
The current issue and full text archive of this journal is available at
**www.emeraldinsight.com/1753-8378.htm**



Received 17 April 2008
Revised 6 June 2008

# Top management involvement in project management

## A cross country study of the software industry

Ofer Zwikael
*Victoria Management School, Victoria University of Wellington, Wellington, New Zealand*

### Abstract

**Purpose** – Top management support is considered to be an area that has high impact on project success. However, previous studies have also stated that effective top management support practices may vary across industries. This paper focuses on top management support for projects executed in the software sector. The objective of this study is to identify those top management support processes that have the greatest impact on software development project success and to compare these critical processes with the actual type of support provided by organisations.

**Design/methodology/approach** – About 17 top management support processes have been identified from the literature. Their effectiveness has been calculated according to their relative impact on project success. Data has been collected from 213 software development project managers and their supervisors in Japan, Israel and New Zealand. For each country, the impact of top management support processes on project success has been analysed to identify critical processes. Then, the actual level of use of both critical and non critical top management support processes by senior managers has been compared.

**Findings** – Different critical top management support processes have been identified in each country. However, six processes have been found to have higher contribution to project success than others. These processes are described and discussed in the paper. It has also been found that in all three countries top managers do not invest more effort in critical processes, than in non critical ones. Instead, in all countries, executives choose to perform easy-to-do processes. Critical top management support processes, which have higher impact on project success, often do not receive an appropriate level of attention from senior managers in the software industry.

**Practical implications** – Senior managers in the software industry may focus on critical processes, rather than paying lip service to less important ones. Specific practices designed to support these critical processes are also presented in the paper.

**Originality/value** – The paper suggests a detailed list of critical top management support processes, which significantly improve project success in different cultures. The paper also discusses this list in comparison with what is currently done by executives in the software industry and concludes with specific recommendations to managers in the software industry.

**Keywords** Senior management, Computer software, Project management, Japan, Israel, New Zealand

**Paper type** Research paper

International Journal of Managing Projects in Business
Vol. 1 No. 4, 2008
pp. 498-511
© Emerald Group Publishing Limited
1753-8378
DOI 10.1108/17538370810906228

## Introduction

A project manager is accountable for delivering project outputs. However, as a project is a complex endeavour, project managers can expect support from others in the organisation. Particularly, the active involvement of senior managers of the performing organisation can help project managers to successfully complete the project. Consistently, the project management literature has found that top

management support positively contribute to project success (Besner and Hobbs, 2008; Lester, 1998; Whittaker, 1999; Zwikael and Globerson, 2004; Johnson *et al.*, 2001; McManus, 2004). These studies show that top management support is considered to be among project management critical success factors (CSFs). This means that the more top management processes are practiced in organisations, the higher the level of project success is. However, with executive limited time and resources, it is also important to identify the most effective support processes for different project scenarios.

A paper, published in the last issue of this journal (Zwikael, 2008), also supports the high importance of top management involvement in projects. Yet, this paper concludes with the following statement: "different top management support processes should be implemented in any industry and culture". This statement is aligned with a project management belief that there is no "one size" for managing projects (Dvir *et al.*, 2006). Another support for this approach is the different extent of use of various project management processes across different industries (Pennypacker and Grant, 2003; Ibbs and Kwak, 2000). According to this approach, various project scenarios (for example, different industries, cultures and level of project complexity) have dissimilar needs. As a result, different management styles may be applicable for each project scenario. With relation to top management support, this means that unique top management support processes may be best used in different project scenarios.

As exclusive practices may be most effective for different project scenarios, this paper analyses top management support processes in an important industry in the current "information era", that is the software sector. The objectives of this paper are to identify the most critical top management support processes in the software sector and to investigate whether these processes are actually used by executives in software organisations. As a result, this paper aims at addressing the following issues:

- Identifying critical top management support processes for the software sector. These processes may allow senior managers to better use their limited time and budget while supporting projects.
- Investigating the actual pattern of support provided by senior managers in software organisations. The objective of this issue is to learn whether senior managers focus on the most effective support processes.

These issues will be analysed through a set of research hypotheses. The paper starts with the presentation of the relevant literature in the areas of software development project management and top management support, raises hypotheses to test, describes research configuration, analyses data and makes specific recommendations.

