The path to excellence in Engineering Firms: Insight from Middle East Countries

Dr Hesham A. E. Magd
Associate Professor,
Prince Mohammad University, Saudi Arabia
Email: hmagd@pmu.edu.sa

Mr Salah ElDin Adam Hamza
SOFCON, Consulting Engineering Co. Saudi Arabia

ABSTRACT

Purpose: The use of critical success factors has covered many industries during the last decades. The scope of the business may vary, but the importance of improvement towards excellence is a common business objective and the capacity of organizations to implement critical success factors is very important to achieve success in the long run. Therefore, the objectives of this current study is to identify the critical success factors in achieving organizational excellence in the Arabian Gulf Environment

Design/ methodology/ approach: Empirical research was conducted in Saudi Arabia and United Arab Emirates to identify the critical success factors for achieving organizational excellence in engineering firms through the distribution of structured survey questionnaire.

Findings: The results of this study are based on 114 participants at different levels and responsibilities in engineering organizations in Saudi Arabia and United Arab Emirates. The results of the study provide an insight to engineering business managements in the Gulf region on the critical success factors that are appropriate to their needs in order to achieve organizational excellence.

Original value: Despite the modest findings, this study provides important insight into the critical success factors needed for engineering firms in Saudi Arab and United Arab Emirates in achieving excellence such as technical resources; internal communications; planning and scheduling; project Management; top management support; and leadership

Key words: Critical Success Factors; Excellence; Saudi Arabia, United Arab Emirates; Engineering organizations

Paper type: Research paper

Introduction

Organizations in today's business environments are faced with major challenges on daily basis. For example making sense of conflicting priorities, allocating limited resources, understanding the impact of the organizations actions, comparing performance with competitors and responding to customer needs in innovative ways are just some of the issues management gave to address within the competitive environment. Balancing the

effort of the organization to address these and the many other issues and challenges faced can be a daunting task, unless a systematic way is identified and followed. Therefore recently organizations started moving towards the utilizations of business excellence which enables organizations to understand the complexities of the conflicting demands placed on them and to learn how to continuously improve the utilization and focus of all their resources to achieve better results and performance. Therefore, critical success factors are the concrete and measurable aspects of the essential requirements for organizational success and excellence in the short and long term. Critical success factors do not change frequently but they may require revision and updating from time to time (Nuland et al., 1999).

The use of critical success factors has covered many industries during the last decades. The scope of the business may vary, but the importance of improvement towards excellence is a common business objective and the capacity of organizations to implement critical success factors is very important to achieve success in the long run. Various studies were implemented to identify the critical success factors in achieving organizational excellence in different industries such as Enterprise Resource Planning (Somers and Nelson, 2001); project management (Pinto and Kharbands, 1995) and healthcare (Hirshfield and Lee, 2006). Zairi and Whymark (2003) identified seventeen critical success factors for organizational excellence and among them were top management commitment, leadership, policy and strategy. These factors identified among various studies in achieving organizational excellence form the key criteria of excellence models such as the Business Excellence Model. According to the European Foundation for Quality Management (1999) that factors such as top management commitment and leadership, people management, policy and strategy, partnership and resources management and management by processes, are generally considered as the initial inputs to the implementation of total quality. Moreover, Baidoun (2003) indicated that in these models of excellence, essentially customer satisfaction, employee satisfaction and a favorable impact on society are achieved through leadership driving and strategy, people partnership, resources and processes, which lead ultimately to excellence in business results. Kanji and Tambi (1999) indicated that it is clear for a company to achieve business excellence, it is necessary for them to adopt a TQM process and the critical success factors which provide the core elements of excellence. In support of this further, Kanji (2000) confirmed a solid relationship exist among the identification of critical success factors and organizational excellence. However organizational excellence has become a subject of focus in many developing countries, including the Gulf Region. The literature review offers many diverse opinion concerning organizational excellence critical success factors in different countries but little empirical research has been carried out in the Gulf region. Therefore, it is important to study the critical success factors in achieving organizational excellence in order to enhance organizational

excellence within the context of engineering organizations[1]. The results of this study are useful for further improvements and economical development within the Gulf region.

Background: Organizational Excellence Critical Success Factors

The current study is based on several of the CSFs identified by Zairi and Whymark (2003). These factors were tested empirically and thoroughly for organizational excellence and considered key criteria of excellence models such as European Excellence Model or the Malcolm Baldrige National Quality Award Model (Zairi and Whymark (2003). These factors include the following:

Leadership and Commitment

Leadership must be exercised in order to develop the performance measurement systems, tackle problems that may be faced at the beginning and ultimately make them culturally acceptable within the organization (Moore and Braga, 2003). Leadership roles include creating the environment for change, showing the need for change, forming the leadership team, breaking down functional unfairness, creating the vision and strategy and creating team accountability for cross functional strategic themes at all organizational levels, Moore and Braga (2003). Doyle and Kalman (1998) declared that nothing will hurt the implementation more than a lack of management credibility and role-modeling. Managers need to be dynamically and evidently engaged. However, even with experienced management, for performance management to succeed, leaders need to be held accountable for their implementation of the process; their performance needs to be linked strategically to leadership standards and effective implementation. Employees need to see their leadership held to the same high standards they are held to as professionals.

