Analysis of Critical Success Factors for Projects in Information Technology Sector in Bosnia and Herzegovina

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Abstract: *The purpose and objective of this research are to analyze project success factors in the Information technology sector in Bosnia and Herzegovina. Methods that were used during the research were conditioned by the problematics that are the subject of the research. The conducted research of critical success factors is quantitative. The research construct of project success influenced by critical success factors is tested. Necessary information about critical success factors was gathered using a questionnaire. During the results analysis phase for reliability and validity testing Confirmatory Factor Analysis was used, and for hypothesis testing the Structural equation modeling. Results of the research showed that the critical factors for IT project success in Bosnia and Herzegovina are competent project managers, technical background, project team, organizational support, and stakeholders. This research represents the first analysis of critical success factors for projects in the IT industry in Bosnia and Herzegovina. The limitation of this research is a smaller sample of examinees. This is the result of insufficient development of the IT industry and project management in Bosnia and Herzegovina.*

Keywords: *Project Management, Information Technologies, Project Critical Success Factors, Project success*

JEL Classification: *M11, M15*

Introduction

In the past 50 years, project management has been recognized as an effective instrument for solving new or complex activities. Avots (1969) introduced project management as a more efficient method for solving complex situations than traditional management approaches.

The introduction of new projects to the market requires companies to implement management techniques different from those used to conduct daily business activities (Munns & Bjeirmi, 1996). Introducing project management in a company enables the creation of a strategic advantage over competing companies, especially in high-risk sectors and markets (Project Management Institute, 2013). Investment in projects, and project management, represents a large financial venture for the company. Therefore, project success is fundamental for the project manager and the company. Previous research has demonstrated that different types of projects need to be managed in different ways to ensure their success (Shenhar & Dvir, 1996; Tishler et al., 1996; Balachandra & Friar, 1997; Dvir, et al., 1998; Shenhar, 2001).

The focus of this research is analyzing the critical success factors of the project. Many studies have attempted to determine the factors necessary for project success (Might & Fischer, 1985; Pinto & Slevin, 1987; Tishler, et al., 1996; Cooke-Davies, 2002; Jugdev & Müller, 2005). Daniel (1961) was the first to recognize the importance of critical success factors for managers. A more recent definition of critical success factors was established by Turner (2007), who commented that they are elements that increase the likelihood of project success. Although many studies have been conducted, success factors, which are common to all projects, have not yet been defined. Moreover, there is little consistency when determining the full range of factors influencing project success (Pinto & Slevin, 1987; Lechler & Gemunden, 1997).

The variables observed in this research are critical factors of project success and measures of project success. The success of the project, as well as the success of the company, largely depends on the environment in which the company operates. From this aspect, this research can significantly contribute to project managers, senior management, as well as other company departments that are in charge of control and supervision.

Following the defined subject of research, the following research objectives have been formulated:

- define the theoretical background of the concept of project success;
- create a conceptual model that will test the relationship between project success measures and critical success factors;
- improve existing knowledge on critical success factors for IT projects in transition countries;
- identify a set of factors that need special attention for the project to be successful;
- explore whether the "iron triangle" should be adhered to when measuring project success;
- provide guidance to project managers and directors of IT companies, who face the problem of project success daily.

Literature review

The literature review in this study was done on the principles set by Kitchenham et al. (2010), and it begins with planning the review itself, followed by research identification, article selection, data extraction, and finally data synthesis.

1. Planning a literature review

The protocol for systematic literature review provides that the research strategy is specified first. The literature review in this research includes the collection of articles in the field of project management, from various scientific journals (International Journal of Project Management, MIS Quarterly, Harvard Business

Review, IEEE Software, IEEE Transactions on Engineering Management, Management Science, International Journal of Business and Management, Information and Management, Research Policy and Project Management Journal). The Google Web, Google Scholar, Directory of Open Access Journals, Web of Science, Researchgate, and J-Gate were used to search for these articles on the Internet.

2. Research identification

Identifying certain terms and keywords that are related to the research topic is the first step. The keywords used in the search of scientific articles are "critical success factors", "project success", "critical success factors IT projects".

During this phase, 300 papers were identified while searching for the aforementioned keywords. The identified papers were analyzed based on titles, and in that phase, 28 papers were eliminated because they did not fully correspond to the field of research.

The remaining 272 papers were analyzed based on abstract reading, and 15 papers were eliminated because they focus exclusively on one project methodology.

The final phase of the analysis of works included 257 works, which remained after the elimination of works in the previous two phases. These papers were analyzed based on the full text, and during this phase, 22 papers were eliminated because they did not answer the previously identified research questions.

3. Selection of scientific articles

Three types of articles were included in this research:

- articles describing the results of empirical research (case study),
- articles in which the authors describe critical success factors based on their experience, and
- articles in which critical success factors were discussed, but the authors did not provide a summary list of these factors.

The reading of the articles was very studious, to avoid misinterpretations. When selecting the appropriate scientific articles, out of all published articles, conferences, and journals, two methods were used. The first is to create a list based on a review of abstracts and research conclusions, and the second is to pay attention to details after reading all the articles from the first list. A list of factors was created while reading the entire article.

4. Data extraction and synthesis

From the reviewed articles, the data that contained useful information on critical project success factors, project success criteria, and information linking critical project success factors and project success criteria were extracted.

Project success includes two components: the success criteria (the measure used to determine the success or failure of a project) and project success factor (the measure used to determine the elements of a project which, if affected, increase the probability of success) (Müller and Jugdev, 2012).