*Project management in the software sector*

Information system projects are the provision of a service to implement systems and solutions, including a variety of hardware and software products (Howard, 2001). Projects executed in the software industry are characterised by high uncertainty, need to use state-of-the-art system, rapid changes, a high need for interpersonal skills; high importance of organisational structure; customers who are not familiar with the system, large number of request changes during the project life cycle, high use of virtual teams, high importance of group learning and high influence of matrix

organisational structure (Sarker and Sahay, 2004; Bondarouk, 2006; Kerzner, 2006; Wallace *et al.*, 2004; Gillard, 2004; Akgun *et al.*, 2005).

The complex environment in which software organisations operate in, causes most projects in this industry to not be completed according to the desired specifications, within the specified budget and the promised time schedule, while keeping the customer and stakeholders happy (McGrew and Bilotta, 2000; Luna-Reyes *et al.*, 2005). van Genuchten (1991) has found that 70 per cent of projects in the software sector are completed over budget and 30 per cent over schedule. According to Whittaker (1999), 31 per cent of these projects are cancelled before completion and more than half the projects cost an average of 189 per cent of their original estimates. Problems derived from unsuccessful software projects cost US companies and government agencies an estimated US$ 145 billion annually (Jiang *et al.*, 2004).

Software development project success results have been reported by the Standish Group every second year since 1994 and are known as the "Chaos Report" (Johnson *et al.*, 2001). Recent data from this survey has shown that 18 per cent of projects executed in the software industry are cancelled without achieving any product, while 53 per cent end up with cost and schedule overruns. However, a major critique, related to the 1994 Standish group data collection, is presented by Jorgensen and Molokken-Ostvold (2006), who also claim that the average cost overrun in projects executed in the software industry is "only" 33 per cent.

Whatever the exact numbers are, it is clear that too many projects in the software industry achieve poor results. Many studies have investigated the major reasons for this poor phenomenon. For example, Whittaker (1999) has found that the three most common reasons for projects executed in the software industry to fail are:

(1) poor project planning;

(2) a weak business case; and

(3) lack of top management involvement and support.

MacInnis (2003) has added poor project manager competency as another major reason for project failures. Many other scholars have turned these failing causes into a list of CSFs. For example, the Standish Group study (Johnson *et al.*, 2001) has found top management support among the CSFs for projects executed in the software industry.

*Top management support*

The majority of executives in the software sector perceive that organisational issues are more important than technical ones (Doherty and King, 2001; Luna-Reyes *et al.*, 2005; Doherty and King, 1998). These findings imply that organisational involvement is important for project success.

Top management support has become a specifically important factor in the software sector with the introduction of maturity models, such as Capability Maturity Model, Capability Maturity Model Integrated and Organisational Project Management Maturity Model (Paulk *et al.*, 1995; Project Management Institute – PMI, 2003). These models analyse projects as an organisational effort, rather than a project manager's exercise. An important assumption of these models is that an organisation has a direct effect on the way project managers run their projects. One example of evidence to strengthen this assumption is that top management support highly influences the tools project managers decide to use in projects (Besner and Hobbs, 2008).

While there are many ways in which an organisation can support its project managers, it is important to focus on the most effective processes. These are called critical success processes – CSPs (Zwikael and Globerson, 2006). A critical success process is one that most significantly improves project success. Critical top management support processes that an organisation may consider to implement, include develop project procedures, involve the project manager during initiation stage, support on going project management training programmes, establish a project management office (PMO), develop a supportive project organisational structure, define clear project success measures and support projects in quality management (Zwikael, 2008). However, these processes are general and hence may not be relevant to the unique software industry.

This paper aims at identifying an exclusive list of top management support processes that most highly contribute to software development project success as a result of the high impact top management support has on project success. These processes may support software development senior managers with limited time and resources in decision making, by choosing to focus on the most effective processes.

## Research hypotheses

This section introduces research hypotheses derived from the literature and aimed at answering the issues in focus.

Critical top management support processes for projects executed in the software industry – as has been found in the literature, different emphasis may be given while managing projects in different sectors. The first research hypothesis relates to the question of whether critical top management support processes in the software sector are different from the ones identified in other sectors:

*H1*. Critical top management support processes for projects executed in the software industry are unique to this sector.

*H0*. Critical top management support processes for projects executed in the software industry are similar to those in other sectors.

The relative use of critical processes versus non-critical processes in the software sector – the second research hypothesis aims at finding a root cause to software development project failures. It investigates whether senior managers put more managerial effort in critical top management support processes. Hence, the second hypothesis claims that senior managers follow critical processes while supporting project managers:

*H2*. CSPs are performed more frequently than non-critical processes.