People Management

Snape and Redman (1995) indicated that in recent years, there has been growing recognition of the contribution of human resources strategies to meeting organizational goals. In most accounts, this involves a call for organizations to adopt a strategic approach to managing their human resources. Human resource management is no longer to be seen simply as a staff specialist, concerned solely with people-management issues and separate from business management. Walker (1992) says that the challenge of managing people is to ensure that all activities are focused on business needs. All human resource activities should fit together as a system and be aligned with human resource strategies. Walker (1992) also indicated that human resource strategies should be aligned

[1] Engineering firms are those organizations dealing with preparation of design drawings, materials and equipment specifications, procurement and construction packages for all type of projects in the fields of infrastructure, oil and gas, water supply and wastewater treatment plants, petrochemicals, residential and commercial buildings, etc.

with business strategies. Moreover, Zairi and Whymark (2003) identified that people management would resolve staff issues and free them to do their jobs appropriately.

Middle Management Involvement

Harrington (2005) recommends that, if some of the employees in the organization are presented by organized labor, the union leaders should get involved as early as possible. He added that the appropriate union leaders become active partners in developing the environmental vision statements and the plan that will transform the organization. According to Harrington (2005), this will help to align the organized labor's goal with the environmental vision statements. Early involvement of key people in the planning process often slows down the process a little, but in the long run much time will be saved because the plan will be much better and much more effectively implemented.

Training and Education

According to Olve et al. (1999), an organization can take several steps to encourage support for improvement efforts within its organization towards process improvement: offer training in improvement techniques to all appropriate personnel to help them properly make process improvements. O'Dell and Grayson (1998) pointed out an important point relating to training and education. They highlighted the importance of internal knowledge transfer and urged organizations to use knowledge management strategies to get the right information at the right time in order to take action and create value.

Reward and Recognition

Reward and recognition systems are probably the least understood of all the elements of the performance management system, Sinclair and Zairi (1995). There are many different facets of reward and recognition, including the reward and recognition of individuals, teams, departments, entire organizations and also suppliers. De Waal (2002) declared that the opportunity of achieving the objectives of the organization are noticeably improved by using the performance alignment model, because the objectives of all management levels are aligned with each other, so all employees know what is important for the organization and what is expected from them. He added that assessment and reward criteria that are related with the strategic objectives of the organization will cause human resource tools to directly support the achievement of the strategy. De Waal (2002) also recommended that the expectations of customers should be integrated in the dimensions and standards of performance that are appraised, thereby eliminating the chance that workers will be rewarded for performance that is valued by their functional area or supervisors but is irrelevant to the customers of the product or service.

Teamwork

One of the most publicized aspects of the Japanese approach to quality has been the quality circles or *kaizen* teams (Oakland, 2000). Teamwork is a critical factor in Total Quality Management (TQM), Everett (2002). One of the major elements of the human resource focus that has been identified by Mehra et al. (1998) as a CSF to the success of TQM programs is teamwork. Zairi and Whymark (2003) identified that teamwork bridges the gaps in individual competencies. According to Day et al. (2004), most organizations would adopt the goal of striving for better teamwork from their employees. Greater collaboration among employees is often seen as a way to achieve collective organizational goals and develop a competitive advantage.

Quality Policy and Strategy

Baidoun (2003) considered policy and strategy as initial inputs to the implementation of TQM among some other factors. He also added that quality gurus and writers strongly stress the significance of strategic planning process based on total quality, Sureshchandar et al. (2001) Westerveld (2003) recommended in his study on project excellence that quality policy and strategy should include project goals, how are they accomplished and should combine the interest of stakeholders into an end-product.

Communicating for Quality

Lockamy (1993) described communication as "performance measurement system linkages." He suggests that these linkages are vital to ensure that performance measurement throughout an organization is aligned. Most organizations appear to rely on methods reinforcing one another. This approach to communication was described by McKinnon and Bruns (1992) as the "information mosaic". The approach uses communication techniques including management presentations, one-to-one meetings and newsletters. Daniels and Rosen (1988) suggest that measurement is required to reduce emotionalism and increase constructive problem solving, increase influence, monitor progress, and give feedback and reinforce behavior. Juran (1992) suggests that "vague terminology is unable to provide precise communication. It becomes necessary to say it in numbers". Salegna and Fazel (2000) recommend that every element of the change must be talked about, presented and discussed, across levels of the organization.

Supplier Management

The role that purchasing plays within the organization has changed from receiving materials requests from user departments and translating these into purchase orders or other contractual relationships with suppliers to strategic process of supplier management (Cousins, 2002). This involves smaller numbers of highly qualified buyers and greater planning activity horizons. Organizational culture and structure are important for consideration as they affect the supplier management process. Cameron and Quinn

(1999) sponsor the importance of culture to the success of organizations and provide examples from leading supply chain developers around the world. However, Brownell and Reynolds (2002) explicitly declare that culture is the single most important influence on relationships between purchasers and suppliers. Zhang et al. (2000) indicates that supplier quality management is an important aspect of TQM since materials and purchased parts are often a major source of quality problems. Several authors, including Jabnoun (2000), sponsor that companies must create supply chain partnerships to encourage suppliers to provide materials needed to meet customer expectations. Dayton (2001) supports these findings.

