achieved through presenting both cases, the first of which is to indicate the direction of the development of electronic communication in the construction industry in UAE, and the second is the comparison of the findings of both cases with similar investigations in other environments. At the same time, both cases are considered as cycles in the action research of implementing project electronic communication (project e-com’n) in the management of construction projects in UAE. Both of the cases are related to the client decision-making process during the construction phase.

The interaction between various communication media, namely electronic and face-to-face meetings, inside the communication network model of project stakeholders, is briefly looked at in the analysis of the second case study, from the perspective of satisfying the strategic benefits in this particular environment. The appreciation of multimedia communication models in the AEC industry, is gaining more ground in the literature. This is supported by the laboratory study of the mechanism of interaction in the multimode capture, transfer, and reuse of knowledge in the design process [28] which aimed at studying the model of interaction between the analogue face-to-face and digital communication, all during the design sessions.

2. Components of the two case studies

2.1. Proposition

These cases studies have been initiated because a solution was needed to solve the problem. An assumption has been proposed that the implementation of electronic communication can be the solution, Yin [23], says that “Only if you are forced to state a proposition will you move in the right direction”, therefore the purpose of case study methodology is to prove that this tool:

- Deals with fragmentation (geographic, organisational and multi disciplinary) problem.
- Can contribute significantly to project success in UAE environment.

2.2. Unit of analysis

- The main unit of analysis is the project success as identified by the success criteria, as have been clarified in literature and through UAE research [17].
- Organisational transformation as the second unit of analysis in the first case study, from functional towards project organisation, and the computerisation of project communication as a top management commitment.

2.3. Boundaries

First case study: the housing project and the client organisation, with documentation from the project manager and the consultant.
Second case study: the project, and the interviews.
2.4. Linking data to proposition

Interview documentation and actual progress, are directly compared and verify the proposition with lessons learned.

2.5. The criteria

- Semi structured interviews coupled with a questionnaire, direct analysis.
- Documents measure of success criteria and organisational transformation.
- Daily progress to measure the success and the transformation.
- Project perceived success.

3. First case study

This case study is a retrospective one (1999–2003), for the effect of the simple, but consistent use of the e-mail, as the main and comprehensive communication and documentation media between the main participants of a major housing project. The study discusses the effect that this e-communication had on the success of the project, and the organisation, from a client perspective, into the strategic issues concerning the project. Lessons learned were discussed regarding the difficulties encountered, the tools that helped, and the organisational benefits gained.

3.1. Project description

The project was a major housing program, synchronising infrastructure networks, for the construction of up to 1900 medium housing units, in different phases and different locations, some more than 300 km apart, as well as facilities such as schools and clinics, with a construction budget exceeding 300 million US$. The project lasted for about 3 years and completed in 2003. The project organisation contained more than 13 building construction contractors, and 8 supervising consulting firms, all under the umbrella of one project management firm and a client representative as seen in Fig. 1.

3.2. Research methodology – first case study

The research method has benefited from both the retrospective case study methodology [23] and action research [29], as the first author has been directly involved in the project management and the implementation of electronic communication management of the project under consideration. Easterby-Smith et al. [30] considered the involvement of the researcher as a virtue, and this type of research is well accepted from a phenomenological point of view. The possible bias of the author needs to be identified and taken into consideration. Action Research has been widely used for assessing the implementation of information systems [31]. This methodology also proved to be effective in organisational research [32], and recommended by the journal of organisational transformation and social change [33] among other forms of subjective epistemology, while on the other hand, the case study methodology is beneficial to measure the strategic project success perception. Soft system thinking [22] is very relevant to this kind of research in order to consider the holistic context.

During this case study, triangulation of evidence which is a recommended in research objective [34] has been achieved through:

- Collection of data from continuous monitoring of the construction project.
- Measurement of success criteria, both during and after the project.
- Interviews with some of the key personnel to elicit their perceived project success.
- Post project changes (organisational transformations).

3.3. Results of the first case study

The implementation of the projects electronic communication system played a significant role in the transformation of the organisation, from a functional structure, into a matrix and project-oriented form of organisation. This transformation would not have been possible without the use of this tool. Initial implementation led to preliminary delegation to project managers and provided transparency through the continuous access to information; consequently trust is created through the feedback loop. A similar link in the mechanism of trust building is found by Diallo and Thuillier [35] and has led to more delegation for more projects in the organisation (see Fig. 2). Latham [36] has stated that the “Use of coordinated project information should be a contractual requirement” while Craig and Sommerville [10] have reported that implementation of project information systems has aided in the management of the client organisation. A similar sort of organisational transformation has been published for public service organisations [37].