*H0*. CSPs are performed with the same frequency as non-critical processes.

## Research configuration

This section introduces the configuration of this research designed to investigate the hypotheses raised in the previous section. This section presents the methodology used, describes data collection and assesses the reliability and validity of the methodology.

*Methodology*

In order to test research hypotheses, a model has been designed. In this study, a critical process is defined as a top management support process which has a significant impact on project success. Hence, the independent variables are project top management support processes and the dependent variables are project success measures, as is shown in Figure 1.

Project success is traditionally measured using the "golden triangle", which means completing the project on time, within budget and to specification (PMI, 2004). This is the operational mindset, which is influenced by the "get the job done" approach (Dvir *et al.*, 2006). However, several studies support the inclusion of customer satisfaction as the fourth dimension of success (Lipovetsky *et al.*, 1997; Lim and Mohamed, 1999; Zwikael and Sadeh, 2007; Kerzner, 2006; Voetsch, 2004). Accordingly, the four project success variables, used as the dependent variables of this research, are schedule overrun, cost overrun, project performance and customer satisfaction.

The independent variable is top management support. Relevant top management support processes have been identified from the literature (Paulk *et al.*, 1995; Zwikael and Globerson, 2004; PMI, 2003, 2004; Kerzner, 2006). About 17 top management support processes, which are included in the model, are shown in Figure 1. Finally, based on the importance culture has in the literature (Hofstede, 2001; Zwikael *et al.*, 2005; House *et al.*, 2004) country is also included in the model, as a variable which potentially moderates the relationship between top management support and project success.

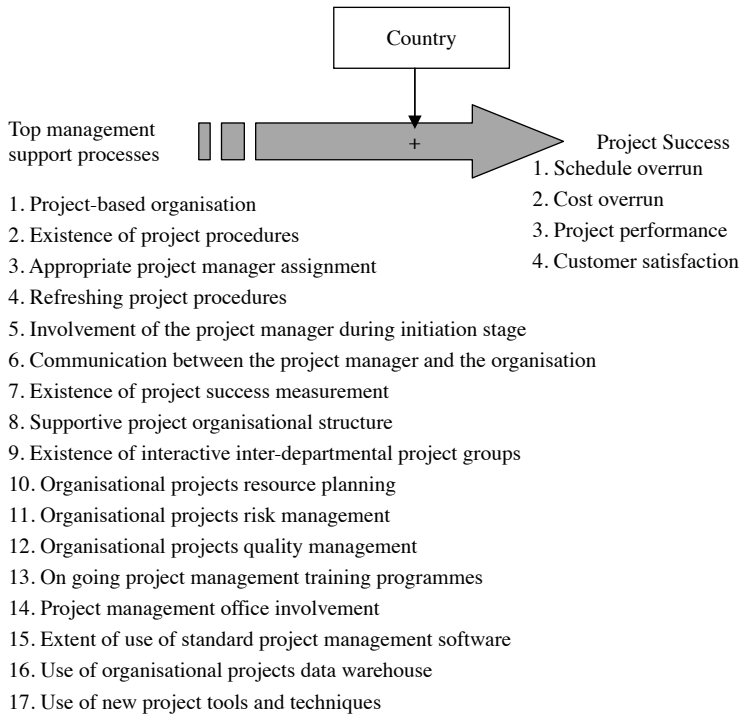


**Figure 1.**
The research model

This research framework includes several limitations that have to be stated. The study focuses on top management support, hence recommendations may relate to a narrow area in managing projects in the software sector. Further research may use the same research approach to identify critical processes in other related areas. A delimitation of this study is with the limited number of countries in this study. As a result, generalization of results may be immature, before more studies are taken in different countries.

*Data collection*

This study uses a questionnaire that has been utilised and validated in previous studies (Zwikael and Globerson, 2004, 2006; Zwikael and Sadeh, 2007). However, all these studies include data from one country only (Israel) and none of them has focused on the software industry or on top management support. The questionnaires used in this study have been collected from 213 project managers involved in projects executed in the software industry in three different countries. About 78 of the questionnaires have been collected in Japan, 95 in Israel and 40 in New Zealand during the years 2002-2007. These countries have been selected to represent different cultures (Asian and Western), country size (population of 4-7 versus 127 million) and several geographical locations.

