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EVALUATION OF CRITICAL SUCCESS FACTORS FOR CONSTRUCTION PROJECTS – AN EMPIRICAL STUDY IN LITHUANIA

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ABSTRACT. This paper aims to identify a comprehensive list of critical success factors for construction projects in Lithuania. Based on the available literature review, this paper identified 71 success factors under 7 broad groups. Based on the survey results, ten factors including project manager competence, project management team members' competence, project manager coordinating skills, client clear and precise goals/objectives, project value, project management team members' relevant past experience, project manager organising skills, project manager effective and timely conflict resolution, client ability to make timely decision, and project manager experience were determined as the most important success factors for construction projects. These critical success factors are of great significance both to researchers and industry practitioners.

KEYWORDS: Construction projects; Critical success factors; Relative importance index; Ranking; Lithuania

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1. INTRODUCTION

The current global financial and economic crisis started in the middle of 2007 and had affected the whole world by 2008. After tremendous growth since 2000, first signs of global economic crisis showed up in Lithuania in 2008, while its major impact was noticed in 2009. Both real estate and construction sectors kept growth tendencies during 2000-2008. However, with a 14.8% drop in GDP in 2009, Lithuania's economy experienced the deepest crisis since the transformation of the planned economic system in the early 1990s (Bertelsmann Stiftung, 2012; Global Finance, 2012). Some industries, such as construction; trade, transport and communications; and the industry sectors were most affected by the crisis. In 2009, the gross value added within the construction sector decreased by 45.6 %,

in contrast to an increase of 1.9% in 2008. As for real estate activities, after an increase of income by 16.5% recorded in 2008, in 2009 a decline by 17.8% has been observed (in 2008 – LTL 3746.5 mill., while in 2009 – 3081.1 LTL mill.). In the whole of 2009, the volume of value added in real estate activities decreased by 3.8%, while compared to 2008 it increased by 13% (Statistics Lithuania, 2013b).

According to Statistics Lithuania (2013a), the gross domestic product (GDP) grew by 5.9% in 2011 and Lithuania returned to the ranks of the fastest growing economies in the EU after an interval of several years (Cedefop, 2012). Despite its growth over the past three years, the Lithuanian economy has not yet recovered to its pre-crisis level: in 2012 the national GDP was 2.4% lower than in 2007 and 5.2% lower than in 2008. Moreover, positive growth was observed in all economic activities, except for construction, which suffers from prolonged stagnation of real estate prices (Mauricas, 2013). The construction sector, one of the engines of economic growth in Lithuania over the last decade, is now facing with serious challenges as companies' closures, rising unemployment, and postponed or even cancelled investments. These events also have changed the developers' and construction companies' behaviour. A reduced demand and shortage of orders dramatically increased a competition between companies of the construction sector. This increased competition leads to more and lower bids, and the need for project management best practises that leads to success of project.

Construction sector plays a vital role in economic growth, development and economic activities. It is dynamic in nature due to the increasing uncertainties in technology, budgets, and development processes (Saqib et al., 2008). Success has always been the ultimate goal of every activity and a construction project is no exception. The construction sector has characteristics that sharply distinguish it from other sectors of the economy, causing the rate of failures to become very high (Elattar, 2009). Performance and productivity of a project has always been an important issue in the construction industry (Pheng and Chuan, 2006; Abdul-Rahman et al., 2011; Ghoddousi and Hosseini, 2012).

There is no an industry-accepted or standardised definition of project success because the fact is that individual project teams find themselves in unique situations, implying that their definition of success will differ from that of another project team. Project success is a topic that is frequently discussed and yet rarely agreed upon. The concept of project success has remained ambiguously defined in the construction industry. Project success is almost the ultimate goal for every project (Chan and Chan, 2004). Construction project development involves numerous parties, various processes, different phases and stages of work and a great deal of input from both the public and private sectors, with the major aim being to bring the project to a successful conclusion (Takim and Akintoye, 2002). The level of success in carrying out construction project development activities will depend heavily on the quality of the managerial, financial, technical and organisational performance of the respective parties, while taking into consideration the associated risk management, the business environment, and economic and political stability (Takim and Akintoye, 2002; Kim, 2010; Banaitienė et al., 2011).