Project success criteria

Despite years of research, and many papers in the field of project management, there are still no universal criteria for determining project success (Ika, 2009; Pinto & Slevin, 1988; Baccarini, 1999). From the literature review, it can be seen that project success is an extremely complex subject that was perceived differently over time (Radujković, 2014; Müller & Jugdev, 2012; McLeod et al., 2012; Alderman & Ivory, 2011; Gunathilaka et al., 2013; Griffith et al., 1999; Atkinson, 1999).

The literature analysis shows that the success criteria, related to the time of project implementation, budget, and quality, are mostly mentioned in the literature as criteria necessary for the success of the project. The triangle that makes up these three criteria has been called the "iron triangle" in the literature (Barber, 2004).

The above parameters reflect the success of project management and can be measured during implementation, and at the very end of the project.

Cooke-Davies (2002) established the difference between project performance and project management performance. The success of the project means achieving all the goals of the project, while the success of the project management focuses only on achieving the criteria of the "iron triangle". This way of determining the success of a project is not precise and accurate enough, that is, it sometimes does not show the real situation (Steyn et al, 2013). This is due to situations where the project has met the requirements set for the budget and delivery time, but the customer is not satisfied with the delivered product.

The next criterion of success, which is mentioned as essential for the success of the project, is client satisfaction. This criterion is particularly prominent in research conducted in the last few years, such as research conducted by Serrador and Turner (2014), and Silva et al (2016a). The project manager, in a subjective way, determines whether the project is successful (Ika, 2009), while the company management, as a measure of project success, takes client satisfaction (Dvir et al, 2003).

The commerciality of the project, the satisfaction of the Stakeholder, the technical specification, and the requirements are the next criteria of success, which had many references. The commercial success of the project and the satisfaction of the Stakeholder are the criteria that are important for evaluation during the project implementation. The Stakeholder satisfaction criterion is also included as a scientific field of modern project management (PMI, 2013). The technical specification and requirements are stated in the sense that the satisfaction of the Stakeholder is compared with what is stated as their expectations and project objectives.
Criteria: functionality, strategic objectives, project utility, and project safety, are listed in the literature, as closely related to Stakeholder expectations and requirements, and show a new perspective on project success. These criteria are used when evaluating the success of a project after its completion.

Some research, as criteria for the success of the project, includes the satisfaction of the project team, the satisfaction of external collaborators, the perspective for further development, and the impact on the environment. What needs to be emphasized is that these criteria are viewed as extended cases of Stakeholder satisfaction, which further indicates the trend of adopting new project success criteria. Supplier efficiency and satisfaction are at the bottom of the project success criteria and are listed in only a few studies.

Critical project success factors

There is a large number of critical project success factors definitions in the literature, and therefore there is no unified concept around which all researchers in the field of project management agree.

Based on the literature reviewed the authors observed different groups of critical factors of project success during their research. The most researched critical success factors of the project are management support (Cooke-Davies, 2002; Andersen et al., 2002; Caldeira and Ward, 2002; Yeo, 2002; Westerveld, 2003; Turner, 2007; Silva et al., 2016b; Yong and Mustaffa, 2017) and clear project objectives (Poon and Wagner, 2001; Andersen et al., 2002; Caldeira and Ward, 2002; Yeo, 2002; Westerveld, 2003; Turner, 2007; Silva et al., 2016b; Yong and Mustaffa , 2017). Clear project objectives are presented as one of the most important factors of project success, as they represent the scope of the project, objectives, and directives to be adhered to during project implementation. Proper definition and understanding of the project and its goals, among all Stakeholders, are very important for the success of the project.
Also, management support gives special meaning to the project, and can significantly increase the chance of success of the project in its early stages.

The critical success factor of the project - communication skills (Yeo, 2002; Westerveld, 2003; Turner, 2007; Alias et al., 2014; Montequin et al., 2014; Osei-Kyei and Chan, 2015; Silva et al., 2016b; Yong and Mustaffa, 2017) and an accurate work plan (Turner, 2007; Alias et al., 2014; Montequin et al., 2014; Osei-Kyei and Chan, 2015), which is revised daily, are the following factors that have the highest number of

references. These factors are related to the basic processes during project implementation and can play a major role in project evolution.
It is important to emphasize that the monitoring of the work plan, and its daily revision, give the project manager and each of the Stakeholders the opportunity to be informed about the progress of the project, and to react in time if they notice a potential problem. Quality internal and external communication is also one of the priorities in project implementation.

Client participation in the project (Caldeira and Ward, 2002; Yeo, 2002; Westerveld, 2003; Turner, 2007), the qualified project team (Ofori, 2013; Wai et al., 2013; Montequin et al., 2014; Silva et al., 2016b), and leadership (Alias et al., 2014; Montequin et al., 2014; Osei-Kyei and Chan, 2015), are the following factors that have a major impact on project success.

Team occupancy (Caldeira and Ward, 2002; Ofori, 2013), known technology (Caldeira and Ward, 2002; Yeo, 2002), project sponsorship (Caldeira and Ward, 2002; Yeo, 2002), accurate budget estimate (Westerveld, 2003; Turner, 2007), good performance of external collaborators (Westerveld, 2003; Turner, 2007), training (Caldeira and Ward, 2002), project methodology and application of previously acquired experience (Turner, 2007), are factors of project success that do not occupy a high position and are not often referenced in research.