In the questionnaire, project managers have been asked to estimate the frequency of use of each of the 17 top management support processes (using a 1-5 Likert scale) in their organisation. In order for the project managers to make accurate estimates, a full explanation about each top management support process was introduced to all project managers who participated in this research. While the independent variables have been collected from project managers, the dependent variables have been collected from their supervisors to avoid "same source bias". Hence, project success results have been reported by the supervisors of the project managers using the following four project success dimensions:

(1) Cost overrun was measured in percentages from the original plan, excluding legitimate variations imposed by the customer.

(2) Schedule overrun was measured in percentages from the original plan, excluding legitimate variations imposed by the customer.

(3) Project performance was measured on a scale of one to ten, with "1" representing low performance, and "10" representing high performance.

(4) Customer satisfaction was measured on a scale of one to ten, with "1" representing low customer satisfaction, and "10" representing high customer satisfaction.

Initial data collection involved project managers who are members in the PMI, which has supported this study in the national chapter level of each of these three countries. Yet, recognising the danger of this type of data collection as a sole source, the other half of the questionnaires have been collected from organisations selected and personally visited by the research team. A questionnaire was included in the final data analysis, only if at least 80 per cent of the questions were answered.

*Project success*

In order to learn about the projects included in this sample, a cross cultural project success comparison has been conducted. Table I presents the level of project success in

Japan, Israel and New Zealand. Results include mean (in the upper row of each cell) values for a project in each of these three countries and for each success measure. Results in Table I also include standard deviation, presented in the lower row of each cell in brackets.

As can be seen in Table I, Israeli projects face higher schedule and cost overruns, as compared to New Zealand and Japan. However, Japanese projects achieve relatively low-performance level and customer satisfaction. New Zealand projects are performed relatively successfully in all dimensions. Overall, these results demonstrate once again the current problems with software development project success.

*Reliability and validity*

The model's reliability has been measured using Cronbach's $\alpha$ – a measure based on the correlations between different items on the same test. Cronbach's $\alpha$ measures whether several items that propose to measure the same general construct produce similar scores. Cronbach's $\alpha$, calculated from the 17 top management processes, has been found to be 0.91. This value is considerably higher than the minimum value required by the statistical literature (Hair, 2006).

The validity of the model has been evaluated by measuring the impact of the 17 top management support processes (independent variables) on each project success measure (dependent variable), using four multiple linear regressions. A summary of these analyses is presented in Table II.

As found in Table II, the 17 top management support processes included in the model have been found to have significant impact on each of the four project success measures. All results are statistically significant with significance level equal or under 0.001.

## Results and discussion

The objectives of this section are to test hypotheses and identify exclusive top management support processes for the software sector.

**Table I.**
Project success in the software sector

| Country | Schedule overrun (per cent) | Cost overrun (per cent) | Project performance (1-10 scale) | Customer satisfaction (1-10 scale) |
|---|---|---|---|---|
| Japan | 9.1 (26.1) | 6.1 (19.3) | 5.5 (2.0) | 6.8 (1.8) |
| Israel | 32.7 (20.5) | 26.2 (14.9) | 8.2 (1.2) | 8.2 (1.2) |
| New Zealand | 11.8 (8.1) | 9.0 (7.6) | 7.3 (1.9) | 7.5 (1.6) |

**Table II.**
A validity test for the model

| Project success measure | $R^2$ | Significance level |
|---|---|---|
| Schedule overrun | 0.28 | $<0.001^{**}$ |
| Cost overrun | 0.27 | $<0.001^{**}$ |
| Project performance | 0.33 | $=0.001^{**}$ |
| Customer satisfaction | 0.26 | $<0.001^{**}$ |

**Notes:** $^{*}p < 0.05$; $^{**}p < 0.01$

*H1. Critical top management support processes for the software sector*

This section identifies those top management support processes, which higher frequency of their execution improves project success. As results may vary among countries, critical processes are analysed for each country separately.

In this study, a top management support process is considered to be "critical" only if it has a positive and significant impact on four project success measures. Hence, the impact of each top management support process on project success has been analysed. A multivariate regression has been administered, using all 17 top management support processes as independent variables and all four project success measures as the dependent variable. A critical process has been identified when a process has had significant impact ($p < 0.05$) on the four project success measures. Table III presents the significance levels in which each top management support process impacts project success measures in overall and for each country. In any case of significant results, the significance level is mentioned. Empty cells mean that the specific process has no significant influence on project success in this country.

