

# EFFECT OF ELECTRONIC COMMUNICATION MANAGEMENT SYSTEMS ON THE SUCCESS OF CONSTRUCTION PROJECTS IN UNITED ARAB EMIRATES

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*ABSTRACT: Good communication during all phases of the project lifecycle is an important factor for the project success; in fact it is the prime factor that connects all of the project success factors together. Often, construction projects suffer from the lack of efficient communication due to many reasons, among which are the enormous versatility of stakeholders during project lifecycle, and the adversary relations which may appear among the construction project parties.*

*This research is investigating the effect of using modern electronic communication management systems on the success of the construction projects in United Arab Emirates, trying to survey the effect on the project success criteria which were identified by the authors for the construction projects in this country. Two case studies, one of them coupled with action research are presented, interviews, surveys document review and progress feedback have been used to collect the evidence, preceded by a literature survey and a brief study to clarify how the communication mechanism works, and how it affects the trust and relations among the project stakeholders and consequently the project success.*

*Some of the results are in agreement with pertinent published literature and research findings, an example of this would be the improvement on schedule and project control. On the other hand, the benefits for quality control during design and construction phases of the project in addition to HSE potential improvement remain debatable. At the same time the current investigation on one of the cases has revealed an organisational transformation trend from functional towards matrix and project structures, this kind of change is taking place after the implementation of project electronic communication management system into the client organisation, this transformation has enhanced chances of project success.*

*KEYWORDS: construction project success, electronic communication, organisational transformation and UAE.*

## 1 INTRODUCTION

The electronic communication in project management needs to be researched on a strategic level (Arayici, Aouad and Ahmed, 2005; Aouad and Wafai, 2002; Alshawi and Faraj, 2002; Snowdon, 1998), or as stated by CIRIA, 2004 that the challenge is to link knowledge management with strategic business objectives of the organisation, this can be articulated to be the link between Knowledge Management and project success as perceived by the stakeholders. Some projects concentrated on the integration of IT system in the AEC industry (WISPER project, Faraj, et al, 2000, Gallicon project, Aouad et al., 2001, and others). Collaboration is found to be the highest score among the most effective four factors that affect project success (Barrett and Barrett, 2006), recent research has stressed the direct research of computer integrated construction into collaboration (Boddy, et al, 2006) and Craig and Sommerville, 2006 claim that "within any construction project the exchange of information is perhaps the principal component/function in ensuring success". NIST report in 2004 and Coleman and Jun of

AISC, 2004 considered the issues of "inadequate interoperability prevents digital communications between software programs used by designers, contractors, specialty contractors, as well as building owners/ operators."

The current research is part of an ongoing research project addressing a series of case studies which aim at realising the strategic benefits of implementation of electronic communication in project management of construction projects in the United Arab Emirates. The ultimate objective of this endeavour is to enhance chances of construction project success. The kind of IT applications used in the projects under investigation are simple and easy to use, starting from the classical email in the first case which was about a project started in 1999. The second case of using web enabled documentation and communication package prepared specifically for the AEC market, therefore issues of IT training needed, support and alike are of much less significance, the same thing to a less extent could be said about process issues at least at this stage of implementation, this area of document management and communication has been recently the fastest growing e-business application in construction (Hjelt and

Björk, 2006). Accordingly it can be said that this research is targeting the same subject but from different angles, and for a different environment:

- More strategic as what is investigated is the effect of the use of project e-com'n. on the project success criteria, success is considered as a strategic issue by the Association for Project Management (APM BoK, 4th ed., 2000; APM BoK, 5th ed., 2006).
- In order to achieve the fore mentioned target at a strategic level and due to the fact that initiation and support of this system must be done by top executives in the construction organisations (Fallon, 2003), during the interviews this group was targeted among other users.
- This research was industry initiated from within client organisation, it was need oriented from the very beginning, and therefore it was for the purpose of satisfying 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 United Arab Emirates have been considered as the domain, and another research which preceded this research has targeted the question of project success identification in this environment (El-Saboni, Aouad, and Sabouni, 2006), the results of which are being investigated during the interviews of this research.

The research into project success criteria show that they are subjective (Hughes, et al 2004) context oriented (Beatham, 2004), and time dependent (Turner, 1999 and Larsen and Myers, 2000)., accordingly the adoption of soft system methodology in a series of interviews has identified success criteria in UAE environment (El-Saboni, Aouad, and Sabouni, 2006) which has been used as a tool for measuring the success after the IT implementation.

