Critical General Team Attributes for Project Success

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Abstract
In today's increasing competitive climate there is no single, uniform measure of project success in the review of the relevant published explicit research models. A systematic tabulation of the implicit relations between social relationship attributes identified in the existing studies reveals a pattern that leads to give clear direction for future research either for testing out of existing studies or for new research on new possible sets of relations between attributes. Hentonnen, (2010) concentrates on the social relations and relationships and shows that seem to have an impact on the performance of groups or teams and the relevant body of research is limited.
This study describes that the formation of a project team from a limited set of human resources is a very important strategic decision since this determines the project outcome of the project. Since not all projects are the same, there is a need to relate the team attributes to the project attributes in order to achieve better project outcomes. The interest of this paper is in the identification of project team attributes, project type attributes and project outcome attributes.
The authors addressed that this paper is one of the very few such attempts to link complexity with Critical Social Team Attributes (CGTAs) in the literature. The identification and ranking of Critical Social Team Attributes (CGTAs) has been done using the CSFs methodology. The hypotheses have been tested using the non-parametric tests Kruskal-Wallis for the comparison of the scores of several continuous variables for more than two groups and the Friedman test for the comparison of different measures of continuous variables under different conditions from the same subjects. The results indicate that more studies of this nature are required in order to validate the outcomes of the current research.

Introduction

The research on the relative importance of the so called human and social capital on the performance of individuals, groups and organizations has developed exponentially during the last few years. The project management success literature has grown significantly as well, especially in marketing projects. New product development (NPD) projects are of primary interest to markets and businesses and attract the attention of current business research.

Most NPD processes are developed in small groups and the research on the success and effectiveness of NPD projects depend on the suitable formation of those teams. Knowledge on groups or teams working on NPD

projects is an area where knowledge is still limited, the most important reason being the scarcity of sufficient suitable data for analysis. This is especially true for NPD projects that are unique in people and other resources, time and budget. While a lot can be measured and analyzed on peoples' skills and capabilities and other personal qualities, the so called human capital, knowledge is still required on the effectiveness of project teams in relation to the social linkages between team members, the so called social capital. We need to know more on whether success and effectiveness of NPD projects is affected by different types of relations and relationships developed between the group members undertaking these projects.

New product development is considered to be important to economic development and business growth and survival and has been traditionally associated with large firms (Vossen, 1998). The reasons as explained in Caputo, Cucchiella, Fratocchi, Pelagagge & Scacchia (2002) is that high costs, fear, moderate knowledge base, limited time and modest financial resources affect owner-managers' opportunities for developing new products. However, there are possibilities for NPD in small and medium enterprises (SMEs) because of their behavioral characteristics, for example skilled labor, flexibility and motivated management (Rothwell, 1991).

The innovation activity of small firms is generally seen to push out industry boundaries and to open up new business fields (Acs & Audretsch, 1990). Even in the context of rapid globalization, the creation of new knowledge has been shown to be an essentially local activity, taking place within social and business relationships between actors with different and complementary knowledge bases (Doz, Santos, & Williamson, 2001; Partanen, 2008) and social capitalization based on value seeking behavior (Hughes, Ireland & Morgan, 2007) and external collaborations (Kratzer, Gemuenden & Lettl, 2008).

A work team comprises individuals who consider themselves and others as a social entity (Guzzo & Shea, 1992). Furthermore, the individuals in the team are interdependent on account of the tasks they carry out as a group, and they are embedded in one or several larger social systems. They are also assumed to carry out tasks that affect third parties such as customers or study colleagues.

Critical General Team Attributes

The formation of a project team from a limited set of human resources is a very important strategic decision since this determines the project outcome of the project. Since not all projects are the same, there is a need to relate the team attributes to the project attributes in order to achieve better project outcomes. The current paper focuses on the identification of project team attributes, project type attributes and project outcome attributes and their interlinking in a theoretical model.

The review of the relevant published explicit research models shows a limited ability to explain the existing studies or to provide guidance for future research. It reveals the absence of multivariate studies and the limitations in both the variables and the measures applied. A systematic tabulation of the implicit relations between social relationship attributes identified in the existing studies are viewed as instances of the proposed model. The overlay of all reviewed model

instances reveals a pattern that leads to a suitable framework for the explanation of the existing studies.

In the context of the current research the Critical Success Factors (Rockart, 1978) has been used in order to identify whether social attributes are important in the formation of project teams in comparison with the traditional human resource management categorical attributes of group members as individuals. It has also been used for the identification of the most important categories of social attributes of project teams that may have an impact in new product development (NPD) projects. The initial step as a full review of the CSFs literature on New Product Development projects. Griffin (1997) was the first to compare the effects of project and process characteristics on NPD. The importance of processes has been studied by Zahra & Ellor (1993) in the context of cross functional teams that appear to have enhanced problem solving skills. Gulati (1997) claims that social interactions within the project team and with the outside organizations help to develop better understanding of product requirements. Connell *et al* (2001) concluded that communication between the team and with the outside organization is very important for NPD. Product innovation is also positively affected by increased internal communication (Dakhli & De Clercq, 2004).