Accredited Quality Management Systems

Kolka (2002) considers that the ISO 9000 series accreditation can be defined as the starting point for entering the competition; the ongoing drive towards TQM must convey the competitive advantage. According to Shipley (2002), many organizations consider ISO 9000 certification as the first step in the implementation process of TQM. A documented quality system as part of a TQM strategy can add to TQM by managing the organization's processes in a consistent manner (Zhang et al., 2000).

Organizing for Quality

Quality care can only be achieved if one builds quality into the design of the service in the first place, then assures that quality is maintained through monitoring and other quality control activities and, finally, assures that the services are continuously improved through quality improvement activities, Nicholas (1999). Some variations in the way of organizing exist and the reasons for variation were pointed out by Nicholas (1999) to include differences in culture, in management philosophy, in the range of quality assurance activities adopted and also due to controversy or uncertainty as to the most effective organizational structure for quality assurance. Senior management should make the set up of a quality organizational structure at the early stage of initiating the TQM program (Oakland and Porter (1994)). Oakland (2000) indicates that this structure is needed to produce an outline, which will enable quality improvement to expand and prosper. He considers the quality organizational structure as a key factor in ensuring successful implementation of TQM.

Managing by Process

Managing by process approach is one of the eight quality management principles upon which the ISO 9000 series of standards is based, Hooper (2001). This principle states that a desired result is achieved more efficiently when activities and related resources are managed as a process. Hooper (2001) indicated that the word process is defined in ISO 9000:2000 clause 3.4.1 as a set of interrelated or interacting activities that transforms inputs into outputs. Inputs to a process are generally outputs of other processes. Processes

in an organization are generally planned and carried out under controlled conditions to add value. The process approach directly links process inputs that come from suppliers to the outputs of the process that go to customers. Hooper (2001) described the horizontal linkage between suppliers and customers in a way to manage and continually improve both the effectiveness and the efficiency of the process.

Benchmarking

The most major contribution of benchmarking is that it is a systematic approach for driving process innovation. Such innovation is frequently the greatest when the benchmark examined is not in the same industry or even a similar overall process. Other industries are often most useful for two reasons. First, non-competitors are keener to share information. Second, the "mental models" (George, 1996) in other industries are more likely to be different, allowing tacit and potentially constraining assumptions to be identified. Comparisons should be based on speed, capital investment, wasted effort, number of employees, and any other yardstick with which the company can measure its own as well as others' operations, Peterson (1992). The next step is to get managers in the key departments to acknowledge that another business is doing all or part of their job better. That becomes easier when the CEO says that he looks on the benchmarking as an opportunity, not as criticism. Top management role is to make benchmarking successful (Peterson, 1992).

Self-assessment

Marguglio (2001) indicates that for a self assessment program to be effective there should be strong sponsorship and support of the performance self-assessment program by management, led by top management. Daily management activities should include: assuring the consistent implementation of policies, procedures and tools, assuring corrective action with certainty and timeliness, providing feedback of corrective action to those who identify the problems, using performance indicators to evaluate the degree of problem self-identification and the effectiveness of corrective action, publicly recognizing exceptional acts of self identification, walking the talk and providing the appropriate types and amounts of resources , Marguglio (2001).

Cost of Quality

Sower and Quarles (2006) found that only about one third of organizations systematically track quality costs. They made key suggestions to be addressed for tracking cost of quality, including the need for education in quality principles throughout the organization, knowledge of change management processes by quality professionals, the need to translate the language of quality into the language of business and recognition of the power of modern information systems. Sinclair and Zairi (2001) pointed out that quality costing is one measurement technique that has often been used to help justify the

implementation of quality improvement initiatives to senior managers. Dale and Plunkett (1999) indicated that a number of top-notch organizations do make use of quality-costing measures as a sign of internal quality performance.

Quality Control Techniques

Statistical process control (SPC) is one of the cornerstones of the model for TQM developed by the European Centre for TQM (Sinclair and Zairi, 2000) and is a strategic technique for reducing variability (Oakland, 2000). The aim of SPC and control charts is to achieve a stable process and to reduce process variation (Stenberg and Deleryd, 1999). Another statistical quality control tool is the Six Sigma (Coronado and Antony, 2002). Quality control techniques play an essential role to reduce variations and achieve stability of product quality attributes. Organizations use different tools according to their level of "quality maturity". Modaress and Ansari (1989) suggest that differences in quality tool applications could vary by function within a company. They found that manufacturing tends to use post-facto tools such as inspection, SPC, and process capability, whereas design and engineering uses proactive tools such as design of experiments and Pareto charts.

Measuring Customer Wants and Satisfaction

Customer satisfaction can be measured by conducting surveys. Nuland et al., (1999) indicate that survey results indicate how well the organization is doing in the eyes of the customers. Customer satisfaction is concerned with customer retention and market penetration (Rao et al., 1996). Zairi (1994) considers measuring customer satisfaction as a cornerstone of TQM. Customer satisfaction should play a central role in the company's TQM, Eklof and Westlund (1998). This requires listening to customers and trying to satisfy their needs, Winser and Corney (2001).

Excellence: Engineering Firms Focus

The booming engineering sector in the Gulf region is faced with performance constraints at scheduling, workability and constructability aspects. Recently, governmental agencies have tried to bridge local engineering firms' shortcomings by allowing and encouraging alliances and affiliations with international organizations. This concept is perceived to strengthen local engineering firms and enhances their efficiency to deliver engineering projects of international level. Several approaches and techniques were utilized and proved their usefulness and have boosted engineering projects management efficiency dramatically, but it is important to identify a set of critical success factors to suit the needs of engineering firms in achieving organizational success and excellence.