Throughout the first case study, the organisational transformation has been evidenced by:

- The actual transformation that took place in the organisation.
- The decision taken by the top management to adopt more project-oriented organisational structures.
- The demand for an advanced implementation of project web based information systems in an organisation that previously had no such applications. Surprisingly this demand originated from top management, compared with previous situations when the demand came from the functional sections.
- The establishment of the Programme Management Office (PMO) in the organisation to “raise” the web implementation and promote the project orientation.
- Daily correspondence that witnessed the trend towards delegation to project managers.
- Interviews with some of the key personnel who played major roles in the transformation.

A similar link between the IT strategy and the organisational transformation is reported in the literature [38].

However, some of the interviews conducted in the client organisation, indicated that not all of those concerned have
considered this transformation as being totally beneficial to the whole organisation. Some were of the opinion that it reduced awareness of the technical quality issues such as design, material and craftsmanship that, in their view, was better handled in the functional departments. Although this was the view of those interviewees from the functional departments, it was also evidenced by quality assurance report documentation, which demonstrated a slight deterioration in quality standards. This kind of debate is not one of the objectives of this paper, however the authors argue that through the comprehensive implementation of the web based system throughout the whole organisation, reaching all functional departments, this deterioration in quality standards will not be the case.

On the other hand the implementation of the electronic communication has participated in the success of the project, which has been measured as shown in Table 1.

### 4. The second case study

This study has been linked to another investigation, which aimed at evaluating the different project electronic communication systems available in the market of UAE for the purpose of implementing to construction projects for a major builder. Satisfaction of stakeholder information needs, stability and reliability are among the evaluation criteria, some of these criteria have been guided by the vendor survey conducted by CICA [39]. A further investigation as explained in the research methodology has been carried out for this research.

#### 4.1. Project description

This is a highly prestigious commercial project, consisting of a shopping mall, a five star hotel and an entertainment facility, the budget exceeding 800 million US$. The project was completed recently and won international awards. The major stakeholders are the client, some investors, a project management firm, design and supervision consultants and different contractors for different packages of the project. The contractual model between the client and various AEC parties is shown in Fig. 3, while the communication network model is shown in Fig. 4.

A well known software package for managing the documentation and communications was implemented and managed by the project manager during the construction; therefore it is not provided through an Application Service Provider “ASP”. (It was found that ASP’s were not the preferred solution in UAE at time of selection because of the information accessibility time.) This issue is discussed further in the results discussion. The communication network model is analysed in the results of this case study.

#### 4.2. Research methodology – second case study

The investigation is designed as a case study [23], with much less subjectivity if compared with the first case. It is still phenomenological, but with part of it shifting towards logical positivism. The researcher faced difficulties during data collection, as many construction professionals in the prevailing culture of the construction industry environment of the UAE feel reluctant to reveal

### Table 1

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<tr>
<th>Project success measurement tools</th>
<th>Measured by</th>
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<tr>
<td>Project success</td>
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<td>Project on time</td>
<td>Documented in project documents</td>
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<td></td>
<td>Project within budget, and even in some of the packages slightly lower than the budget quality</td>
<td>Documented in project documents</td>
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<td>Top management support</td>
<td>To do more projects under the same system</td>
<td>Actual follow up of the houses after construction</td>
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<td></td>
<td>To demand to advance and expand the electronic communication into more projects</td>
<td>Documented</td>
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![Fig. 2. Mechanism of trust building that led to transfer to project organisation.](image-url)
any information about their projects. The apprehension of leaking information outweighs the benefits of participating in the investigation. The soft system approach [22] requires an in-depth analysis in order to understand the purpose of why this system has been selected, how it has been implemented, how much of success is attained in actual implementation, and how much it did contribute to the overall success of the construction project, however, the difficulties in collecting this kind of information made the job more difficult.

