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Project planning and risk management as a success factor for IT projects in agricultural schools in Serbia

Vuk Vujović [a], Nebojša Denić [b], Vesna Stevanović [a], Mališa Stevanović [a], Jelena Stojanović [a], Yan Cao [c], Yasir Alhammadi [d], Kittisak Jermsittiparsert [e,f,*], Hiep Van Le [g], Karzan Wakil [h,i], Ivan Radojkovic [j]

[a] Faculty of Information Technology, Alfa BK University, Palmira Toljatija 3, 11070 Belgrade, Serbia
[b] Univerzitet u Prištini, Prirodno matematički fakultet, Kosovska, Mitrovica, Serbia
[c] School of Mechatronic Engineering, Xi'an Technological University, Xi'an, 710021, China
[d] Department of Civil Engineering, College of Engineering, Prince Sattam bin Abdulaziz University, Al-kharj, 11942, Saudi Arabia
[e] Informetrics Research Group, Ton Duc Thang University, Ho Chi Minh City, Vietnam
[f] Faculty of Social Sciences and Humanities, Ton Duc Thang University, Ho Chi Minh City, Vietnam
[g] Institute of Research and Development, Duy Tan University, Da Nang, 550000, Vietnam
[h] Research Center, Sulaimani Polytechnic University, Sulaimani, 46001, Kurdistan Region, Iraq
[i] Department of Computer, College of Science, University of Halabja, Halabja, 46018, Kurdistan Region, Iraq
[j] Dunav Voluntary Pansion Funs, Serbia

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ABSTRACT

Enterprises and business systems are introducing modern information and communication technologies into their organizations to improve their business processes and gain a competitive advantage. Theoretical research, as well as research carried out in practice, unambiguously indicate that companies take this step without the necessary professional analysis of business processes and insufficient knowledge of the project management methodology. Also, in this area there is a lack of adequate literature, especially in the field of information technology (IT) project management. This paper provides a new approach for research in the field of project management throughout a studious analysis of risk management in IT projects. To confirm hypotheses, this paper examines and outlines concrete IT management solutions in business systems with emphasis on education organizations, which leads to business improvement and achievement of positive business results.

1. Introduction

Modern companies' business and business systems are based almost exclusively on projects management. For this reason, knowledge and skills in project management become an increasingly important resource for every successful company. Projects are usually multidisciplinary and therefore project management involves a large number of complex activities in planning, coordination and control from different areas of business: sales, marketing, IT, etc.

The project is usually defined as a one-off venture, undertaken to create a unique product, service, or other particular result [1]. However, this definition only indicates some basic characteristics of the project. Wysocki [2] described the project as a series of unique, complex and interconnected activities, with one goal or purpose, which must be achieved at a given time and budget and in accordance with the specifications. The project can also be the realization of a new venture in terms of risk and uncertainty, competition with the necessary resources, in a certain period of time, with a defined cost price and the required quality [3].

Today, all major business systems tend to project their activities and thereby gain a competitive advantage. The efficiency of modern business depends to a great extent on the application of information technologies (IT) in solving complex business tasks and projects. According to Schwalbe [4], IT projects are those that use certain hardware, software and the network to create an informational product, service, or result. In practice, the IT project can be realized by introducing the information system, introducing new hardware and/or software solutions and as a training for users. Project management is the leading tool

* Corresponding author. Department for Management of Science and Technology Development, Ton Duc Thang University, Ho Chi Minh City, Vietnam.
E-mail address: kittisak.jermsittiparsert@tdtu.edu.vn (K. Jermsittiparsert).

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chosen to implement the strategy and achieve key business goals. Therefore, this is no longer the sole responsibility of the individual - the project manager, but the entire company, including the leading management. About 60% of leading executives believe that a strong discipline of project management should be among the three most important strategic priorities for their company in the future [5]. Project management has, as a scientific discipline, evolved over time from a set of desirable processes in the organization, to a structured methodology that is necessary for the survival of the company.

Although project management gets important, many projects do not achieve the set goals. This is especially true for IT projects, where projects are unsuccessful regardless of the way they are organized. In 2017, only 34% of the projects were completed on time and 42% within the planned budget [6]. The situation improved slightly in 2018, when 40% of the projects were completed on time and 46% within the budget [7]. Different approaches to project management adopt various project success criteria [8]. Some authors [9] have the view that it is the responsibility of the management team to determine what is appropriate and applicable to a particular project. The most common reasons for the failure of the IT project are [10]: incomplete defined project goals, poor planning and assessment, inadequate project methodology or its disadvantage, lack of understanding of clients' demands, communication problems between the contracting authority and IT experts and unrealistic expectations of the contracting authority. The rapid development of technology has a great impact on the complexity of the IT project. The process of managing an IT project can be divided into the following phases [11]: designing, defining requirements, planning, design, production, delivery. Success or failure of the project depends on the readiness and knowledge used in project management.