Achieving success is a highly critical issue for the companies to survive in a competitive business environment. The construction industry is also an area where there is strong competition due to a large number of construction contractors (Arslan and Kivrak, 2008). Measuring a project's success is more than making sure it's completed. Doubts often arise about what and who really determine construction project success. According to Al-Tmeemy et al. (2010), project success is a strategic manage-

ment concept where project efforts must be aligned with both short and long-term goals of the company. Traditionally, success is defined as the degree to which project goals and expectations are met (Arslan and Kivrak, 2008; Elattar, 2009). Elattar (2009) observes that project success should be viewed from different perspectives of individuals and the goals related to a variety of elements, including technical, financial, education, social, and professional issues. Measuring project success is a complex task since success is intangible and can hardly be agreed upon. People also judge the success of projects differently depending on their personal objectives, and it can be the case that one person judges a given project a success, while another judges it a failure (Muller and Turner, 2007). Abdul-Aziz and Jahn Kassim (2011) examined objectives, success and failure factors of housing public-private partnerships in Malaysia. According to their study, the three success factors: organisation reputation, project reputation, and early completion are most important for public-private partnership housing projects.

Project success can be achieved through the good performance of project managers in the project. The researchers (Geoghegan and Dulewicz, 2008; Shahhosseini and Sebt, 2011; Yang et al., 2011; Keršulienė and Turskis, 2011; Nixon et al., 2012; Zavadskas et al., 2012) argue that human factors play an important role in determining the success of a project. Furthermore, the importance of stakeholder management in the success of the projects was recognized by many scholars (Yang et al., 2009; Cook-Davies, 2002; Niu et al., 2010).

Lim and Mohamed (1999) classified project success into two categories: the macro and micro viewpoints. They suggested that two criteria are sufficient to determine the macro viewpoint of project success: completion and satisfaction. Whereas the completion criterion alone is enough to determine the micro viewpoint of project success, a successful endeavour would result in enhanced worth so there is a need to explore the factors affecting project success. These factors are called critical success factors (CSFs). The term "critical success factors", in the context of projects and the management of projects, was first used by Rockart (1982). A construction project is completed as a result of a combination of many events and interactions, planned or unplanned, over the life of a facility, with changing participants and processes in a constantly changing environment (Saqib et al., 2008). Construction planners determine the sequence of the activities to complete a project. They treat an activity as a whole and identify the critical activities that require to be completed without any flexibility in time (Divakar and Subramanian, 2009). According to Bradley (2008), project success is defined as organizational impact and on time and on/under budget project completion. The perception of construction project success is dependent on project participants; scope, size, and complexity of a project; sophistication of the owner related to the design and construction of a facility, technological implications, and a variety of other factors.

Ahadzie et al. (2008) have introduced success criteria for mass house building projects, which included: environmental-impact, customer's satisfaction, quality and overall cost, and time. Al-Tmeemy et al. (2010) identified 13 critical success factors for building projects in Malaysia from the contractors' perspective. These criteria included: cost, time, quality, safety, achieving scope, customer satisfaction, technical specifications, functional requirements, market share, competitive advantage, reputation, revenue and profits, and benefit to stakeholder. Iyer and Jha (2005) identified 55 project success/project failure attributes. Critical success attributes included: project manager's competence; top management support; project manager's coordinating and leadership skill; monitoring and feedback by the participants; coordination among project participants;

and owners competence and favourable climatic condition. Critical failure attributes included: conflict among project participants; ignorance and lack of knowledge; presence of poor project specific attributes and non existence of cooperation; hostile socio economic and climatic condition; reluctance in timely decision; aggressive competition at tender stage; and short bid preparation time. Elattar (2009) proposed three sets of success criteria are viewed from the different perspectives of the client/owner, designer, and contractor.