The approach used has been soft and systemic (Checkland, 2002), and mainly qualitative case studies (Yin, ), which renders most of it as being phenomenological, but making use of other, more empirical and positivist research done by other researchers (Nitithamyong, ) which quantified some of the areas about people and processes related to using slightly different systems (ASP's), therefore it addressed areas like IT readiness of users, training needed,...etc., and some of their effect on "hard" success of projects, In this research it is rather the whole content of the cases that is visited and considered, applying SSM methodology and aiming at defining the effect on the overall success of the project as perceived mostly by the client and his team, the researcher is part of a client organisation, and tried during data collection to "listen" to the other stakeholders through daily contacts, documentation in case one and long interviews in case two.

Two case studies are presented, and while other research addressed using electronic communication during different phases of the project lifecycle (Alshawi and Ingirige,

2003), this investigation focused mainly on systems suited and used for construction stage with an extension of its effect in the preceding tendering stage (in first case)and the following operation and maintenance stage (second case), the first case involved the use of simple technology for the communication management of a construction project, the second case study which is more recent involved the use of web based solutions 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 United Arab Emirates, presenting both of them shows the direction of development of electronic communication in the construction industry and comparison between their results and the similar investigations in other environments. Two different research approaches are used. At the same time both cases are considered as cycles in the action research of implementing of e-com'n in the management of construction projects in UAE.

## 2 COMPONENTS OF CASE STUDY

### 2.1 Proposition

These cases were 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, 2003 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 ( El-Saboni, et al 2006)
- 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

Interviews documents and actual progress are directly compared and are verifying 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 to 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 players 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 are discussed about the difficulties encountered, the tools that helped, and organisational benefits gained.

### Project description

The project was a major housing program, in the range of 1900 medium housing units, in different phases and different locations, some more than 300 km apart, a construction budget exceeding 300 million US\$. A full coordination was to be established with the infrastructure networks construction, and also a synchronisation with the construction of facilities such as schools and clinics. The project lasted for about 3 years and handed over on stages which ended in 2003. More than 13 building construction contractors, and 8 consulting supervision firms all under one project management umbrella of a project management firm and a client representative as seen in Fig. 1:

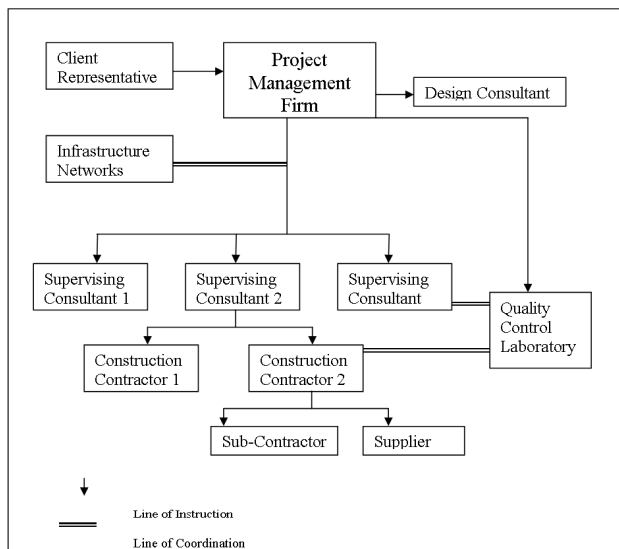


Fig.1. The Organisation Structure of the first case study, which shows the lines of instructions.

## 4 RESEARCH METHODOLOGY – FIRST CASE STUDY

The research method has benefited from both of retrospective case study methodology (Yin, 2002) and action research (McNiff, 2002), as one of the authors was directly involved in the project management and the implementation of electronic communication management of the project under consideration. Smith, Thorpe and Lowe, 1991 considered the involvement of the researcher as a virtue, and this type of research is well accepted from phenomenological point of view, taking into consideration the possible bias of the researcher which needs to be identified. Action Research has been widely used for the research into the assessment of the implementation of Information systems (Nicolcar and Collado, 2002), this methodology proved also to be effective in organisational research (Whitehead, 2005), and the journal of organisational transformation and social change recommended action research from subjective epistemology, while on the other hand the case study methodology was beneficial to measure the strategic project success perception. Soft System Methodology (Checkland, 2002) is very relevant to this kind of research in order to consider the holistic context.

Triangulation of evidence (Amaratunga and Baldry, 2001) through collection of data from: The daily follow up of the construction project, measurements of some of success criteria both during and after the project, interviews with some of the key personnel to elicit their perceived project success, and post project changes (transformations) .