The relationship between project success criteria and critical project success factors

Analysis of the literature reveals that when researching critical success factors and their impact on project success, several authors do not consider project success criteria. When researching project success, authors who considered success criteria and critical success factors used the iron triangle (budget, schedule, and scope) as the success criteria. The iron triangle was either employed alone or expanded using additional criteria for project success.

Bellasi and Tukel (1996) aimed to define the effect of critical success factors on project performance. Before analyzing individual factors, they determined the group to which the factors belonged and subsequently combined the effects of these factors upon project success. They employed the iron triangle to measure project success. During their research, Bellas and Tukel asked project managers to identify the critical factors that influenced successful project completion. To examine the obtained results, they used descriptive statistics and multivariate analysis. Project success factors were ranked based on the frequency of repetition. The results indicated that regardless of the observed project success measure, factors related to organizational and technical aspects of project management were dominant for having a successful project. The research also demonstrated that company-related factors were fundamental for project success, while factors related to project managers' performance were found to be irrelevant.

Cooke-Davies (2002) addressed the following research questions:

- What factors are important to the success of project management?
- What factors are important for the success of a project?
- What factors lead to projects always being successful?

Unlike Bella and Tukel, Cooke-Davies did not use specific criteria as a measure of project success but took a subjective view of the project manager, which was presented as a limitation of the research. Analyzing projects and interviewing project managers, resulted in defining twelve project success factors that had been implemented in large multinational or national companies. The research demonstrated that of the twelve factors, only three were crucial for project success, while the remainder focused on successful project management. The following factors were identified as important for project success: risk management, accurate daily planning and revision, and learning from previous experience.

White and Fortune (2002) published research employing the same method as Bellasi and Tukel (1996), the iron triangle, to measure project success. The research aim was to explore the experiences of individuals actively involved in project management. In addition, the following objectives were included in the research:

- to identify a common criterion for defining project success; and

- to establish a list of critical success factors for the project.

The results revealed that clear project objectives and accurate budget assessment were factors critical to project success. This finding is in line with project success measures. Additional key factors included management support, a qualified team, and communication skills.

Westerveld (2003) sought to link project success criteria and critical success factors into one coherent model. Like Bella and Tukel, and White and Fortune, he used the iron triangle as criteria for project success and identified two additional criteria during the research: customer satisfaction and stakeholder satisfaction. Westerveld presented a model that used a case study approach to test the relationship between project success criteria and critical project success factors. The results indicated that the critical factors for project success were related to the following project success criteria: leadership, a qualified team, stakeholders, and project risk. Improving these critical factors increased project functionality and success within a company.

Crawford et al. (2005) examined trends in project management explored by previous researchers. Their research used keyword analysis and covered a period of 10 years, from 1994 to 2003. The results revealed developing trends in project management and identified the critical success factors influencing project success. The research demonstrated a decreasing focus on interpersonal skills and quality management and increasing focus on project evaluation and improvement project implementation. A synthesis of the results revealed the importance of continually managing resources (such as time and costs) and risk.

Fortune and White (2006) revised previously identified critical success factors by analyzing the results of 63 studies and created a list of critical project success, basing the results of repetition frequency. They concluded that there was an overlap between groups of factors, whereas the list of individual critical success factors differed greatly. The following three factors were most frequently discussed in the literature: the importance of management support, clear goals, and an effective project plan.

Ofori (2013) analyzed the critical success factors previously identified as most important for project success. The researcher focused on critical success factors identified by analyzing the literature and cross-tabulation and aimed to explain the relationships between the critical success factors. Although Ofori did not specify the criteria used for measuring project success in the research, several participants referred to the iron triangle criteria, which is in line with research conducted by Bellasi and Tukel (1996).

Analyzing the research conducted so far, it may be observed that qualitative research did not consider project success criteria. In quantitative research, however, authors set measurable determiners of project success and specified the criteria influencing project success. This observation is indicative of the need to employ quantitative research methods in this study to examine the impact of critical success factors on project outcomes using specified, measurable criteria.

Methodology

The study population comprised project managers employed in IT companies located in Bosnia and Herzegovina. Project managers were chosen as the research focus because, due to insufficient development in the IT industry and project management as a discipline, the results of previous research cannot be applied to everyday practice within an observed business environment. Furthermore, in the Bosnian and Herzegovinian IT sectors, all projects are undertaken for foreign markets, which further distinguishes this study from previous research.

In this study, all questions were answered only by project managers since team members lacked sufficient insight into project success factors. Focus groups included project managers with work experience ranging from 3 to 15 years. The sample consisted of 110 project managers employed in IT companies with 50+ employees in major cities in Bosnia and Herzegovina (Sarajevo, Mostar, Tuzla, Zenica, and Bihac).

Although the original aim was for project managers to complete separate questionnaires for each project, in line with the definition of a medium-sized project in the IT industry in Bosnia and Herzegovina, this method was avoided to prevent data heterogeneity.

The classification of a medium-sized project was taken from research conducted by Du Randt et al. (2014). The managed projects were evaluated based on six characteristics with a maximum of 100 points. Those projects rated between 40 and 60 points were identified as medium-sized projects.

The research was conducted using a questionnaire which was taken from Du Randt et al. (2014) research and contained sets of questions divided into 3 categories and 21 subcategories. The first category included demographic data, the second category related to critical success factors, and the third category was dedicated to perceptions of success and measuring project success.