In the overall analysis presented in Table III, out of the 17 processes included in the model, ten have been found to have significant impact on project success. These ten critical top management support processes in the software sector are:

(1) appropriate project manager assignment;

(2) refreshing project procedures;

(3) involvement of the project manager during initiation stage;

(4) communication between the project manager and the organisation;

(5) existence of project success measurement;

| Top management support planning process | Overall | Japan | Israel | New Zealand |
|---|---|---|---|---|
| Project-based organisation | – | – | – | 0.003** |
| Existence of project procedures | – | – | – | 0.001** |
| Appropriate project manager assignment | 0.005** | – | 0.002** | 0.026* |
| Refreshing project procedures | 0.035* | – | – | 0.000** |
| Involvement of the project manager during initiation stage | 0.045* | 0.013* | – | – |
| Communication between the project manager and the organisation | 0.000** | – | – | 0.001** |
| Existence of project success measurement | 0.000** | – | 0.014* | 0.001** |
| Supportive project organisational structure | 0.015* | – | 0.010* | 0.046* |
| Existence of interactive inter-departmental project groups | 0.003** | – | – | 0.018* |
| Organisational projects resource planning | 0.005** | – | – | 0.000** |
| Organisational projects risk management | – | – | – | – |
| Organisational projects quality management | – | 0.033* | – | 0.046* |
| On going project management training programmes | – | 0.011* | – | 0.029* |
| PMO involvement | 0.019* | 0.013* | – | 0.001* |
| Use of standard project management software | 0.004** | – | – | – |
| Use of organisational projects data warehouse | – | – | 0.025* | 0.017* |
| Use of new project tools and techniques | – | 0.027* | – | – |

**Notes:** *$p < 0.05$; **$p < 0.01$; JP – Japan; IL – Israel; NZ – New Zealand

**Table III.**
Critical success top management support processes in software development organisations (significance levels)

(6) supportive project organisational structure;
(7) existence of interactive inter-departmental project groups;
(8) organisational projects resource planning;
(9) PMO involvement; and
(10) use of standard project management software.

This list is different from what has been found in different sectors. For example, organisational project risk management is a critical process in the production sector and on going project management training programmes is a critical process in the engineering industry (Zwikael, 2008). This allows us rejecting the first hypothesis. This means that different sectors have exclusive top management support needs.

Different critical top management support processes exist in each country as well. For example, in New Zealand most top management support processes have a significant impact on project success. These results suggest top management support has an important role in New Zealand organisations.

In Japan, only five processes have been found to significantly impact project success. An analysis of these processes suggests increasing project managers' involvement in project initiation and training and improving professionalism using new tools and techniques, PMO support and quality management, which is considered to be a core area in Japan (Zwikael *et al.*, 2005). As a result, it is important that senior managers in Japan follow these processes.

In Israel, the existence of a project success measurement system has been found to be a critical process. This finding may encourage managers to impose the implementation of a success measurement system in projects. As the Israeli culture desires to leave some room for on going negotiation, senior managers can insist that project objectives are officially approved before projects begin (Zwikael *et al.*, 2005). Another critical process found in Israel is assigning an appropriate project manager. The high importance of this process is probably due to the fact that most software development project managers in Israel have a strong technical background, as programmers, team development leaders or system analysts, but less management experience. Therefore, senior level management in Israel may consider whether project management training should also include general managerial skills and whether assigned project managers have both technical and managerial skills.

In this section, different top management support critical processes have been found in different countries. For each country it can be claimed that some top management support processes have higher impact than others influencing project success. No top management support process has been found to be critical in all three countries. In addition, critical top management support processes, found in the software sector, are different from those identified in other sectors (Zwikael, 2008). One managerial conclusion deriving from these findings is that more effort and budget may be spent on critical processes identified in this section. As a result, performing these processes with higher frequency may improve project success.

*H2. Extent of use of top management support processes*

The second research hypothesis assumes that critical processes are performed more frequently than non critical processes, because of their high contribution to project

success. The objective of this section is to investigate whether this is the case in software development organisations. Owing to the high-cultural differences among countries, a separate analysis has been conducted for each country. The average extent of use of each top management support process has been measured in the questionnaires using a scale of one (low) to five (high) and is presented in Table IV. The critical processes for each country are marked with superscript a. The three processes with the highest extent of use in each country (as identified in Table III) are marked with "H", while the three processes with the lowest extent of use in each country are marked with "L". At the bottom of Table IV, the average extent of use of all critical processes and of all non critical processes are presented for each country.