## 5 RESULTS OF THE FIRST CASE STUDY

The implementation of the project electronic communication system had played a significant role in the transformation of the organisation from functional structure into matrix form of organisation towards project oriented organisation, it would not have been possible to do this transformation without the use of this tool, initial implementation led to preliminary delegation to project managers accompanied by the transparency provided by the continuous information access and consequently trust was created through the feedback loop, which led to more delegation for more projects in the organisation, Craig and Sommerville, 2006 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 (Zuurmond, 2005). in this case study this was evidenced by:

- The actual transformation that took place in the organisation.
- The willing of the top management to adopt more project oriented organisational structures.
- The demand for advanced implementation of project web based information systems in an organisation which had no such applications before, this demand has surprisingly been in the form of pull from the top

management compared with the situation before when it used to be pushed from the functional sections.

- The establishment of PMO in the organisation to “raise” the web implementation and promote the project orientation.
- The documents of daily correspondence which witnessed the trend towards delegation to project managers.
- The interviews with some of the key personnel who witnessed and were major players into it.

A similar sort of link between the IT strategy and the organisational transformation is reported in the literature (Henderson and Venkatraman, 1992) and the benefits of similar transformation in the organisation on the project success was identified by Prakabhakar, 2005.

This transformation, however was not totally beneficial to the organisation, as shown in the interviews conducted, it caused less attention to the technical quality issues of design, material and workmanship which used to be handled to a better standard in the functional departments. Although this was the view of those interviewees from the functional departments but it was also evidenced by the documents of quality assurance reports which demonstrated a slight deterioration in the quality standards, this kind of debate is not one of the objectives of this paper, but the authors argue against this that through the comprehensive implementation of the web based system down to all concerned functional departments personnel of quality assurance, this will not be the case.

On the other hand the implementation of the electronic communication has participated in the success of the project which was measured as shown in table 1:

Table 1.

	Measured by	Evidenced in
Project Success	Client Satisfaction	interviews
	Project on time	documented in project documents
	Project within budget, and even in some of the packages slightly lower than the budget	documented in project documents
	Quality	Actual follow up of the houses after construction
Top Management Support	To do more projects under the same system	documented
	To demand to advance and expand the electronic communication into more projects	documented

## 6 THE SECOND CASE STUDY

This study was linked to another investigation to evaluate different systems of project electronic communication available in the market of UAE for the purpose of implementation at construction projects for a major builder, satisfaction of stakeholder information needs, stability

and reliability were among the evaluation criteria some of these criteria were guided by the vendor survey conducted by CICA, a further investigation as explained in the research methodology has been done for this research.

### *Project description*

This is a highly prestigious commercial project, consisting of a shopping mall, a 5 star hotel and an entertainment facility of budget which exceeded 800 million US\$, ended recently and won international awards. The major stakeholders were the client, some financiers, a project management firm, a few consultants and different contractors for different packages of the project. A well known software package for managing the documentation and communications was implemented and managed by the project manager during the construction, therefore it was not an ASP, as 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.

## 7 RESEARCH METHODOLOGY – SECOND CASE STUDY

Non of the researchers has been involved in the construction of this project. It is designed as a case study (Yin, 2002) 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 the difficulties associated with data collection in this culture, which deserves to be investigated but is not considered as part of the scope of this paper, at the same time the need was there for an in-depth analysis as soft (Checkland, 2002) as attainable in order to understand the purpose of why this system was selected, how was it implemented, how much of success in actual implementation, and how much did it contribute to the overall success of the construction project.

The researcher has been lucky enough to select members from a major contractor, a design and supervision consultant, the operation and maintenance team who tested and commissioned and later on operated and also from the project manager who enforced the system and controlled its daily implementation, the respondents ranged from project directors to designers down to actual operator whose only job was the daily communication management of the project. A series of semi- structured interviews coupled with a written survey which has been used to initiate the discussion during some of the interviews some further contact has been needed to compare between the different information received. A total time of interviewing has been more than 16 hours, over different periods lasted over four months, one single interview lasted for about four hours in which the interviewee has been very much actively involved in the daily implementation for more than three years, and communication management has become his career since then. The first author and prior to these interviews took different courses of training on this system in order to know exactly what he has been inquiring about, this knowledge is not making

him biased as it is part of his job to continuously evaluate the project communication systems available in the UAE market.

Issues of ease of use, support and IT related implementation which are related to actual user have been researched by other researchers (Nitithamyong and Skibniewski, 2006) These features were taken care of during the data collection but the main theme of the investigation remained focused on the construction project success, It is worth to be mentioned that an initial research plan of a quantitative questionnaire distributed by mail to the users with the help of IT vendors have been cancelled earlier as it was found that respondents might be biased which could be again a cultural issue different among different societies that worth to be investigated (Nitithamyong and Skibniewski 2007), and also the possibility of missing the point of question if respondent has not been interviewed, plus the need for more in depth answers.