A Likert scale with five divisions was used in the second and third categories. To avoid participant bias when answering the questionnaire, questions were focused on specific projects managed by the participants. The projects were managed between 2016 and 2018.

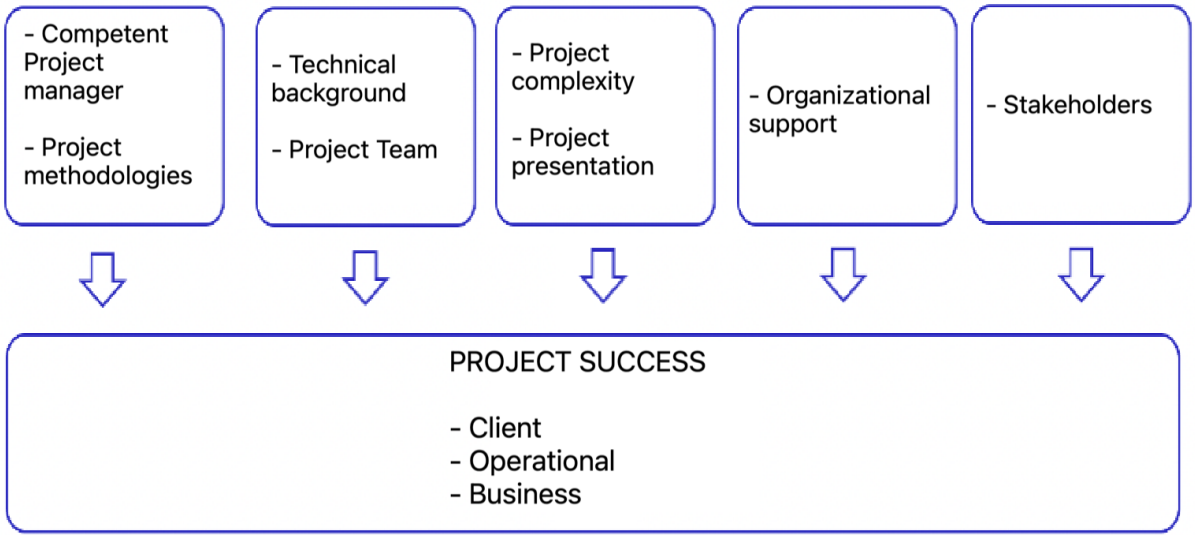
During this research, project success will be measured by the criteria suggested by Tishler (1996). He stated that the success of the project is viewed from three points of view:

- client's - the project met the functional and technical specifications,
- operational - the project met the projected budget, and
- business - the project met the anticipated time frame.

The aforementioned project success measures have been used, and validated in later research, as criteria for project success (Belassi and Tukel, 1996; White and Fortune, 2002; Westerveld, 2003; Ofori, 2013).

Based on the critical success factors of the project, and the project success criteria, a conceptual framework was created, shown in the following figure, which will be used during the research:

Figure 1. Research Conceptual framework



The research, conducted on a conceptual framework, relies on the aforementioned theories that a competent project manager, application of project methodologies, technical background, project team, project complexity, project presentation, organizational support, and Stakeholders, affect project success which is measured by the "iron triangle" criterion (Belassi and Tukel, 1996; White and Fortune, 2002; Westerveld, 2003; Ofori, 2013).

Hypothesis formulation

Considering the previous research and the set conceptual framework, the following research questions and hypotheses were formed.

Q1: The first research question relates to the competence of a project manager - that is, whether, and to what extent, a competent project manager influences the success of medium-sized and complex projects in the IT industry in Bosnia and Herzegovina. The factor "competent project manager" in this research includes leadership skills, communication skills, and application of previously acquired experience. Jiang, Klein & Margulis (1998) stated that the project manager is the most important factor for the successful realization of a project. Subsequent research has confirmed their claim that the project manager is one of the basic factors contributing to the success of a project (Turner & Müller, 2005; Krahn & Hartment, 2006; Jha & Iyer, 2007). Based on the formulation of the research question, and the results of previous research, the following hypothesis is set:

- H1: Competent project manager influences project success

Q2: The second research question relates to the application of project methodologies in project implementation - that is, whether and to what extent project methodologies affect the success of medium-sized and complex projects in the IT industry in Bosnia and Herzegovina. The application of project methodologies implies that an accurate work plan has been created and that based on previous experience with project methodologies, the right choice of project methodology has been made. In their 2016 study, Joslin & Müller confirmed that project methodology is essential to project success, which was consistent with previous research (Belassi & Tukel, 1996; Zwikael & Unger-Aviram, 2010). Based on the formulation of the research question, and previous research, the following hypothesis is set:

- H2: The application of project methodologies affects the success of the project

Q3: The third research question relates to the technical background of the team, that is, whether the team is sufficiently qualified, as well as whether the team has enough members. The research attempts to determine whether the aforementioned team characteristics affect the success of medium-sized and complex projects in the IT industry in Bosnia and Herzegovina. The experience of team members and their technical background is related to project performance (Bandura, 1986; Barrick et al., 1998), and can influence project success. To improve project success, companies can start assigning more experienced team members to projects, that is, team members who have more knowledge in the field of the project (Pinto and Slevin, 1987, a; Pinto and Covin, 1989). Project teams with a larger technical background can solve operational and technical problems more quickly, which increases the speed of project implementation and its success (Clark & Fujimoto, 1991; Atuahene-Gima, 2003). Based on the formulation of the research question, and previous results, the following hypothesis is set:

- H3: The technical background affects the success of the project

Q4: The fourth research question relates to the project team, ie whether team occupancy affects the success of medium-sized and complex projects in the IT industry in Bosnia and Herzegovina. Banister-Hazama, Moreci, and England stated in their research in 2012 that the larger the number of team members, the greater the possibility of an error on the project. In the same research, they stated that it is important that every role in the team is filled, and that every member of the team takes responsibility for the success of the project. Alexandrova and Ivanova-Stankova (2013) in their research confirmed the assumption given by Turner in 2007 that the personal goals and characteristics of each team member should be considered a vital component, not only of the overall organizational culture but also one of the essential factors of a successful project team, which is key to the success of the project. Based on the formulation of the research question, and previous research, the following hypothesis is set:

- H4: The project team influences the success of the project

Q5: The fifth research question relates to the complexity of the project, ie whether the known technology and clear project objectives affect the success of medium-sized and complex projects in the IT industry in Bosnia and Herzegovina. Banister-Hazama, Moreci, and England (2012) stated in their study that as the complexity of a project increases, so does the number of interactions within work teams. As the interaction increases, so do the risk of project failure, as the success of the project is affected by several factors. Silva et al. (2016b) conducted a study of critical project success factors by analyzing previous research and concluded that one of the factors influencing project success and - clearly defined project objectives and that it is one of the factors that can be influenced within the company. Young and Mustaffa (2017) also confirmed the importance of clearly defined project objectives. They state that one of the most important factors for project success is understanding the project, which means that the goals, priorities, client

requirements, and interests of all Stakeholders are clearly defined, but also that the project plan is clear. Based on the formulation of the research question, and previous research, the following hypothesis is set:

- H5: Project complexity affects project success

Q6: The sixth research question concerns the presentation of the project, ie whether the correctly estimated project and its budget, affect the success of medium-sized and complex projects in the IT industry in Bosnia and Herzegovina. Accurate budget estimation is one of the critical success factors identified very early in research (Baker et al., 1983; Cleland and King, 1983; Morris and Hough, 1987). Turner (2007) cites accurate project budget estimation as one of the key factors of project success and presents budget estimation as one of the most important strategies for achieving the projected project objectives. Wurtemberg et al. (2011) in their research state that budget assessment can affect project success, in the sense that if an accurate assessment is not made and appropriate expectations are not set at the beginning, then the client and management may consider the project unsuccessful if it does not meet the assessment. Based on the formulation of the research question, and previous research, the following hypothesis is set:

- H6: Project presentation affects project success

Q7: The seventh research question refers to organizational support, ie whether management support, well-organized organizational structure, involvement of the main investor, and enabled training in the project area and technology, affect the success of medium and complex projects in the IT industry in Bosnia and Herzegovina. A review of the literature has shown that the success factor "management support" is the most mentioned in all research, and there is a consensus among scientists who have done previous research (some of them are: Taylor, 2000; Thite, 2000; Poon and Wagner, 2001; Cooke-Davies, 2002; Andersen et al., 2002; Caldeira and Ward, 2002; Yeo, 2002; Westerveld, 2003; Turner, 2007; Silva et al., 2016b; Yong and Mustaffa, 2017). Based on the formulation of the research question, and previous research, the following hypothesis is set:

- H7: Organizational support affects the success of the project

Q8: The eighth research question refers to stakeholders' participation in project implementation, ie whether client involvement and good performance of external collaborators affect the success of medium-sized and complex projects in the IT industry in Bosnia and Herzegovina. The influence of Stakeholders on project success is one of the most discussed factors in the literature. The influence of Stakeholders on project success has been recognized as an essential factor for project success even in the earliest research on critical project success factors (Baker, Murphy & Fisher, 1983; Kerzner, 1998). The importance of Stakeholders for the success of the project was also confirmed in later research (Caldeira and Ward, 2002; Yeo, 2002; Westerveld, 2003; Turner, 2007). Based on the formulation of the research question, and previous research, the following hypothesis is set:

- H8: Stakeholders affect the success of a project

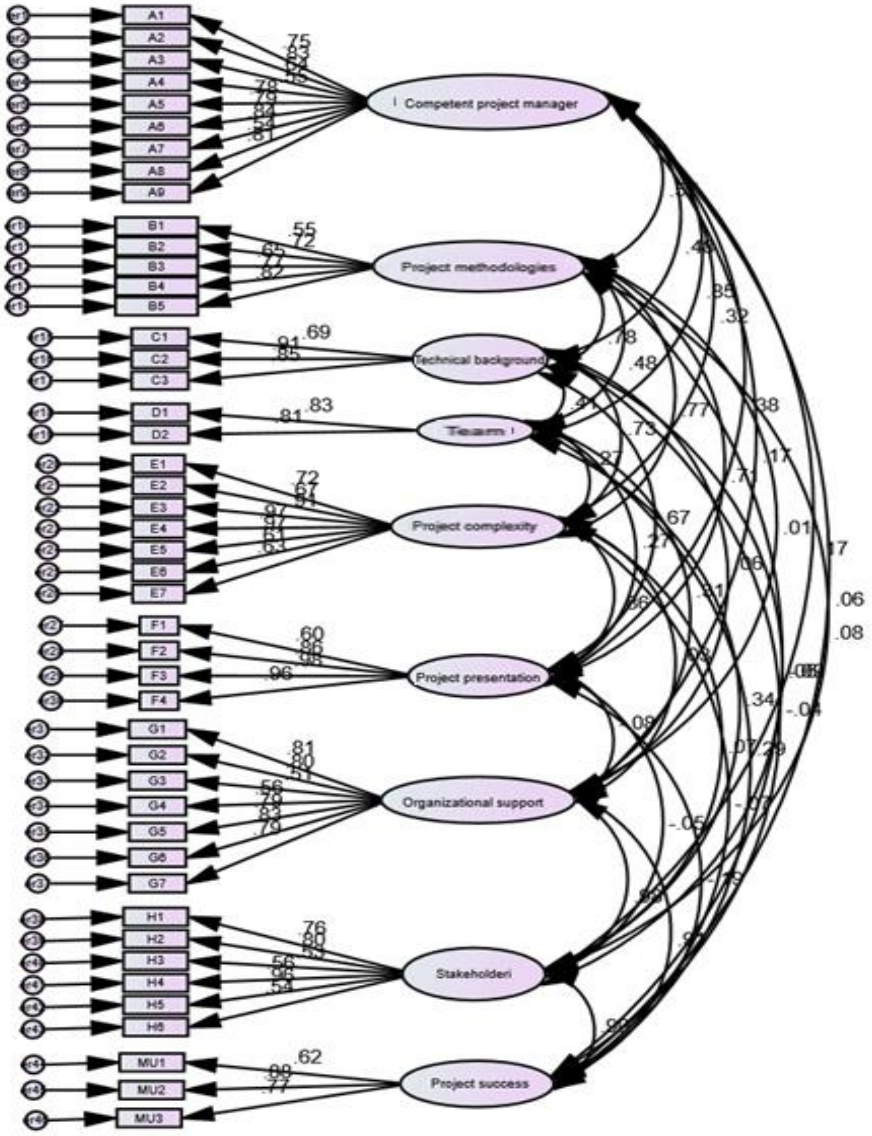
Although the number of research participants was relatively small (110 project managers), the results were analyzed using structural equation modeling (SEM). The small number of respondents was due to underdeveloped project management in Bosnia and Herzegovina, resulting in a small number of project managers within IT companies. Wolf et al. (2013) demonstrated that SEM can be used to analyze results in samples ranging from 30 (simple CFA with four indicators and a load of 0.80) to 450 cases (mediation models). The number of cases analyzed in this study was consistent with the results obtained by Wolf et al. (2013).

The data were analyzed using statistical software such as SPSS and Amos. These programs are commonly used in statistical research in the field of project management. Confirmatory factor analysis (CFA) was used to test reliability and validity.

Results

After checking the measurement scale's reliability, a CFA model was created. The model presented in the following figure, Figure 2, is a measurement model and reveals the analysis path, regression coefficient, and covariance values between latent variables.

Figure 2. Measurement model for CFA



Validation of CFA model

To check the validity of the defined CFA model, values for the convergent and discriminant validity of the model were calculated. The correlation and statistical significance between latent variables (factors) are shown in the following table. The conditions for the model to be valid are:

- beta values greater than 0.5, and
- derived variance average (AVE) values greater than 0.5.

AVE values greater than 0.5 indicate good convergent validity, as they suggest that the latent construct explains 50% or more of the variance of the associated manifest variables. The discriminant validity of a latent construct is proven if the square roots of the AVE of an individual latent construct are greater than the value of its correlation with other latent constructs in the measurement model (Agić, 2018).

The following table, Table 1, and calculations of correlations and statistical significance between latent constructs show that the results of the analysis are valid.

Table 1. Model validity calculation

	AVE	Project Success	Competent PM	Project Methodologies	Technical Background	Project Presentation	Project Complexity	Organizational Support	Stakeholders	Team
Project Success	0.538	***0.733***								
Competent PM	0.503	0.572	***0.709***							
Project Methodologies	0.676	0.481	0.407	***0.822***						
Technical Background	0.674	0.653	0.478	0.403	***0.821***					
Project Presentation	0.633	0.318	0.356	0.727	0.274	***0.796***				
Project Complexity	0.742	0.384	0.315	0.673	0.273	0.768	***0.861***			
Organizational Support	0.546	0.165	0.015	0.062	0.312	0.025	-0.078	***0.739***		
Stakeholders	0.504	0.171	0.084	0.056	0.345	0.067	-0.050	0.625	***0.710***	
Team	0.585	0.065	-0.092	-0.036	0.292	-0.072	-0.191	0.642	0.567	***0.765***

Calculation of GoF for CFA model

After determining the validity of the CFA model, it was necessary to verify the model's representativeness by calculating the Goodness of Fit (GoF). The following GoF indices were observed:

- X2 / df is an index of freedom levels. This index is used to compare the observed covariance matrix with an estimated covariant matrix, assuming that the tested model is correct.
- The comparative fit index (CFI) represents a relative improvement in a hypothetical model's adequacy.
- The root means a square error of approximation (RMSEA) is an index representing the root of the mean value of the square of the approximation error, which estimates the difference between the observed and estimated covariant matrix of the population.