The first author has been able to meet and interview individuals from a major contractor, a design and supervision consultant, the operation and maintenance team and also the project manager team who initiated the electronic communication system and controlled its daily implementation. The interviewees ranged from project directors to designers, down to the operator whose sole job is the daily documentation management of the project. A series of semi-structured interviews coupled with a written survey were used to initiate the discussion during some of the interviews. Some further interviews were needed to compare the different information received. Total interview time took more than 16 h, over different periods of time, extended over 4 months. In order to gain knowledge of the research area, prior to these interviews, the first author undertook different courses of training on the electronic communication system. This knowledge did not make the author biased, as it is part of his role, in his organisation, to continuously evaluate the project communication systems available in the UAE market.

Issues regarding ease of use, support and IT related implementation, which are related to the actual user, have been researched and reported in relevant literature [25]. This has been considered during the data collection, but the main theme of the investigation remained focused on the strategic issue of construction project success. An initial research plan, of a quantitative questionnaire to be distributed by mail to the users, with the help of an IT vendor, was cancelled at an earlier stage, as respondents may have been biased, which could again be a cultural issue. This would not be the case amongst different society’s culture [26].

In comparison between the different research methods for data collection, the interview is found to be much better than questionnaire for this kind of research. In the case of using questionnaires, the respondent may misinterpret the objective of implementation of the system and instead, judge on the success of the IT system and not the strategic success of the whole project.

4.3. Results of second case study

Results of the second case study are outlined in Table 2 and further analysed in Table 3. In Table 2 the scores of 1–5 represents the extent to which the interviewee considers that an improvement has happened in the areas of cost, safety, quality, etc. due to the implementation of electronic communication system. Score 1 shows very weak benefit, while score 5 indicates a very strong benefit.

In Table 3 the weight of a particular criterion represents the extent to which the professionals in UAE consider that this criterion contributes to the overall perceived success of the construction project.
projects. The results are tabulated against success criteria in UAE as taken from previous research [17].

Factors to consider in the analysis of these results:

1. Experience of the interviewee.
2. Position of the interviewee in the organisation.
3. Role of the firm in the project.
4. Is his firm the one who proposed the communication system?
5. Who has control over the information?
6. The interviewee being an IT user before, or not.
7. Is he a specialized person who cares about quality first, or a progress manager who cares about schedule first?

Factors of bias which are eliminated by the interviewer:

- Assurance of confidentiality to all interviewees.
- Avoiding formalities.
- Screening and analysis of results.

4.4. Various relational networks of case 2

In this case study, various communication media used among the AEC parties has been investigated and the two networks of contracting and communication have been compared, a further analysis of the communication model of Fig. 4 shows the following:

- Face-to-face mode of communication is the major mode of information flow for some of the communication relationships. According to the traditional point of view, this used to indicate a failure in adopting digital communication, while it should rather be considered as part of the nature of social network [38].

Table 2

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<td>Quality</td>
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<td>Minimum variations</td>
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<td>29 4</td>
<td>29 5</td>
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<td>38 2</td>
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<td>37 4</td>
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<tr>
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<td>49 5</td>
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<td>10 3</td>
<td>10 3</td>
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<td>31 5</td>
<td>31 1</td>
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<td>8 2</td>
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<td>17 4</td>
<td>17 1</td>
<td>17 4</td>
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<td>Profitable as per expectations</td>
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<td>31 5</td>
<td>31 4</td>
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<tr>
<td>Master file with lessons learned</td>
<td>48 4</td>
<td>48 5</td>
<td>48 4</td>
<td>48 5</td>
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Table 3

<table>
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<tr>
<th>Project success criteria</th>
<th>Weight</th>
<th>Score</th>
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<tbody>
<tr>
<td>Time</td>
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<tr>
<td>Budget</td>
<td>5 N. A</td>
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<tr>
<td>Quality</td>
<td>5 Low</td>
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<tr>
<td>Minimum variations</td>
<td>4 Moderate</td>
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<tr>
<td>Claim management</td>
<td>3 High</td>
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<tr>
<td>HSE</td>
<td>3 V. low</td>
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</tr>
<tr>
<td>Few snags</td>
<td>4 V. high</td>
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<tr>
<td>End user satisfaction</td>
<td>3 Low</td>
<td></td>
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<tr>
<td>Sponsor satisfaction</td>
<td>3 Moderate</td>
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<tr>
<td>Project team satisfaction</td>
<td>3 V. high</td>
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<tr>
<td>Transparency</td>
<td>2 High</td>
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<tr>
<td>Low maintenance</td>
<td>2 Moderate</td>
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<tr>
<td>Maintaining relationship</td>
<td>2 High</td>
<td></td>
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<tr>
<td>Profitable as per expectations</td>
<td>2 V. low</td>
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<tr>
<td>Master file with well organised communications with lessons learned</td>
<td>2 High</td>
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</table>