The identification of critical success factors early enough during the front end assessment of engineering projects is a vital start for ensuring successful project completion (Trop et al., 2005). Trop et al. (2005) identified eleven critical success factors for large public

projects in Norway and they were project organization, contract strategy, project planning and controlling, stable framework and conditions, stakeholder management, technical factors, nature and market conditions, objective management, top management support, interface towards surrounding projects and management of design. This study is in line with Morris and Hughes (1987) findings, with the exception of an extra factor identified by Trop et al. (2005) which is contract strategy. Moreover, Pinto and Slevin (1987) identified various critical success factors and they included project mission, top management support, project planning, client involvement, personnel, technical activities, client acceptance, monitoring and feedback, communication, and trouble shooting. Furthermore, Havaleschka (1999) recommended various critical success factors in achieving competitive engineering design and they are leadership and commitment, people management, employee involvement, training and education, reward and recognition, teamwork, communication, supplier management, and customer satisfaction. While other critical success factors identified were project mission, project management, top management support, training, planning and scheduling, power and politics, customer communication, information technology, personnel, urgency of the project, technical resources, monitoring and feedback, internal communication, leadership and employee empowerment (King, 2001; Anderson et al., 2002; Davies, 2002; and Westerveld, 2003).

These factors will help project teams to minimize fire fighting, intuitive approach in managing uncertainties and changes encountered during project implementation (Pinto and Kharbanda, 1995). The measurement of successful project implementation is not the avoidance of problem but knowing, beforehand as much as possible, how to respond when problem develops. Pinto and Slevin (1988) developed the notion of success and presented three key factors for successful project completion and they are technical validity, organizational validity and organizational effectiveness. Iyer and Jha (2005) concludes that the important success attributes are effective monitoring and feedback by the project manager and project team members, coordinating ability and relationship of project manager with top management, positive attitude of project manager, and project participants, and project managers' technical capability. On the other hand, failure attributes were poor human resource management and labor strike, negative attitude of project manager and project participants, inadequate project formulation in the beginning, vested interest of client representative in not getting the project completed in time, and conflicts between project manager and top management (Iyer and Jha, 2005).

It is clear that the identified critical success factors within the context of engineering project management are shifting from purely technical aspects into organizational aspects such as top management support, organizational issues, stakeholder management, coordination and human relations. The literature shows the availability of different critical success factors, but it lacks the provision of a specified set of critical success

factors applicable to the needs of the engineering firms in the Gulf region as these organizations are facing difficulties to meet external customer requirements. Therefore, the main objective of the current study is the identification of appropriate critical success factors to engineering firms in order to enhance their performance and excellence.

Research methodology

To identify the appropriate critical success factors in achieving organizational excellence, a survey questionnaire was used among a sample of Engineering firms in Saudi Arabia and the United Arab Emirates. The utilization of this approach permits use of large samples of respondents, provides highly specific and precise numerical data, results in high reliability and allows for generalization from the sample to the whole population. The questionnaires were developed based on an extensive review of the literature in the area of project management (King, 2001; Anderson et al., 2002; Davies, 2002; and Westerveld, 2003) in order to have a solid and reliable questionnaire. The survey questionnaires were distributed to a sample 256 participants. After two weeks from the time the questionnaire were distributed, only few answered questionnaires were returned. Reminder e-mails, telephone calls and verbal communications were utilized to persuade participants who have not responded to expedite their participation. Two more weeks late, more answered questionnaires were returned and the total responses reached 114, which represented a response rate of 44.5%.

Survey findings and discussion

Organizational characteristics

In terms of experience in the engineering sector among the surveyed organizations, 76 of the participants had more than 10 years experience in the engineering industry, representing 66.67% of the surveyed sample. 5 – 10 years experience ranked second with 29 participants, representing 25.43% of the sample, followed by 3 – 5 (5.26%) years experience and 1 – 2 years (2.63%) as illustrated in table 1. Clearly the majority of the participants is highly experienced in the engineering industry and would have enough experience in identifying the appropriate critical success factors in achieving organizational excellence. In terms of ISO 9000 certification as illustrated in table 1, 92.11% of the surveyed organizations were certified, which indicates clearly that these organizations identified certification as an important aspect of their business in order to achieve an effective quality system in achieving quality products/services and also to enable them to export their products to the world and to fierce completion in the engineering sector. In terms of organizational size, it was important to determine the size classification for this study, therefore for the purpose of this study, organizations with less than 49 were classified small, those with 50 – 249 as medium, and those with more than 249 as large. With respect to the size of the organizations surveyed (see table 1), 10.53% had a staff less than 249 (Medium sized organizations) and 89.47% had staff of

more than 249. It is clear that large sized firms constituted the largest portion of the surveyed organizations.