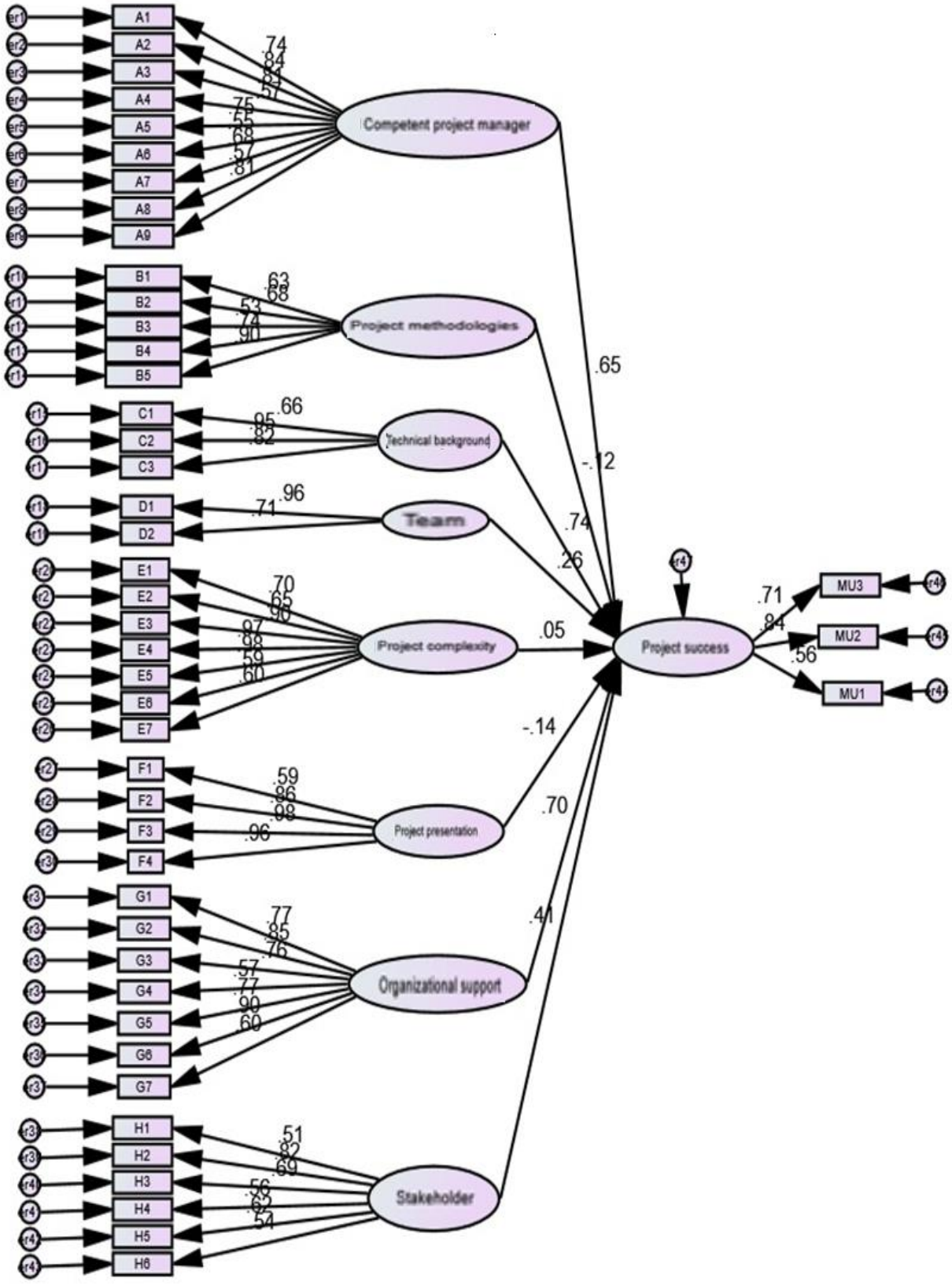
The GoF index values for the CFA model are presented in Table 2.

Table 2. GoF index value for CFA model

Fit index	Recommended value	Hypothetical model
X^2 / df	Less than 3	2.511
CFI	0 (does not match) and 1 (matches)	0.934
RMSEA	<0.05 - fits very well 0.05 - 0.08 - fits pretty well 0.08 - 0.10 - corresponds > 0.10 does not match	0.076

Based on the measurement model presented earlier, the structural model is specified in the following figure, Figure 3.

Figure 3. Representation of the structural model



Calculation of GoF for SEM model

The GoF index values for the structural model are presented in Table 3.

Table 3. GoF index value for structural model

Fit index	Recommended value	Hypothetical model
X^2 / df	Less than 3	2.628
CFI	0 (does not match) and 1 (matches)	0.914
RMSEA	<0.05 - fits very well 0.05 - 0.08 - fits pretty well 0.08 - 0.10 - corresponds > 0.10 does not match	0.072

Based on the values shown in Table 3, it can be concluded that the observed model is representative.

The results of the hypothesis testing are shown in the following table, Table 4. The columns in the table represent the standardized beta coefficient, the non-standardized expected value (Estimate), standard error (SE), critical ratio (CR), and statistical significance in the form of the p-value (p-value). For p values that are less than 0.05 the hypothesis is rejected, and for values that are greater than or equal to 0.05, the hypothesis is accepted. Hypothesis H6 is not supported because p = 0.09 is at the significance limit, while in cases when p > 0.09 the hypotheses are rejected.