Table IV analyses the actual extent of use of each top management support process in each country. Analysing the processes with the lowest extent of use (identified with "L" in this table), it has been found that two processes have the lowest extent of use in all three countries. These processes are "use of organisational projects data warehouse" and "use of new project tools and techniques". These results suggest software development organisations have very low interest in an important project management area – learning (Sense, 2008). This is exemplified in this study by low extent of use of processes related to both learning from recently completed internal projects and learning from new tools used in the external markets. On the other edge of the scale the process that is most supported by senior managers in Israel and New Zealand is the "use of project management software packages". This process has less importance in

| Top management support planning process | Japan | Israel | New Zealand |
|---|---|---|---|
| Project-based organisation | 3.96 H | 3.81 | 4.02[a] |
| Existence of project procedures | 3.62 H | 3.89 | 3.64[a] |
| Appropriate project manager assignment | 3.00 | 3.75[a] | 4.05[a] H |
| Refreshing project procedures | 2.97 | 3.08 | 2.77[a] |
| Involvement of the project manager during initiation stage | 3.65[a] H | 3.91 H | 3.70 |
| Communication between the project manager and the organisation | 2.81 | 4.00 H | 4.05[a] H |
| Existence of project success measurement | 3.29 | 3.12[a] | 3.77[a] |
| Supportive project organisational structure | 2.91 | 3.67[a] | 3.80[a] |
| Existence of interactive inter-departmental project planning groups | 2.36 L | 3.43 | 3.09[a] |
| Organisational projects resource planning | 3.12 | 3.24 | 3.07[a] |
| Organisational projects risk management | 2.78 | 2.87 | 3.27 |
| Organisational projects quality management | 2.77[a] | 3.09 | 3.05[a] |
| On going project management training programmes | 2.77[a] | 2.91 | 2.66[a] |
| PMO involvement | 2.50[a] | 2.57 L | 2.51[a] L |
| Use of standard project management software | 2.54 | 4.27 H | 4.61 H |
| Use of organisational projects data warehouse | 2.49 L | 2.61[a] L | 1.66[a] L |
| Use of new project tools and techniques | 2.22[a] L | 2.65 L | 1.84 L |
| Average extent of use of critical processes | 2.78[a] | 3.29[a] | 3.24[a] |
| Average extent of use of non critical processes | 2.99 | 3.36 | 3.36 |

**Notes:** [a]A critical top management support process; extent of use is presented in the following scale: "1" – low to "5" – high; H – one of the three processes with the highest extent of use in this country; L – One of the three processes with the lowest extent of use in this country

**Table IV.**
Extent of use of top management support processes

Japan, as Japanese project management methodology has more emphasis on communications than on scheduling (PMCC, 2001).

Another result from Table IV is the low correlation between the list of the critical top management support processes and the list of processes that are most frequently performed. For example, senior managers in New Zealand put very low effort in two critical processes, while executives in Israel and Japan neglect one critical process. As can be seen in the last row of Table IV, in each of the three countries, less effort is invested in critical processes than in non-critical processes. This means that senior managers do not treat the critical supporting processes with higher level of effort. Hence, the second null hypothesis cannot be rejected, meaning that senior managers do not distinguish between more and less important project support processes.

## Conclusion

Top management support is known to have a positive influence on project success. Indeed, executives in the software sector spend much effort in supporting projects in numerous ways. However, following the results of this paper, it seems that many managers are not aware of, or prefer to ignore, the different impact various supporting processes have on project success. As a result, they pay similar attention to critical support processes and to support processes that have low impact on project success. For example, most senior managers choose to focus on developing project management procedures instead of defining clear and realistic project goals. Executives in the software industry can improve project results by investing more effort in critical top management support processes.

This paper has implemented the CSPs approach, firstly presented by Zwikael and Globerson (2006). This approach suggests that a detailed list of critical project management processes can assist project managers in managing their limited time and resources. The CSPs approach is demonstrated in this paper on an important project area, which is top management support (BBesner and Hobbs, 2008; Lester, 1998; Whittaker, 1999; Zwikael and Globerson, 2004; Johnson *et al.*, 2001; McManus, 2004; Zwikael, 2008). Moreover, as unique top management support processes should be identified for each industry (Dvir *et al.*, 2006; Pennypacker and Grant, 2003; Ibbs and Kwak, 2000; Zwikael, 2008), this paper focuses on identifying top management support processes in the software industry.