Table 1: Characteristics of Surveyed Engineering Organizations (N=114)

Activity	Number of Organizations	Percentage of Organizations
Experience in the Engineering Sector		
Less than 1 year	0	0
1 – 2 years	3	2.63
3 – 5 years	6	5.26
5 – 10 years	29	25.43
More than 10 years	76	66.67
Certification level		
ISO 9000 Certified	105	92.11
Non ISO 9000 Certified	9	7.89
Organizational size		
1 – 49 (Small)	0	0
50 – 249 (Medium)	12	10.53
250 or more (Large)	102	89.47

Critical success factors

The present study focused on 15 possible critical success factors in achieving organizational excellence and participants were asked to rate the extent to which factor has helped the surveyed organizations the most in achieving organizational excellence. The rating was from very important for success to not important for success. The results are illustrated in table 2. by examining table

2, various critical success factors were identified. The most critical success factors contributed to organizational excellence within the surveyed organizations chosen based on high score (95% and above) and these factors are as follow:

1. Technical resources

2. Internal communications

3. Planning and scheduling

4. Project Management

5. Top management support

6. Leadership

In terms of technical resources, it is clear that in order to attain knowledge needed to succeed; engineering firms must make sure that the technical resources are available. Engineers must have computers equipped with suitable engineering software to perform design, vehicles and transportation facilities to be able to have access to work sites whenever needed, office space to allow for resources expansions and meet urgency of the projects, etc. Hakserver (1996) claims that organizations have problems in implementing total quality management due to the lack of resources, and therefore as illustrated the availability of technical resources within engineering firms are vitally important in achieving excellence in engineering projects.

Table 2: Critical success factors in engineering organizations

Critical success factors	Very important	Important	Count	Count (%)	Rank	Neutral	Somewhat important	Not important	Count
Project mission	66	42	108	*94.70*	8	3	0	3	6
Project management	76	35	111	*97.37*	4	3	0	0	3
Employee leadership	83	26	108	*96.84*	6	12	0	3	15
Training	36	57	93	*81.58*	13	6	9	3	18
Planning and scheduling	78	33	111	*97.37*	3	3	0	0	3
Power and politics	17	29	46	*40.35*	15	29	21	18	98
Customer communication	57	51	108	*94.70*	9	6	0	0	6
Information technology	26	70	96	*84.21*	12	9	6	3	18
Personnel	81	27	108	*94.70*	7	6	0	0	6
Urgency of the project	24	48	72	*63.15*	14	24	9	9	42
Technical resources	84	30	114	*100*	1	0	0	0	0
Monitoring and feedback	42	63	105	*92.10*	10	3	6	0	9
Internal communication	48	66	114	*100*	2	0	0	0	0
Top management support	54	57	111	*97.37*	5	3	0	0	3
Employee empowerment	33	66	99	*86.84*	11	6	6	3	15

Internal communication was perceived as a critical success factor in achieving excellence as communication among teams, employees, and management is quite important to ensure that each member is aware of the various tasks, activities and problems associated with the projects, which in turns enable each member to participate with full knowledge of the current situation concerning the project at hand. This is supported further by Daft (1995) who indicated the importance of internal communication in achieving organizational success and suggested that internal communication is one important dimension in shaping organizational structure in addition to specialization, functional differentiation, professionalism, formalization, centralization, technical knowledge

resources and administrative intensity. Planning and scheduling was another factor perceived to be important in the surveyed organizations in achieving organizational excellence. As this factor focus mainly on identifying various issues such as who should work in a project, which activities to do, how long each activity, what to use as input, what to deliver, at what cost, etc., are all questions considered and answered during the planning and scheduling stage. Therefore, improper handling of planning and scheduling never helps organizations to deliver their final product on time at the anticipated costs. The results of this study is supported by Whittaker (1999) who indicated that planning is seen as one of the most common reasons for failure of information technology projects.

Regarding project management factor, the current study revealed that project management is critical is achieving organizational excellence and is even more important than project mission. Excellent project management capability in engineering firms supports better defining project mission, performance targets, and delivery on time. This is supported further by Pinto and Slevin (1988). In terms of top management support, the surveyed sample indicated the importance of top management support in achieving organizational excellence where top management support is essential to have the required technical and human resources without delay and raise employees' morale if they feel that management is giving them enough support. Ives and Olson (1984) supports the current study as they identified the critical role of top management support within their study.

Leadership was identified as an important critical success factor within the current study where organizational excellence depends on effective leadership of employees leading design teams through deploying management practices, implementing lessons learned, solving design and staff problems and presenting innovative ideas to customers and to managements. In support of this, Braga (2003) indicated that leadership must be exercised in order to develop the systems, tackle problems that may be faced at the beginning and ultimately make them culturally acceptable within the organization. In this context, they pointed out that leadership roles are creating the environment for change, showing the need for change, forming the leadership team, breaking down functional unfairness, creating the vision and strategy and creating team accountability for cross functional strategic themes at all organizational levels.