Chan and Chan (2004) have proposed two groups of success factors for construction project success. The first group was objective measures, which were the issues of time, cost, safety, and environment. The second group was subjective measures, which comprised quality, functionality, and satisfaction of different project participants. Belassi and Tukel (1996) constructed a framework for critical success factors for projects which takes external factors influencing project success into account. The framework does not provide a single list of success factors but defines groups of success factors. Westerveld (2003) constructed The Project Excellence Model which consists of six result areas covering project success criteria and six organisational areas covering critical success factors. The model uses five different project types to describe the project organisation, giving guidance to the application of the model. Thi and Swierczek (2010) examined the relationship between project factors (external environment, project manager and team, organization, and project characteristics) and the successful performance of projects (cost, time, technical performance and customer satisfaction). Ng et al. (2009) identified 17 critical success factors for equipment-intensive subcontractors and through a factor analysis grouped into six components namely: market position, equipment-related factors, human resources, earnings, managerial ability to adapt to changes, and project success related factors. Mbachu and Nkado (2007) identified two groups of factors constraining successful building project implementation in South Africa. These were controllable (project characteristics, service providers' influences, client organisational influences) and uncontrollable (socio-cultural issues, unforeseen circumstances, economic and global dynamics, governmental/statutory controls) factors, depending on the extent to which they could be controlled by clients and project teams. Saqib et al. (2008) grouped critical success factors under seven main categories: project management factors, procurement-related factors, client-related factors, design team-related factors, contractor-related factors, project manager-related factors, business and work environment-related factors. Frodell et al. (2008) classified success factors under five groups: project (conformance with expectations, functionality, profitability, prediction on time, quality issues at hand-over, return on investment), environment (end-user satisfaction, supplier level of service, end-user participation, availability of resources, community involvement, economical environment), client (ability to make decisions, confidence in workmanship's ability, ability to brief), construction management (commitment, competence, commitment to time, cost and quality, ability to motivate, flexibility), workmanship (commitment, adequate competence, interaction with each other, team working, trust and confidence, learn from mistakes). The most important success factors have been identified as the user's participation, commitment to the project, high standard of quality consideration among the construction workforce and team working. Enshassi et al. (2009) identified 10 groups of factors as having influence on project performance in the Gaza Strip, these include: cost, time, quality, productivity, client satisfaction, regular and community satisfaction, people, health and safety, innovation and learning, environmental. Delays because of borders/roads closure leading to materials shortage;

unavailability of resources; low level of project leadership skills; escalation of material prices; unavailability of highly experienced and qualified personnel; and poor quality of available equipment and raw materials, however, was identified as the most significant of all the factors, having maximum influence on project performance. Arslan and Kivrak (2008) concluded 3 success factors leading to construction company success: business management, financial conditions, and owner/manager characteristics. Tan et al. (2007) identified six categories of KCIs for measuring contractors' competitiveness in Hong Kong construction industry: corporate image, technical ability, financing ability, marketing ability, management skills, and human resources strength. Belassi and Tukel (1996) have outlined a framework where they can be grouped into four interrelated areas: project, project manager and team members, organization and external environment. Yang et al. (2009) 15 critical success factors grouped into five dimensions namely, precondition factor, stakeholder estimation, information inputs, decision making, and sustainable support. All these five groups and their relationship were included in a framework for successful stakeholder management in construction projects.

Traditionally construction project success is measured using cost, time and quality performances. Dvir et al. (1998) indicate that project success factors are not universal for all projects and those different projects exhibit different sets of success factors, suggesting the need for a more contingent approach in project management theory and practice. This means that in order to develop a suitable model for all projects, we have use groups of success factors.

Based on an analysis of the literature that has been outlined earlier, it has become apparent that there is a plenty of factors with the potential to affect the project success. This paper aims to identify a comprehensive list of critical success factors of construction projects and quantitatively prioritize the factors contributing to the successful implementation of construction projects in Lithuanian construction companies based upon the respondents' perceptions.

2. RESEARCH METHODOLOGY

A questionnaire survey was designed by incorporating the applicable 71 factors affecting or enabling successful construction project performance. The questionnaire was divided into two parts. The first part comprised background questions about the respondents' individual and organisational information. The second part investigated the relative importance of each success factor to construction projects, according to the respondents' direct experience.

Based on a literature review and on our own experience, a total of 71 project success factors were established. For the purposes of the study, the success criteria were further classified into 7 groups: external factors, institutional factors, project related factors, project management/team members related factors, project manager related factors, client related factors, and contractor related factors. In the survey, the proposed success factors were rated by construction professionals and experts who have project management knowledge and related experience. The Likert scale was used to capture the importance, or weights, of the critical success factors for construction projects in Lithuania. A 5-point Likert scale was adopted, where 1 represents "not important", 2 – "less important", 3 – "important", 4 – "more important", and 5 – "most important".