Table 4. Results of hypothesis testing

Hyp.	Relation	B	Estimate	S.E.	C.R.	P	Result
H1	ProjectSuccess ← CompetentPM	.653	.706	.159	4.438	< .001	Supported
H2	ProjectSuccess ← ProjectMethodologies	-.118	-.087	.063	-1.372	.170	Rejected
H3	ProjectSuccess ← TechnicalBackground	.742	.836	.250	3.347	< .001	Supported
H4	ProjectSuccess ← Team	.257	.283	.100	2.833	.005	Supported
H5	ProjectSuccess ← ProjectComplexity	.048	.056	.094	.597	.550	Rejected
H6	ProjectSuccess ← ProjectPresentation	-.136	-.111	.066	-1.678	.093	Rejected
H7	ProjectSuccess ← OrganizationalSupport	.702	1.215	.361	3.364	< .001	Supported
H8	ProjectSuccess ← Stakeholder	.414	.452	.137	3.310	< .001	Supported

Analysis of result shows that hypotheses H1, H3, H4, H7, and H8 are supported by this research, whereas hypotheses H2, H5, and H6 are rejected.

Confirmation of hypothesis H1 (i.e., a competent project manager influences project success) supports previous research. Jiang, Klein, and Margulis (1998) observed that the project manager is the most important factor for successful project realization. Subsequent research has confirmed that the project manager is among the basic factors contributing to project success (Turner & Müller, 2005; Krahn & Hartment, 2006; Jha & Iyer, 2007). Team members' experience and technical background are related to project performance during implementation (Bandura, 1986; Barrick et al., 1998) and can influence project success. To improve success, companies can assign more experienced team members (i.e., team members with greater knowledge in the project field) to particular projects (Pinto and Slevin, 1987a; Pinto and Covin, 1989). Project teams with a technical background can solve operational and technical problems more

efficiently, increasing the speed of implementation and project success (Clark & Fujimoto, 1991; Atuahene-Gima, 2003). Based on the results of the aforementioned research, the confirmation of hypothesis H3 (technical background affects project success) is in line with previous research findings. This study also confirmed hypothesis H4 (the project team influences project success). Alexandrova and Ivanova-Stankova (2013) argue that the personal goals and characteristics of each team member should be considered as vital components, not only of organizational culture but also of successful project teams. The confirmation of hypothesis H7 (organizational support affects project success) is in line with previous research. As stated in the theoretical framework, based on the literature review, the management support factor is most widely discussed in previous research, and authors agree regarding its contribution to project success (Taylor, 2000; Thite, 2000; Poon and Wagner, 2001; Cooke-Davies, 2002; Andersen et al., 2002; Caldeira and Ward, 2002; Yeo, 2002; Westerveld, 2003; Turner, 2004; Silva et al., 2016b; Yong and Mustaffa, 2017). Stakeholder influence upon project success is also widely discussed in the literature. The confirmation of hypothesis H8 (stakeholders affect project success) is consistent with the results of the earliest research (Baker, Murphy & Fisher, 1983; Kerzner, 1998). The importance of stakeholders for project success was also recognized in later research by Caldeira and Ward (2002), Yeo (2002), Westerveld (2003), and Turner (2007).

This study's rejection of hypothesis H2 (the application of project methodologies affects project success) is consistent with the results of previous research, which demonstrated that effective implementation of the project methodology did not guarantee project success (White & Fortune, 2002; Davies & Hobday, 2005). Emam and Koru (2008) demonstrated that there was no connection between project complexity and project success, which is in line with the results of this research and confirms the rejection of hypothesis H5 (the complexity of the project affects project success). Project presentation considers whether the project was completed within the planned budget, and hypothesis H6 predicts that this factor significantly affects project success. In the Bosnian and Herzegovinian IT industries, most projects are agile and based on time and material models. The time and material model represent projects for which the budget is not predetermined; instead, the client pays for the number of hours the developer spends on project implementation. In such models, project success is not affected by whether or not the project is completed within the planned budget. Therefore, the rejection of hypothesis H6 (presentation affects project success) is expected and consistent with previous research (PMBOK, 2013; Gray & Larson, 2014).

Conclusion

This research presented critical success factors of a project for medium-sized projects in the IT industry in Bosnia and Herzegovina. Each of the elements of the research offered indicative conclusions and opened additional questions and pointed out the still insufficiently researched area of project management. The analysis of the research results answered all the questions that were defined at the very beginning of the research.

The results showed that, out of the critical success factors which were defined by previous research, the following factors have the greatest impact on the success of medium-sized projects in the IT industry in Bosnia and Herzegovina:

- technical background of the team,
- competent project manager,
- Stakeholders,
- organizational support, and
- project team.

The factors listed in previous research, for which the results showed that they have no impact on the success of the project in the observed environment, are:

- project methodologies,
- project complexity, and
- project presentation.

The practical implication of this research is the possibility of applying the obtained results in the daily work of project managers in Bosnia and Herzegovina. Given that the research identified critical success factors for medium-sized projects in the IT industry in Bosnia and Herzegovina, it provides project managers, but

also owners and directors of IT companies, with insight into the areas in which they need to invest for projects to be successful.

Limitations and Future work

The results and limitations of this empirical study imply several recommendations for further research:

1. Since this research employed the iron triangle as a measure of project success, the first recommendation for future research is to examine the extent to which critical success factors affect project success, in IT companies in Bosnia and Herzegovina, when taken as a measure of success in a model that anticipates the multidimensionality of project success.
2. The second recommendation refers to the type of projects observed during this research. The focus of this research was medium projects. Hence, the same research applied to both small and large projects is recommended to determine whether the critical success factors are the same for projects of different sizes.
3. The third recommendation relates to the research field. Future research should examine whether companies from other industries in Bosnia and Herzegovina must consider the same critical factors for project success.

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