This paper has identified specific top management support processes which have higher impact on project success in the software sector. These processes, presented in Table III, have been found to be unique to each of the three countries participated in this study. A possible implementation of these results by senior managers is to apply cost-benefit analyses in order to decide whether to perform critical processes, which are related to the relevant culture, more frequently than other support processes. However, in order to assist software sector executives from around the world implementing the results of this study, the overall six most critical support processes have been identified (all are indicated by ** in Table III). These processes have the most significant impact on project success and are presented below. Moreover, specific recommendations for top management support best practices, which are related to these six critical processes, have been identified from the general project management literature (Kerzner, 2006) and from the software project management literature (Marchewka, 2006). These critical processes and practices include the following:

(1) Appropriate project manager assignment – make sure the assigned project manager has the following attributes:
   - the ability to deal with people;
   - the ability to create and sustain relationships; and
   - the ability to organise.

(2) Communication between the project manager and the organisation:
   - make sure project managers have the ability to communicate with people; and
   - make sure project managers develop a communications plan, which identifies stakeholders, information requirements, type of report and timings.

(3) Existence of project success measurement:
   - define project success measures;
   - set project targets; and
   - stakeholders to approve project targets.

(4) Existence of interactive inter-departmental project groups:
   - make sure project managers involve line managers during planning; and
   - make sure the quality assurance department is actively involved in the project from its beginning.

(5) Organisational projects resource planning:
   - analyse resource load on the multi-project level; and
   - implement a project management software package that support multi-project management.

(6) Use of standard project management software:
   - train project managers on how to use the software;
   - involve the PMO in supporting project managers using the software.

Finally, following the major differences among countries, further research may be conducted in other countries, aimed at deeper understanding the cultural issues related to top management support in projects executed in the software industry.

## References

Akgun, A.E., Byrne, J., Keskin, H., Lynn, G.S. and Imamoglu, S.Z. (2005), "Knowledge networks in new product development projects: a transactive memory perspective", *Information & Management*, Vol. 42 No. 8, pp. 1105-20.

Besner, C. and Hobbs, B. (2008), "Project management practice, generic or contextual: a reality check", *Project Management Journal*, Vol. 39 No. 1, pp. 16-33.

Bondarouk, T.V. (2006), "Action-oriented group learning in the implementation of information technologies: results from three case studies", *European Journal of Software Developments*, Vol. 15 No. 1, pp. 42-53.

Doherty, N.F. and King, M. (1998), "The importance of organisational issues in systems development", *Software Development and People*, Vol. 11 No. 2, pp. 104-23.

Doherty, N.F. and King, M. (2001), "An investigation of the factors affecting the successful treatment of organisational issues in systems development projects", *European Journal of Software Developments*, Vol. 10 No. 3, pp. 147-60.

Dvir, D., Sadeh, A. and Malach-Pines, A. (2006), "Projects and project managers: the relationship between project managers' personality, project types, and project success", *Project Management Journal*, Vol. 37 No. 5, pp. 36-48.

Gillard, S. (2004), "Software development project management: a conceptual view", *Journal of American Academy of Business*, Vol. 5 Nos 1/2, pp. 381-4.

Hair, J.F. (2006), *Marketing Research*, McGraw-Hill, New York, NY.

Hofstede, G. (2001), *Culture's Consequences*, 2nd ed., Sage, Newbury Park, CA.

House, R.J., Hanges, P.J., Javidan, M., Dorfman, P.W. and Gupta, V. (2004), *Culture, Leadership, and Organisations: The GLOBE Study of 62 Societies*, Sage, Thousand Oaks, CA.

Howard, J. (2001), *Computer Services: 2001 Market Report*, Key Note Ltd, Hampton.

Ibbs, C.W. and Kwak, Y.H. (2000), "Assessing project management maturity", *Project Management Journal*, Vol. 31 No. 1, pp. 32-43.

Jiang, J.J., Klein, G., Hwang, H.G., Huang, J. and Hung, S.Y. (2004), "An exploration of the relationship between software development process maturity and project performance", *Information and Management*, Vol. 41 No. 3, pp. 279-88.

Johnson, J., Karen, D., Boucher, K.C. and Robinson, J. (2001), "The criteria for success", *Software Magazine*, Vol. 21 No. 1, pp. S3-S11.

Jorgensen, M. and Molokken-Ostvold, K. (2006), "How large are software cost overruns? A review of the 1994 CHAOS report", *Information and Software System*, Vol. 48 No. 4, pp. 297-301.

Kerzner, H. (2006), *Project Management: A Systems Approach to Planning, Scheduling and Controlling*, 9th ed., Wiley, New York, NY.