## 8 RESULTS OF SECOND CASE STUDY

Results of second case study are outlined in Table2 further analysed in Table3

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 or not before.
7. Is he a specialized person who cares about quality first, or a progress manager who cares about schedule first?

Factors of Bias which were eliminated by the interviewer:

- Assurance of confidentiality to all interviewees.
- Avoiding formalities.
- Screening and Analysis of Results

The results are tabulated against success criteria in UAE as taken from previous research (El-Saboni, Aouad and Sabouni, 2006)

Further elaboration and comparison with the first case results in section 9. Results , Summary Discussion and Comparison of Results for both Case Studies:

Table 2. Results of Second Case Study.

Project Success Criteria <sup>1</sup>	1 <sup>st</sup> Interviewee		2 <sup>nd</sup> Interviewee		3 <sup>rd</sup> Interviewee		4 <sup>th</sup> Interviewee		5 <sup>th</sup> Interviewee		6 <sup>th</sup> Interviewee	
	Q.No. <sup>2</sup>	Score	Q.No. <sup>2</sup>	Score	Q.No. <sup>2</sup>	Score	Q.No. <sup>2</sup>	Score	Q.No. <sup>2</sup>	Score	Q.No. <sup>2</sup>	Score
Time	7	5	7	5	7	4	7	5	16	4	16	3
Budget <sup>3</sup>	47	5	47	5	47	3	47	4	54	2	54	1
Quality	36	3	36	4	36	4	36	3	43	1	43	4
Minimum Variations	29	3	29	NA <sup>4</sup>	29	5	29	5	38	2	38	4
Claim Management	9	3	9	NA <sup>4</sup>	9	5	9	4	18	4	18	1
HSE	37	3	37	4 <sup>5</sup>	37	1	37	1	44	2	44	1
Few Snags	49	5	49	5	49	5	49	5	10	3	10	5
End User Satisfaction <sup>9</sup>	31	4	31	5	31	1	31	2	8	2	8	5
Sponsor Satisfaction	17	3	17	- <sup>6</sup>	17	1	17	NA <sup>4</sup>	26	3	26	4
	33	4	33	4	33	2	33	3	40	3	40	5
Project Team Satisfaction	18	2 <sup>0</sup>	18	5	18	5	18	5	12	2	12	5
	22	4	22	5	22	5	22	5	27	4	27	NA <sup>4</sup>
	52	4	52	5	52	4	52	3	31	4	31	4
Transparency	6	4	6	1	6	1	6	15	3	15	5	
	10	4	10	4	10	2	10	19	4	19	2	
Low Maintenance	50	4	50	NA <sup>4</sup>	50	NA <sup>4</sup>	50	NA <sup>4</sup>	11	2	11	5
Maintaining Relationship	51	4	51	5	51	2	51	4	14	5	14	5
Profitable as per Expectations				NA <sup>4</sup>		NA <sup>4</sup>		NA <sup>4</sup>		NA <sup>4</sup>		NA <sup>4</sup>
Master file with Lessons Learned	48	5	48	4	48	4	48		9	1	9	5

1 As concluded from the Project Success Survey in UAE (El-Saboni, Aouad, and Sabouni, 2006)

3 This feature was not supported by the particular software package used in this project

4 This was the answer of the interviewee, or this particular benefit is not applicable for the respondent, for example; a profitable project is not applicable .

5 Question numbering was different for different interviewees for reasons of different role, therefore if he was involved in operation stage then questions about maintenance and master file come first and so on and also for verification purposes, some other questions were also used to verify .

6 Some results have been cancelled after double checking and verification.

9 End user of the facility and the completed construction project (not the "IT end-user")

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

Table 3. Matrix of Project E-communication versus Success Criteria in UAE Environment.

Project Success Criteria <sup>1</sup>	Weight <sup>1</sup>	Score <sup>2</sup>
Time	5	V.High
Budget <sup>3</sup>	5	N. A <sup>4</sup>
Quality	5	Low
Minimum Variations	4	Moderate
Claim Management	3	High
HSE	3	V. Low
Few Snags	4	V.High
End User Satisfaction <sup>9</sup>	3	Low
Sponsor Satisfaction	3	Moderate
Project Team Satisfaction	3	V. High
Transparency	2	High <sup>7</sup>
Low Maintenance	2	Moderate <sup>8</sup>
Maintaining Relationship	2	High
Profitable as per Expectations	2	V.Low
Master file from well organised communications with Lessons Learned	2	High

1 As concluded from the Project Success Survey in UAE (El-Saboni Aouad and Sabouni, 2006)

2 According to this case study

3 This feature was not supported by the particular software package used in this project

4 This was the answer of the interviewee, or this particular benefit is not applicable or relevant for the respondent in particular.