The questionnaires were distributed via e-mail and personal delivery to increase the rate of response and sample representation. A total of 45 questionnaires were delivered to the respondents, 27 valid copies were retrieved giving a response rate of 60%.

To determine the relative ranking of the critical success factors, the scores were then

transformed to importance indices based on the following equation (Doloi, 2009; Iyer and Jha 2005; Zeng et al., 2005; Kazaz et al., 2008):

$$RII = \frac{\sum W}{A \times N} \quad (1)$$

where: W is the weight given to each factor by respondents, ranging from 1 to 5; A is the highest weight = 5; N is the total number of respondents.

Based on Equation (1), the relative importance index (*RII*) can be derived that ranges from 0 to 1. The questionnaire survey results are shown in Tables 1–7. The procedure, findings, and relevant discussion of the analyses are detailed in the following sections.

3. DATA ANALYSIS AND FINDINGS

Among the 7 success factors groups affecting construction projects, external factors were found as the least important group with an average index of 0.593, as can be seen in Table 1. Eight success factors were investigated in this group. Among all success factors within this group, the highest relative importance index (0.836) was given to economic environment and the least important is cultural environment with the relative importance index of 0.436. If 71 factors are totally considered, no single external factor is available among the top 10 factors.

Table 1. Summary of survey results on external factors

	RII	Rank in total	Rank in group
Economic environment	0.836	17	1
Social environment	0.582	68	5
Political environment	0.600	67	4
Physical environment	0.527	69	6
Technological environment	0.673	58	2
Legal environment	0.636	62	3
Cultural environment	0.436	71	8
Nature ecological environment	0.455	70	7
Average	0.593		

Institutional factors group ranked sixth with an average importance index of 0.723 (see Table 2). Four success factors were investigated in this group. Among all success factors within this group, the highest relative importance index (0.764) was given to construction regulations the least important is product and service certification with the relative importance index of 0.691. If 71 factors are totally considered, no single external factor is available among the top 10 factors.

Table 2. Summary of survey results on institutional factors

	RII	Rank in total	Rank in group
Construction permits	0.727	44	2
Construction regulations	0.764	37	1
Product and service certification	0.691	55	4
Standards	0.709	49	3
Average	0.723		

Project related factors group ranked fifth with an average importance index of 0.760 (see Table 3). Sixteen success factors were investigated in this group, and value with a *RII* of 0.909, planning with a *RII* of 0.836, profitability with a *RII* of 0.836, adequate funds/resources with a *RII* of 0.891, and procurement with a *RII* of 0.818 were ranked by the participants as the 5 most important projects success factors. If 71 factors are totally considered, only one project related factor (value) is available among the top 10 factors.

Table 4 illustrates the ranking of the project management/team members related factors. Among the 7 success factors groups affecting construction projects, project management/team members related factors were found as the second important group with an average index of 0.805. Eleven success factors were investigated in this group. The most important factor under this group is competence with relative importance index (0.945) and is ranked the first among the 71 success factors affecting construction projects. The next one relevant past experience with

relative importance index (0.891) and is ranked the sixth among the 71 success factors.

Table 3. Summary of survey results on project related factors

	RII	Rank in total	Rank in group
Value	0.909	5	1
Size	0.691	55	13
Clear and realistic goals/ objectives	0.818	25	5
Project type	0.655	60	16
Procurement	0.818	25	5
Complexity and uniqueness	0.745	41	8
Realistic schedule, urgency	0.709	49	10
Planning	0.836	17	2
Innovations	0.709	49	10
Materials and equipment	0.800	31	7
Supervision	0.709	49	10
Construction methods	0.691	55	13
Accidents	0.673	58	15
Profitability	0.836	17	2
Risk	0.727	44	9
Adequate funds/ resources	0.836	17	2
Average	0.760		

Table 4. Summary of survey results on project management/team members related factors

	RII	Rank in total	Rank in group
Relevant past experience	0.891	6	2
Competence	0.945	1	1
Trouble shooting	0.745	41	8
Decision making effectiveness	0.782	35	7
Control system	0.745	41	8
Motivation	0.836	17	4
Project organization structure	0.800	31	6
Good communication	0.818	25	5
Risk identification and allocation	0.727	44	10
Technical capability	0.855	12	3
Personnel issues	0.709	49	11
Average	0.805		