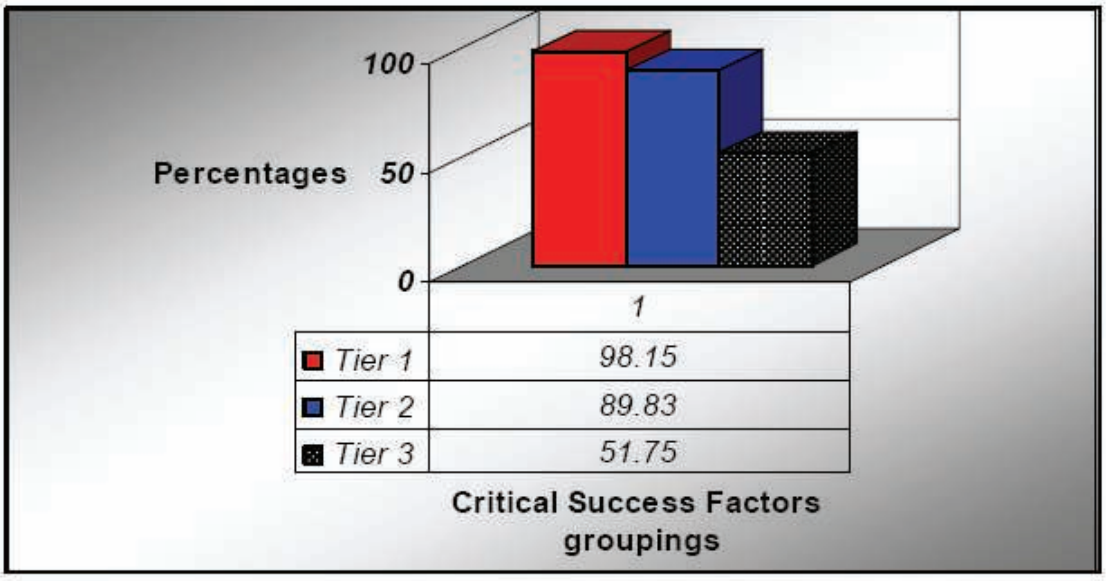
The study revealed that the above six critical success factors are quite cruical for achieving organizational excellence, however the study also identified other factors which can be recognized for their importance and contribution towards achieving organizational excellence, and these factors are personnel, project mission, customer communication, monitoring and feedback. These factors are supported by Cooke-Davis (2002) who identified similar factors in achieving projects success in Europe. However, it is surprising to see that urgency of the project and power and politics ranked at the bottom of the table 2 of the critical success factors for achieving organizational excellence. Power and politics ranked at the bottom of the critical success factors and

indicated that they have no significant effect on organizational excellence within the surveyed sample and these results differ from the results of Pinto and Slevin (1988) who indicated the importance of power and politics in achieving organizational success. However the variations within the current study might be due to the fact that organizational structure within the engineering firms is based on different nationalities of the workforce and it would be impossible to impose such a factor. Moreover, the urgency of the project was the second lowest success factor in the study and this might be due to the fact that engineering employees do not have concerns whether the project is urgent or not and their productivity remains the same in all cases. However, from top management perspectives, the picture may look different, top management may realize that an effort has to be made in order to raise productivity and get a project accomplished in a rush schedule. This can be accomplished through asking employees to work overtime or obtain more resources and in this case top management support is crucial in achieving the requested objectives.

In examining table 2, the researchers classified the various identified critical success factors into different tiers as illustrated in Figure 1, where tier 1 (Technical resources; Internal communications; Planning and scheduling; Project Management; Top management support; and Leadership) is crucial to organizational excellence, tier 2 (Personnel; Project mission; Customer communication; Monitoring and feedback; Employee empowerment; Information technology and Training) is intermediate crucial level and tier 3 (urgency of the project; and Power and politics) is the lowest level.

In comparing the current study with previous studies, it is fair to illustrate that the current study is highly supported with previous studies but the only differences is that the ranking of the different critical success factors is different among studies and this is could be due to the variations of culture, where the selected ranking of the critical success factors within the current study is based on the traditional critical factors rather than the focus of the humanistic aspects of organizational excellence and therefore this might be an area where these engineering firms need to improve and focus on in the near future.

Figure 1: Critical Success factors Classification



Conclusion

There are various reasons available as to why construction projects are often completed late and significantly over budget. But all the more recent reviews agree that a significant contributory factor is the tendency for a poor relationship to exist between construction firms, Engineering firms and their clients and between contractors, sub-contractors and suppliers. This is attributed in part to clients placing too much stress on lowest price in awarding contracts. As a result some firms have priced work unrealistically low and then sought to regain their profit margins through contract cost variations arising from, for example design changes and other claims leading to disputes and litigation. Therefore identifying and determining critical success factors is believed to help alleviating engineering firms from their endurable problems and would enable them to achieve organizational excellence. Through the research, several critical success factors were identified within the sample in Saudi Arabia and United Arab Emirates and they included technical resources, internal communication, planning and scheduling, project management, top management support, and leadership. These identified factors within the surveyed sample seem to focus on the traditional factors without paying much attention to the importance of the soft factors such as training and empowerment as it does not matter how much your workforce is motivated and skilled, it is important to utilize various techniques from the soft factors in ordr to enhance the motivations of your workforce and maintain them.