7 Transparency is considered from the client perspective in which data from the follow-up experience of the first author working as client representative for more than 20 years and from data of another case study

8 The experience of the 5th interviewee is highly considered

9 End user of the facility and the completed construction project (not the "IT end-user")

## 9 RESULTS, SUMMARY DISCUSSION AND COMPARISON OF RESULTS FOR BOTH CASE STUDIES

Benefits on Schedule, Safety, and Profitability: the second case study coincides with research in different environment which confirmed schedule benefits if electronic communication is implemented (El-Mashaleh, O'Brien, and Minchin Jr, 2006), while the first case study daily follow up and interviews have shown that e-com'n had its positive effect on schedule indirectly bypassing delegation and expedited decision making which has been empowered by the transparency and availability of information when needed. It is also interesting that the second case study have shown almost nil impact on safety and profitability which in turn is identical to El-Mashaleh et al, 2006, while Cheung, et al, 2004 and Cheung, et al,

2004-b have shown promising results when safety is concerned, the difference could be related to different cultural, 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 gives 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, Diallo, Thuillier, 2003 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, this might 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.

However, other researches anticipated potential saving at least due to web interoperability instead of paper based communication (NIST, 2004), but extra cost is to be considered for the IT requirement and extra HR for data entry in different stakeholder organisation. It is the researcher understanding that indirect cost benefits need to be considered and if so, they will outweigh the extra cost involved.

Benefits on Snags, End User Satisfaction and Maintenance issues: Snags management is much easier and controlled, improvement on maintenance during the lifecycle is disputable during the interviews, most end users expressed medium satisfaction, but specialised consultants expected better performance if better control would have been exerted.

Benefits on Quality; found to be low, even with some participants from case one who expressed concern about quality issues with the transfer from functional to project organisation.

Benefits on Claims and Variations: Claims management is 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 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, and highly 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 (Nitithamyong, and Skibniewski, 2004, 2006, 2007) or qualitative (Ruikar, Anmba, and Carrillo, 2005), are not contested against in this paper but rather referred to, compared and integrated with, what 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, Aouad and Sabouni, 2006 Figure 3).

Monitoring and Control: One of the main objectives of implementation is to assist the project manager in the monitoring and control of the project (Cheung, 2004), the interviews of this investigation with the top management in the project management firm has 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 (Adriaanse, 2005)

IT related conclusion: It has been found during a parallel investigation conducted by the first author that relying on ASP’s to provide the communication and documentation management used not to be the preferred solution in UAE at the time of project initiation, because of the long information accessibility time among other reasons, this makes this research in disagreement with Nitithamyong and Skibniewski,-2006 but this is due to difference in local conditions of internet capabilities and it is the researcher conclusion that ASP’s in UAE started to gain the ground again, this is related to the IT market, technology and culture, clearly some of these factors are very much time and environment dependent.

Table 4.

Stakeholder	Actual benefit of Implementation	Measured during the interview by:
Client Organisation	<ul style="list-style-type: none"> <li>- Transparency</li> <li>- Governance</li> <li>- Enhanced capability of decision making</li> </ul>	<ul style="list-style-type: none"> <li>- Access to all information in real time.</li> <li>- Willing to do more projects under the same system</li> <li>- Led to organisational transformation</li> <li>- Plethora of lessons learned</li> </ul>
Project Management Firm	<ul style="list-style-type: none"> <li>- Control</li> <li>- Documentation</li> </ul>	Project team confidence in comprehensive documentation and overall control of projects
Consultant	<ul style="list-style-type: none"> <li>- Organised flow of work</li> <li>- Quality assurance</li> </ul>	To a less extent than other stakeholders but measured through more confidence about the follow up of the project progress.
Contractor	<ul style="list-style-type: none"> <li>- Tracking of submittals</li> <li>- Timely approvals</li> </ul>	<ul style="list-style-type: none"> <li>- Number of RfI’s (Request for Information).</li> <li>- Consistency of Reporting</li> </ul>

## 10 CONCLUSIONS

It has been concluded that implementation of web enabled project management in construction projects in the United Arab Emirates has been always 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 by the introduction of project management methodology together have 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 WEPM 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. A further research is needed to understand the mechanism of this need satisfaction; this research shall most probably be of qualitative, soft, and in-depth analysis more than anything else.

However, UAE construction industry, and despite being successful in using web technology to achieve aforementioned objectives, but has failed to utilise 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, this arena can represent another potential field of future research.

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.

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