Among the 7 success factors groups affecting construction projects, project manager related factors were found as the most important group with an average index of 0.843, as can be seen in Table 5. Thirteen success factors were investigated in this group, and competence with a *RII* of 0.945, coordinating skills with a *RII* of 0.927, organising skills with a *RII* of 0.891, effective and timely conflict resolution with a *RII* of 0.891, and experience with a *RII* of 0.873 were ranked by the participants as the 5 most important projects success factors. When all 71 factors are considered, it is seen that there are 5 project manager related factors among the top 10 factors, namely the competence was the most important success factor, coordinating skills was 3, organising skills, and effective and timely conflict resolution were 6 ones.

Table 5. Summary of survey results on project manager related factors

	RII	Rank in total	Rank in group
Competence	0.945	1	1
Experience	0.873	10	5
Technical capability	0.818	25	9
Leadership skills	0.855	12	6
Motivating skills	0.855	12	6
Organising skills	0.891	6	3
Coordinating skills	0.927	3	2
Effective and timely conflict resolution	0.891	6	3
Adaptability to changes, management of changes	0.800	31	10
Delegation of authority and responsibility	0.800	31	10
Perception of role and responsibilities	0.727	44	12
Trust	0.727	44	12
Contract management	0.855	12	6
Average	0.843		

Table 6 shows the ranking of the client related factors. Among the 7 success factors groups affecting construction projects, client

related factors were found as the fourth important group with an average index of 0.770. Eight success factors were investigated in this group. Among all success factors within this group, the highest relative importance index (0.927) was given to clear and precise goals/objectives and the least important are influence and size with the relative importance index of 0.636. When all 71 factors are considered, it is seen that there are 2 client related factors among the top 10 factors, namely precise goals/objectives is ranked the third and ability to make timely decision is ranked the sixth.

Table 6. Summary of survey results on client related factors

	RII	Rank in total	Rank in group
Experience	0.764	37	5
Type (private vs. public)	0.655	60	6
Size	0.636	62	7
Influence	0.636	62	7
Ability to make timely decision	0.891	6	2
Clear and precise goals/objectives	0.927	3	1
Risk attitude	0.818	25	4
Ability to participate in different phases of project	0.836	17	3
Average	0.770		

Contractor related factors group ranked third with an average importance index of 0.774 (see Table 7). Eleven success factors were investigated in this group, and economic and financial situation with a *RII* of 0.873, technical and professional capability with a *RII* of 0.855, and experience with a *RII* of 0.836 were ranked by the participants as the 3 most important projects success factors. If 71 factors are totally considered, only one project related factor, namely economic and financial situation is available among the top 10 factors.

Table 7. Summary of survey results on contractor related factors

	RII	Rank in total	Rank in group
Company characteristics	0.764	37	7
Technical and professional capability	0.855	12	2
Experience	0.836	17	3
Economic and financial situation	0.873	10	1
Owner‘s management capability	0.636	62	10
Top management support	0.636	62	10
Quality issues	0.818	25	5
Health and safety conditions	0.764	37	7
Work conditions	0.709	49	9
Advanced technologies	0.836	17	3
Extent of subcontracting	0.782	35	6
Average	0.774		

4. CONCLUSIONS

Project success and project critical success factors have been discussed for a long period of time, but there is no an industry-accepted or standardised definition of project success or single list of critical success factors will ever be totally comprehensive. The paper proposes a prioritized list of the critical success factors that need to be considered to ensure successful construction project performance.

Based on a literature review, a total of 71 project success factors were identified. These factors affecting the construction project success were classified into 7 broad groups and further prioritized. Based on results of the survey, ten factors including project manager competence, project management team members' competence, project manager coordinating skills, client clear and precise goals/objectives, project value, project management team members' relevant past experience, project manager organising skills, project manager effective and timely conflict resolution, client

ability to make timely decision, and project manager experience, were determined as the most important success factors for construction projects in Lithuania. These critical success factors are of great significance both to researchers and industry practitioners and indicate clearly that project manager and project management team have the most significant role in supporting the successful implementation of construction projects.

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