To reduce the risk of project failure, risk planning and project risk management is of great importance. Risk is always associated with some loss or unfavorable outcome. The known risks are those that are detected and analyzed and can be proactively managed [12]. Risk management processes [4] are defined as follows:

- Planning of risk management,
- Risk identification
- Qualitative risk analysis,
- Quantitative risk analysis,
- Planning a risk response,
- Monitoring and risk control.

Planning a risk management involves the development of a quality plan. The best way to identify risks [13] emphasizes brainstorming with the team, because the collective knowledge and experience of people is greater than the knowledge and experience of an individual. The other method or technique to be prepended is the Ishikawa diagram or the diagram of causes and consequences. The software tool itself can not replace this knowledge, but it can save time and at the same time manage it efficiently, as it can simplify otherwise complex tasks. The main advantages of using software tools for project management are to increase efficiency [14]. Many companies opt for the purchase of software project management tools without a detailed consideration of their specific needs and requirements. There are many such tools and providers on the market, so buying the right is not at all easy. Some software packages or software tools are designed for large, complex projects, while others focus on simple projects. Often, one tool or software package does not meet all the needs of project management. Thus, when projects become more complex, it increases the need for appropriate software that will allow to manipulate large amounts of data generated during the life cycle of the project. When projects have IT support, this will enable the collection, storage and processing of data to support decision-making [15–27]. Software tools can also significantly contribute to better communication [28].

The IT projects could drive business success and ultimately impact global socio-economic dynamics [29]. This could happen both internally through how firms operate but also externally with connections to consumers and the digital world we live, work, and interact [30]. Funding of techno-entrepreneurship projects could gain ground for the societies [31]. In study [32] has been identified adequate training and resistance to change as leading obstacles to IT deployment processes.

Table 1
The demographic characteristics of the sample.

Gender	Number of respondents	%
Male	10	58.82
Female	7	41.18
Education level	**Number of respondents**	**%**
High school or lower	4	23.53
College	1	5.88
Higher education/university	10	58.82
Master or Doctorate	2	11.77
Total work experience	**Number of respondents**	**%**
Less than 5 years	2	11.77
Between 5 and 10 years	4	23.53
Between 10 and 15 years	6	35.29
More than 15 years	5	29.41
Work experience in the current company	**Number of respondents**	**%**
Less than 5 years	2	11.77
Between 5 and 10 years	4	23.53
Between 10 and 15 years	6	35.29
More than 15 years	5	29.41
TOTAL	17	100.00

The purpose of this research is to analyze two factors that depend on the success for IT projects [33]: project planning and project risk management. A these are very important parts of the project management, empirical research has been carried out in order to check the real state of the risk management in projects within school organizations. The main task is to check how many project managers and other project participants perform risk management in the project in a proper manner, how different their approaches are and what the actual situation is in relation to certain rules.

Based on the set goal and the task, a hypothesis was set up:

- Inadequate project planning, an inadequately prepared project plan and a poor risk management project lead to the collapse of the IT project.

2. Methodology

2.1. Data

In the context of research for this work, data for strategic management of projects related to non-core activities of nine secondary agricultural schools and colleges in Serbia were used. The main activity of agricultural schools is the education of pupils and students, and besides, in these schools' special activities are also carried out in the field of primary agricultural production and processing industry. For the purposes of this analysis, the questionnaires were forwarded to 43 project managers and other project participants, and a total of 17 responded to the questionnaire. All of them participate in projects that carry out risk management. The questionnaire contains three sets of questions. The first part of the questionnaire refers to demographic characteristics: gender, level of education, total work experience and years of work in the current company. The second part of the questionnaire examined how many respondents were familiar with project management. These data are necessary for the analysis that is related to project planning and risk management. The third part of the questionnaire is essential for this research and it has collected information on project risks, what steps should be taken, i.e. what methods and tools should be used to implement project risk management. The demographic characteristics of the sample are shown in Table 1.