Shaded areas represent the areas where the answer is very relevant, the role of the firm matches the question 100%.

a As concluded from the Project Success Survey in UAE El-Saboni et al. [17].
b This feature is not supported by the particular software package used in this project.
c This has been the answer of the interviewee, or this particular benefit is not applicable for the respondent, for example; a profitable project is not applicable.
d Question numbering is different for different interviewees for reasons of different role, therefore if he has been involved in operation stage then questions about maintenance and master file come first and so on and also for verification purposes, some other questions are also used to verify.
e Some results have been cancelled after double checking and verification.
f End user of the facility and the completed construction project (not the “IT end-user”).
project manager, but contractually committed directly to the client. This traditional form of network is prevalent in the construction environment and is a continuous source of conflict.

Further elaboration and comparison with other literature results are in Section 5.

5. Summary and discussion

Benefits on schedule, safety, and profitability: The second case study coincides with research in different environments, which confirmed schedule benefits if electronic communication is implemented [40]. The daily follow up and interviews in the first case study have shown that electronic communication had a positive effect on schedule, indirectly bypassing delegation, and expedited decision making, which has been empowered by the transparency and availability of information whenever needed.

It is also interesting that the second case study has shown almost no impact on safety and profitability which in turn is identical to El-Mashaleh et al. [40], while Cheung et al. [41] and Cheung 2004 [42] have shown promising results where safety is concerned. The reason for this disagreement can be related to difference in culture, and legal contexts, or due to different features and capabilities offered by different IT packages. However recent evaluations of most available packages in UAE have shown that they are including safety tracking records, and recent HSE regulations are strictly applied, which promises more potential of success in this field.

Benefits on sponsor satisfaction, project team satisfaction, transparency, maintaining relationships, and eventually on trust: Questionnaires, interviews and daily follow up have all shown a promising potential for these benefits. This is in agreement with Diallo and Thuillier [35], who have shown that trust can be knowledge based and “constructed” through knowledge building between all stakeholders, particularly in emerging economies.

Benefits on budget could not be identified and may be due to:

- The package does not track the budget and leaves this job to each organisation internal packages.
- People involved in this interview are not linked directly with budget.

The NIST report, [11] identified potential savings associated with the implementation of the electronic communication systems. Some of these savings can be attributed to electronic media as an alternative to paper based communication, but extra cost is to be considered for the IT requirement and extra Human Resources for data entry in different stakeholders’ organisations. However, the long-term benefits of implementing the web technology, leading ultimately to the learning organisation [43], are expected to outweigh the extra cost involved.

Benefits on snags, end user satisfaction and maintenance issues: With the introduction of electronic communication, snags management is much easier and controlled. Improvement on maintenance during the project lifecycle has been disputed during the interviews, most end users expressed medium satisfaction, but specialists’ expected better performance if better control would have been exerted.

Benefits on quality found to be low, even with few participants from first case study who expressed concern about quality issues with the transfer from functional to project organisation.

Benefits on claims and variations: Claims management has evidently improved, some clients’ representatives expressed concern about helping the contractor by organising his documentation. Variation control is moderately improved through better tracking but package functionality, which is a feature of one of the IT communication packages, has not been fully utilised.

The following results represent the bottom line, which could be concluded from the semi-structured interviews conducted on both cases. These interviews are considered by the authors as being much more capable of revealing and capturing the tacit knowledge of experience of real world implementation of web enabled technology, in the daily progress monitoring, documentation and documentation of construction projects in this locality, summarised in Table 4. Results of similar recent investigations whether quantitative [24,25], and [26] or qualitative [44], are not contested against in this paper but rather referred to, compared and integrated with. What are rather more emphasised in this inquiry are the new findings about client and project manager strategic benefits and consequently the support to these systems, this sort of result which could be generalised if similar set of procurement strategy and cultural values are prevailing (reference to El-Saboni et al. [17], Fig. 3).