Ernst (2002) reviewed all the then existed empirical research findings on critical factors for NPD. He summarizes the findings in relation to organizational variables affecting the NPD process. The resulting conclusion from his tabulation is "the success of new products depends on the type and strength of a project organization for NPD in a company". Aronson, Reilly & Lynn (2006) found that leader personality plays more important role for NPD success in cases of high uncertainty. The study by Makela & Brewster (2009) showed that social capital facilitates internal resource exchange. Schimmoeller (2010) reviewed the critical success factors for NPD processes and pointed out that the emphasis in research has shifted from products to processes. Lee *et al* (2011) have identified social capital, leadership and modularity as the critical success factors for NPD while team diversification did not seem to play a significant role in their study. They also stress the importance of the external advice network. The study does not use SNA tools and constructs to measure social capital but measures perceptions on a Likert scale. Out of this review we can identify the important factors from Cooper and Kleinschmidt (1995) as

> "*(1) a cross-functional NPD team; (2) a strong and responsible project leader; (3) an NPD team with responsibility for the entire project; (4) the commitment of the project leader and the team members to the NPD project; and (5) intensive communication among team members during the course of the NPD process*."

The updated review of CSFs on NPD shows that the conclusions of Cooper and Kleinschmidt (1995) have been evolving to a wider model that replaces the communication variable with a new wider set of social networking variables that are measured with quite different constructs using SNA tools and techniques. Table 1 lists the general categories of team attributes resulted from the CSFs and the NPD literature review.

Table 1: Team General Attributes from CSFs Literature	
1	Members' external links with their parent organization[s]
2	Internal links between members
4	Team diversity (race, age, sex, language, role)
3	Team know-how, skills, expertise
5	Members' external links with powerful stakeholders
6	Project Manager Abilities

Methodology

A range of methodologies can be applied for a number of desired outcomes (Chen, Kang, Xing, Lee & Tong, 2008; Kratzer, Leenders & Van Engelen (2009, 2010). This essay is an attempt for the identification of all possible categories of social attributes that may contribute to NPD success and effectiveness using a qualitative and quantitative analysis involving the following four steps:

1 Extensive literature review of experimental studies related to the Critical Success Factor for NPD and of the wider literature on the impact of social attributes on project success and effectiveness in order to determine the Critical General Team Attributes (CGTAs).

2 Discussions with a core team of experts for the final selection and identification of CGTAs for NPD success and effectiveness out of the ones selected in the literature. The results were tabulated using standard terminology in order to avoid duplicate terminologies with the same meaning. A discussion with the initial team of experts was made on whether the research should proceed with the Delphi repetition of three rounds of evaluation and convergence or a different approach would be used. It was decided that getting all the experts from three countries, from a variety of organizational and other differences through three rounds to agree on the hierarchy of CGTAs would be a tedious time consuming task. The approach taken was the addition of weighting factors that would give a much better approximation comparing to hierarchical preferences that could only be administered once. The hierarchical evaluation was not discarded from the questionnaires to help avoid possible mistakes in the weighting process.

3 Questionnaires for the evaluation of CGTAs, were administered to NPD project experts of the Technological Research Center[1] (TRC) of Thessaly in Greece, the CustoMediaLabs[2] company in both USA and Greece, and to individual NPD project experts in Denmark and Greece. The data have been subjected to non-parametric analysis for the identification of any differences between different group attributes and complexity. The questionnaire included the identification of the general attribute categories of [a] categorical (abilities, skills, knowledge) and [b] social (internal and external links). Diversity was also included, a categorical attribute that can produce social links and can be considered as hybrid since its measurement can be done either statistically or using SNA (Blanas *et al*, 2011). In the 1st round, out of the 70 questionnaires sent to TRC experts 28 valid questionnaires were received. Valid 1st round questionnaires from CML

[1] http://www.trc-thessalia.gr/index_eng.html
[2] http://www.customedialabs.com/

were 15 and out of 15 Danish experts 9 valid questionnaires were received.

Statistical Analysis

Friedman Tests for Identification of Critical General Team Attributes (CGTAs)

The Friedman test is the non-parametric alternative to the one-way repeated measures ANOVA. It is used in order to test the same questions – evaluations made by the same experts.

Table 2 is a reorganization of the final ratings in reverse hierarchical order (from max to min) and next to each CGTAs its relative mean rating is provided after the application of the relevant Friedman tests. The Friedman test results are at ,000% significance level.

Table 2: Hierarchical Ranking of CGTAs	
Critical General Team Attribute	**Ranking**
Team know-how, skills, expertise	5,33
Project manager Abilities	5,00
Members' external links with powerful stakeholders	4,56
Internal links between members	3,11
Members' external links with their parent organization[s]	1,89
Team diversity (race, age, sex, language, role)	1,11
Asymp. Sig	.000

Conclusions

The aim of this paper is to contribute to scientific knowledge on the impact of social networking aspects of project management (PM) teams to the effectiveness of new product development (NPD) projects. Both qualitative and quantitative approaches have been used. Interviews have been done and questionnaires have been given to project managers and members of new product development teams in Denmark, Greece and USA. The results have been investigated using experimental and quantitative information received from NPD project managers and members opinions from past experience.

IPMA (International Project Management Association) literature like PMBOK (Project Management Body Of Knowledge) concentrates on the iron triangle (cost, time, quality) and describes desired project manager's and team members' attributes (know-how, experience, abilities, diversity etc) but for the moment it leaves out relationships between people and organizations. In the list of general team attributes we can identify a category that relates to links that portrait possible relationships. We concentrate on the links within the project team and the links of the project team with their parent organisations and the rest of the stakeholders. We then rank each of these general team attributes as viewed by NPD managers and members in order to see the importance of the link related GSTAs as compared with the traditional GSTAs. Team diversity is a special attribute that is being measured

statistically and used in traditional project management but on the other hand is a source of development of possible relationships.

The identification and validation of the attributes has been done using a variation of the CSF methodology. Since this is the first such attempt to identify the CGTAs in the literature, more studies of this nature are required in order to validate the outcomes of the current research. Since these results have been produced with non-parametric tests bigger samples are desirable that would be sufficient for the application of the equivalent parametric tests.

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