References

Anderson, E. S., Dyrhaugb, O. X., Jessena. S. (2002), "Evaluation of Chinese projects and comparison with Norwegian Projects", **International Journal of Project Management**, No. 20, pp. 601-609

Armstrong, M. and Baron, A. (1998), "Performance Management, the New Realities" **Institute of Personnel and Development**, London

Baidoun, S. (2003), "An empirical study of critical success factors of TQM in Palestinian organizations", **Logistics Information Management**, Vol. 16, No. 2, pp. 156-171

Bottorff, D. (1997), "Cost of Quality Systems: The Right Stuff", **Quality Progress**, Vol. 30, No, 3, March: 33-35

Brownell, J., Reynolds, D. (2002), "Strengthening the F&B purchaser–supplier Partnership: Actions That Make a Difference" **Cornell Hotel and Restaurant Administration Quarterl,** Vol**.** 43, pp. 49–61

Cameron, K. S., Quinn, R. E. (1999), **Diagnosing and Changing Organizational Culture**, Addison–Wesley, Reading, MA

Coronado, R.B. and Antony, J. (2002), "CSFs for the successful implementation of six sigma projects in organizations" **The TQM Magazine,** Vol. 14 No. 2, pp. 92-99

Cousins, P. D. (2002). "A conceptual model for managing long-term inter-organizational relationships", **European Journal of Purchasing and Supply Management**, Vol. 8, pp. 71–82

Daniels, A.C. and Rosen, T.A. (1988), **Performance Management: Improving Quality and Productivity through Positive Reinforcement**, 2nd ed., Performance Management Publications, Tucker, GA

Davies, T. C. (2002), "The real success factos on projects", **International Journal of Project management**, Vol. 20, pp. 185-190.

Day, D. V., Gronnb, P. and Salas, E. (2004). "Review Leadership Capacity in Teams", **The Leadership Quarterly**, Vol. 15, pp. 857–880

Dayton, N. A. (2001). "TQM CSFs, A Comparison: the UK versus the USA", **Total Quality Management**, Vol. 12, No. 3, pp. 293- 298

De Waal, A. (2002), "The Power of World class Performance Management: Use it!" **Measuring Business Excellence***,* Vol. 6, pp. 9- 19

Doyle, J.C. and Kalman, L. (1998) "Total Performance Management: Catalyst for Change", **ASQ's 52nd Annual Quality Congress Proceedings**, May 4-6, Philadelphia, Pennsylvania.

Eklof, J. and Westlund, A. (1998), "Customer satisfaction index and its role in quality management", **Total Quality Management**, Vol. 9, No. 1, pp. 80-5

George, S. (1996) "Discussion". **The Quality Management Journal**, 1996, 3, No. 3, 42-49.

Haksever, C. (1996). “Total Quality Management in the small Business Environment”. **Business Horizons,** Vol. 39, No. 2, pp. 33-40.

Harrington, H. J. (2005) “Reengineering Total Quality Management”, ASQ’s 54th Annual Quality Congress Proceedings. www.asq.org Web Site. [Online]. Available from www.asq.org/members/news/aqc/54_2000/14 061.pdf. [Accessed 17 September 2006].

Havaleschka, F. (1999), "Personality and leadership: a benchmark study of process and failure", **Leadership and Organization Development Journal**, Vol. 20, No. 3, pp. 114-132.

Hirshfield, M. and Lee, P. D. (2006), "Critical Success Factors for Healtcare software implementations", www.getvitalized.com, accessed 28th September 2006.

Huotari, M.L. and Wilson, T.D. (2001) “Determining organizational information needs: the CSFs approach”, **Information Research**, Vol. 6 No. 3, April

Ives, B. and Olson, M. H. (1984), ""User involvement and MIS success: a review of research", **Management Science**, Vol. 30, No. 5, pp. 586-603.

Iyer, J. C., and Jha, K. N. (2005), "Factors affecting cost performance: evidence from Indian construction projects", **International Journal of Project Management**, Vol. 23, pp. 283-295.

Jabnoun, N. (2000), “Restructuring for TQM: a review”, **The TQM Magazine**, Vol. 12, No. 6, pp. 395-9.

Juran, J.M. (1992), **Juran on Quality by Design**, The Free Press, New York, NY.

Kanji, G. (2000), "Take a test drive for business excellence", **Annual Quality Congress**, Indianapolis, IN, Vol. 54, No. 0, May, pp. 377-385.

Kanji, G. and Tambi, A. (1999), "Business excellence through customer satisfaction", **Total Quality Management**, Vol. 10, No. 1, pp. 129-153.

Kanji, G.K., Asher, M. (1993), "Total quality management process – a systematic approach", **Advances in Total Quality Management Series**, Carfax Publishing, Abingdon.

King, T. Y. (2001), "The critical success factors that influence organizations to adopt internet technology", **Malaysian Journal of Library and Information Science**, Vol. 6, No. 2, pp. 35-51.

Kolka, J. (2002). “ISO 9000 and 9004: a framework for disaster preparedness”, **Quality Progress,** Vol. 35, No. 2, pp. 57-62

Konchar M. and Sanvido V. (1998), “Comparison of US Project Delivery Systems” **Journal of Construction Engineering and Management**, Vol. 124(6), pp. 435–44.

Lockamy, A. (1993), “How to Compete in Your Industry”, **Production and Inventory Management Journal**, First Quarter, pp. 1-5

Marguglio, B. (2001), “Performance Self assessment in High Technology Enterprises”, **Annual Quality Congress**, Charlotte, NC, Vol. 55, No. 0, pp. 616-636.

McKinnon, S.M. and Bruns, W.J. JR, (1992), **The Information Mosaic**, Harvard Business School Press, Boston, MA

Mehra, S., Sirias, D., Hoffman, J. (1998), "A Critical Analysis of Total Quality Management Implementation", **International Journal of Applied Quality Management**, Vol. 1 No.1, pp.12-26

Modaress, B. and Ansari, A. (1989), "Quality Control Techniques in U.S. firms: A survey", **Production and Inventory Management Journal***,* 30, no. 2:58–62.