Monitoring and control: One of the main objectives of implementation is to assist the project manager in monitoring and control of the project [41]. The interviews of this investigation with the top management in the project management firm have shown this to be the main objective of initiating and implementing the system.

It has been evident from the discussions held in this particular case that actual efficiency of such systems in cutting cross the organisational boundaries has been less than satisfactory, consequently it is moderate in overcoming the organisational fragmentation, this area needs further investigation [45].

IT related conclusion: During a parallel investigation conducted by the first author it has been found that relying on ASP’s to provide the communication and documentation management proved not to be the preferred solution in UAE at the time of project initiation of the second case study. This is because of the time taken to access information, amongst other reasons. The findings of this early investigation are in disagreement with Nithathymong and Skibniewski [25]. However, this is due to differences in local conditions and internet capabilities between the two contexts. The first author personal experience does show that ASP’s in UAE started recently to regain ground. This is related to the IT market, available technology and culture, and these factors are very much time and context dependent.

Table 4

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Actual benefit of implementation</th>
<th>Measured during the interview by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Client organisation</td>
<td>Transparency, governance, enhanced capability of decision making</td>
<td>Access to all information in real time, willing to do more projects under the same system, led to organisational transformation, plethora of lessons learned</td>
</tr>
<tr>
<td>Project management</td>
<td>Control, documentation</td>
<td>Project team confidence in comprehensive documentation and overall control of projects</td>
</tr>
<tr>
<td>Firm</td>
<td>Organised flow of work, quality assurance</td>
<td>To a less extent than other stakeholders but measured through more confidence about the follow up of the project progress</td>
</tr>
<tr>
<td>Consultant</td>
<td>Tracking of submittals, timely approvals</td>
<td>Number of RfI’s (request for information), consistency of reporting</td>
</tr>
<tr>
<td>Contractor</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
6. Future work

Three major directions of future research are considered:

1. The authors intend to investigate the interaction between various communication media, systems and networks in and around the construction project environment. This will be performed considering the ultimate objectives of the whole project management processes in pursue towards the strategic benefits of the project and its stakeholder organisations. The research will emerge from the hypothesis that this co-existence of different communication media should not be regarded as a failure in the electronic communication system to cover the whole information needs of the project stakeholders but rather as a natural social and efficient combination. This kind of further investigations will use the soft system approach in order to consider the local environments under consideration. It is anticipated that this line of research could yield to a better understanding of the role of electronic communication tools in the construction industry, and help developing and employing them more efficiently.

2. Further research is needed to understand the mechanism of satisfying strategic needs of the project in UAE environment. This research shall be of qualitative, soft, and in-depth analysis more than anything else.

3. Investigations into the reasons for the failure of web technology to cut across organisational boundaries, and to defragment the industries inter-organisational relations in this environment, are also to be considered.

4. The mismatch between the contractual network and the communication network is prevalent even in other countries and other industries. This subject can be investigated in light of the latest web enabled communication systems which provide an easy access to project information for various project stakeholders. This access to information could modify the communication network to make it more compatible with the contractual one.

7. Conclusions

It has been concluded that implementation of web enabled project management WEPM in construction projects in the United Arab Emirates has always been initiated by the client, his representative, or the project management firm in order to satisfy strategic needs such as enhancing project success. The implementations of this technology accompanied with the introduction of project management methodology have together led to major organisational transformations from traditional functional organisations into project and matrix forms. In this paper, it is argued that in order to expand and sustain the electronic communication systems in this environment; client strategic needs including soft issues such as transparency and governance for the client organisation and documentation and control for the project manager are to be addressed and satisfied.

However, UAE construction industry, and despite being successful in using web technology to achieve aforementioned objectives, has failed to utilise it to cut cross organisational boundaries and also to integrate the supply chain. In other words, it has not been able to “defragment” the industry inter-organisational relations.

The electronic communications in the project environment do co-exist with the other types of communication; this combination is not considered as a failure but rather a more efficient way to attain the strategic objectives.

One further inquiry which is only to be mentioned briefly, to be the subject of a debate is to consider the communication of project knowledge as one of the project success criteria in addition to the already well established notion of considering it as a success factor.

Acknowledgement

Considerable part of the outcome of this investigation has been part of the proceedings of the CIB W78 Conference on Bringing ITC Knowledge to work, Maribor, Slovenia, 26–29 June, 2007 [46].

References