Lester, D.H. (1998), "Critical success factors for new product development", *Research System Management*, January/February, pp. 36-43.

Lim, C.S. and Mohamed, M. (1999), "Criteria of project success: an exploratory re-examination", *International Journal of Project Management*, Vol. 17 No. 4, pp. 243-48.

Lipovetsky, S., Tishler, A., Dvir, D. and Shenhar, A. (1997), "The relative importance of project success dimensions", *R&D Management*, Vol. 27 No. 2, pp. 97-106.

Luna-Reyes, L.F., Zhang, J., Gil-García, J.R. and Cresswell, A.M. (2005), "Software developments development as emergent socio-technical change: a practice approach", *European Journal of Software developments*, Vol. 14 No. 1, pp. 93-105.

McGrew, J.F. and Bilotta, J.G. (2000), "The effectiveness of risk management: measuring what didn't happen", *Manage Decision*, Vol. 38 No. 4, pp. 293-300.

McManus, J. (2004), *Risk Management in Software Development Projects*, Butterworth-Heinemann, Oxford.

MacInnis, P. (2003), "Skill test question", *Computing Canada*, Vol. 29 No. 18, p. 10.

Marchewka, J.T. (2006), *Information Technology Project Management: Providing Measurable Organizational Value*, 2nd ed., Wiley, New York, NY.

Paulk, M.C., Curtis, B., Chrissis, M.B. and Weber, C.V. (1995), *The Capability Maturity Model for Software*, Software Engineering Institute, Carnegie Mellon University, Pittsburgh, PA.

Pennypacker, J.S. and Grant, K.P. (2003), "Project management maturity: an industry benchmark", *Project Management Journal*, March, pp. 4-9.

PMCC (2001), *P2M – A Guidebook of Project & Programme Management for Enterprise Innovation*, Project Management Professionals Certification Center, Tokyo.

PMI (2003), *Organisational Project Management Maturity Model (OPM3) Knowledge Foundation. PMI Standards Committee*, Project Management Institute, Newtown Square, PA.

PMI (2004), *Guide to the Project Management Body of Knowledge. PMI Standards Committee*, Project Management Institute, Newtown Square, PA.

Sarker, S. and Sahay, S. (2004), "Implications of space and time for distributed work: an interpretive study of US-Norwegian systems development teams", *European Journal of Software Developments*, Vol. 13 No. 1, pp. 3-20.

Sense, A.J. (2008), "Conceptions of learning and managing the flow of knowledge in the project-based environment", *International Journal of Managing Projects in Business*, Vol. 1 No. 1, pp. 33-48.

van Genuchten, M. (1991), "Why is software late? An empirical study of reasons for delay in software development", *IEEE Transactions on Software Engineering*, Vol. 17 No. 6, pp. 582-90.

Voetsch, R.J. (2004), "The current state of project risk management practices among risk sensitive project management professionals", PhD thesis.

Wallace, L., Keil, M. and Rai, A. (2004), "Understanding software project risk: a cluster analysis", *Information and Management*, Vol. 42 No. 1, p. 115.

Whittaker, B. (1999), "What went wrong? Unsuccessful software development projects", *Information Management and Computer Security*, Vol. 7 No. 1, p. 23.

Zwikael, O. (2008), "Top management involvement in project management – exclusive support practices for different project scenarios", *International Journal of Managing Projects in Business*, Vol. 1 No. 3.

Zwikael, O. and Globerson, S. (2004), "Evaluating the extent of use of project planning: a model and field results", *International Journal of Production Research*, Vol. 42 No. 8, pp. 1545-56.

Zwikael, O. and Globerson, S. (2006), "From critical success factors to critical success processes", *International Journal of Production Research*, Vol. 44 No. 17, pp. 3433-49.

Zwikael, O. and Sadeh, A. (2007), "Planning effort as an effective risk management tool", *Journal of Operations Management*, Vol. 25 No. 4, pp. 755-67.

Zwikael, O., Shimizu, K. and Globerson, S. (2005), "Cultural differences in project management processes: a field study", *International Journal of Project Management*, Vol. 23 No. 6, pp. 454-62.

**Corresponding author**
Ofer Zwikael can be contacted at: ofer.zwikael@vuw.ac.nz

To purchase reprints of this article please e-mail: **reprints@emeraldinsight.com**
Or visit our web site for further details: **www.emeraldinsight.com/reprints**

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.