Molenaar K.R. and Songer A.D. (1998) "Model for Public Sector Design-built Project Selection", **Journal of Construction Engineering and Management**, Vol. 124(6), pp. 467–79.

Moore, M.H. and Braga, A.A. (2003), "Measuring and Improving Police Performance: The Lessons of Compstat and its Progeny", **Policing: An International Journal of Police Strategies & Management**, Vol. 26 No. 3, pp. 439-453.

Nuland, N. Y., Broux, G., Grets, L., De Cleyn, W., Legrand, J., Majoor, G. and Vleminckx, G. (1999), **Excellent: A guide for the implementation of the EFQM Excellence Model**, Comatech, Blanden.

O'Dell, C. and Grayson, C.J. (1998), **If Only We Knew What We Know: The Transfer of Internal Knowledge and Best Practice**, New York: Simon & Schuster, Inc.

Oakland J. S. (2000), **Total Quality Management - Text with Cases**, 2nd Edition, Butterworth-Heinemann.

Oakland, J. S. and Porter, L. (1994), **Cases in Total Quality Management**, Butterworth

Olve, N., Roy, J. and Wetter, M. (1999), **Performance Drivers: A Practical Guide to Using the Balanced Scorecard**, John Wiley & Sons, Chichester.

Pinto and Slevin (1988), "CSFs Across the Project Life Cycle", **Project Management Journal**, Vol. 10, No. 3, pp. 67-75.

Pinto, J. and Kharbanda, O. P. (1995), **Successful project managers: Leading teams to success**, New York, van Nostrand Rheinhold.

Pinto, J. K. and Slevin, D. P. (1987), "Critical success factors in successful project implementation", **IEEE Transactions on Engineering Management**, Vol. 34, No. 1.

Rao, A., Carr, L., Dambolena, I., Kopp, R., Martin, J., Rafii, F. and Schlesinger, P. (1996), **Total Quality Management: A Cross functional Perspective**, John Wiley and Sons.

Salegna, G. and Fazel, F. (2000), "Obstacles to Implementing Quality", **Quality Progress**, Vol. 33, No. 7, July, pp. 53-57

Shipley, D. (2002), "Destination: ISO 9000", **Quality Progress,** Vol. 35, No. 3, pp. 32-9

Sinclair, D. and Zairi, M. (2000), "Performance Measurement: A Critical Analysis of the Literature with Respect to Total Quality Management", **International Journal of Management Review**, Vol. 2 No. 2, pp.145-68.

Sinclair, D. and Zairi, M. (2001), "An Empirical Study of Key Elements of Total Performance Measurement Systems: A Case study Approach in Service Industry", **Total Quality Management**, Vol. 12, No. 4, pp. 535- 50

Sinclair, D. and Zairi, M., (1995), "Effective Process Management through Performance Measurement, Part III: An Integrated Model of Total Quality-based Performance Measurement", **Business Process Reengineering & Management Journal**, Vol. 1 No. 3, pp. 50-65

Snape, E. and Redman, T. (1995), "Managing Human Resources for TQM: Possibilities and Pitfalls", ***Employee Relations*****,** Vol. 17 No. 3, pp. 42-51

Somers, T. M. and Nelson,K. (2001), "The impact of critical success factors across the stages of enterprise resources planning implementation", **Proceedings of the 34th Hawaii International Conference on Systems Sciences (HICSS 34),** Jan 3-6, Maui, hawaii.

Sower, V. E. and Quarles, R. (2006) Cost of Quality: Why More Organizations do not Use it Effectively. http://www.shsu.edu/~mgt_ves/ Web Site. [Online], available from http://www.shsu.edu/~mgt_ves/ , [accessed September 28, 2006].

Stenberg, A. and Deleryd, M. (1999), "Implementation of Statistical Process Control and Process Capability Studies: Requirements or Free Will", **Total Quality Management**, Vol. 10 No. 4/5, 439-446

Sureshchandar, G. S., Rajendran, C. and Anantharaman (2001), "A Conceptual Model for Total Quality Management in Service Organizations", **Total Quality Management**, Vol. 12, No. 3, pp. 343-63

Trop, O., Austeng, K. and Mengesha, W. J. (2005), "Critical success factors for prject performance: A study from front end assessment of large public projects in Norway", www.concept.ntnu.no, accessed on 19th Nov 2006

Walker, J.W. (1992), **Human Resource Strategy**, McGraw-Hill, New York, NY.

Westerveld, E. (2003), "The project excellence model, linking success criteria and critical success factors", **International Journal of Project Management**, No. 21, pp. 411-418.

Westerveld, E. (2003), "The Project Excellence Model1: linking success criteria and CSFs", **International Journal of Project Management**, No. 21, pp. 411–418.

Winser, J. and Corney, W. (2001) "Comparing Practices for Capturing Bank Customer Feedback: Internet versus Traditional Banking", **Benchmarking: An International Journal**, Vol.8, No.3, pp.240-50

Zairi, M. and Whymark, J. (2003), **Best practice organizational excellence**, e-TQM Publishing House, Dubai, United Arab Emirates

Zhang, Z., Waszink, A. and Wijngaard, J. (2000), “An instrument for measuring TQM implementation for Chinese manufacturing companies”, **International Journal of Quality & Reliability Management**, Vol. 17, No. 7, pp. 730-55.