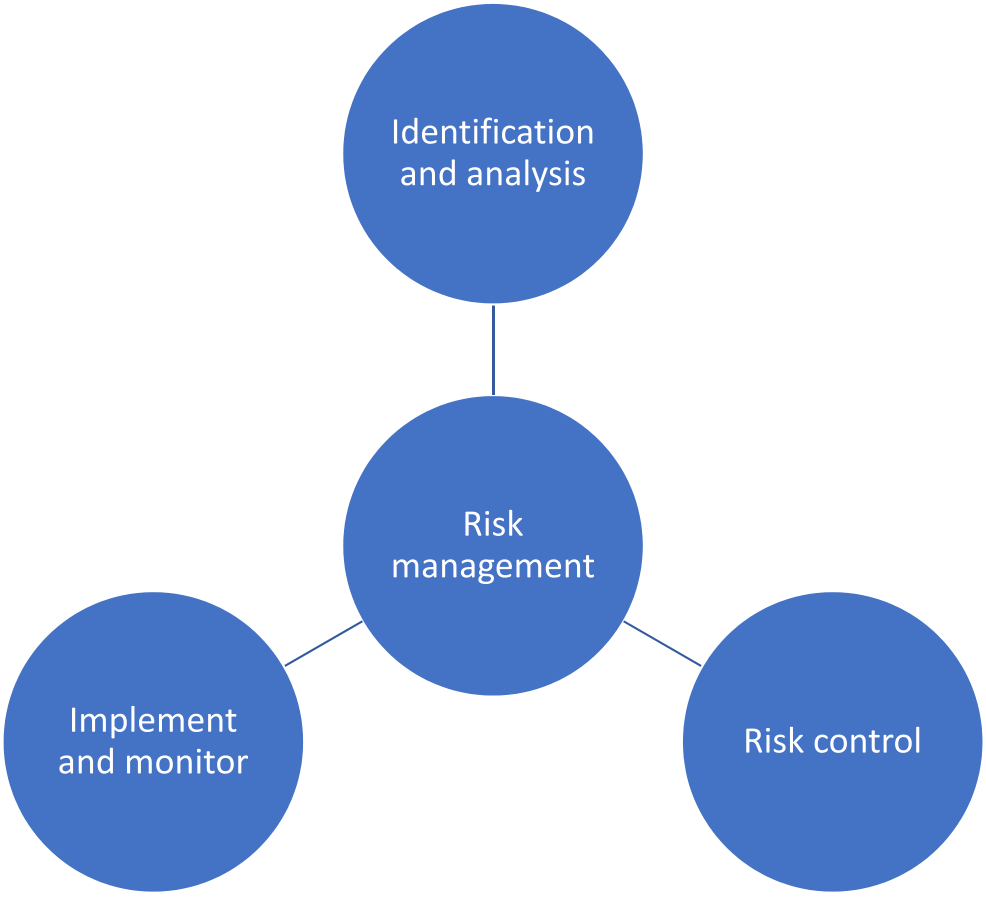

Fig. 1. Risk management framework [34,35].

Table 2
Participation data and roles in the project.

Participation in project management training	Number of respondents	%
Yes	11	64.71
No	6	35.29
The size of the current project	**Number of respondents**	**%**
Small (up to 5 employees)	3	17.64
Medium size (from 5 to 20 employees)	7	41.18
Large (20 or more employees)	7	41.18
The role on the project	**Number of respondents**	**%**
Software developer	5	29.41
Test engineer	1	5.88
Configuration Management Engineer	1	5.88
Technical documentation writer	2	11.77
Quality control manager	2	11.77
Project manager	4	23.53
Program manager	1	5.88
Sales clerk	0	0.00
External associate on the project	0	0.00
Other	1	5.88
TOTAL	17	100.00

2.2. Proposed framework

The used framework in the study is shown in Fig. 1 [34,35]. The first step was to identify and analyze, the second step was to control the risk and the third step was to implement and monitor. The most important step was the first step where one should identify the process in order to analyze it. Also, one cannot control the risk of the process is not identified. Afterwards there is risk control and finally there is implementation and monitoring of the process.

Table 3
The degree of risk analysis and knowledge of the risk management rules of the project.

Risk considerations on projects	Number of respondents	%
Complete risk analysis	14	82.36
Partial risk analysis	3	17.64
Non-risk assessment	0	0.00
Knowledge of project risk management rules	**Number of respondents**	**%**
Yes	10	58.82
No	7	41.18
TOTAL	17	100.00

3. Results

3.1. Results

The results of the survey based on the questionnaires are necessary for the analysis; that is related to project planning and risk management. Table 2 shows answers to questions about participation in the project.

Table 3 shows the answers to the question of whether the projects in which they participate, analyze potential risks and know the rules on

Table 4
Implementation of project risk management planning.

Implementation of risk management planning	Number of respondents	%
Yes	13	76.47
No	3	17.65
I don't know	1	5.88
TOTAL	17	100.00

Table 5
The content of the risk management plan for the projects.

The content of the risk management plan for the projects	The number of respondents who describe the content	% of all chapters	% of all respondents
Roles and responsibilities in risk management	8	22.22	34.78
Cost and time planning in the realization of risk management	0	0	0
Defining the main risk categories of the project	9	25.00	39.13
Determining the probability and impact	0	0	0
Matrix of probability and influence (P–I matrix)	15	41.67	65.22
Format and content of project risk management reports	4	11.11	17.39

project risk management.

Risk management planning is a decision-making process on how to address and implement risk management activities on a project. Table 4 shows whether the risk management planning is carried out on the project, and Table 5 shows the content of the risk management plan for the projects.

The results presented in Table 2 shows that almost two thirds of respondents attended project management training. The data on what kind of project the respondents are currently working on, say that a small percentage (3%) works on small projects, while the ratio of those who work in medium and large projects is even.

The role of the participants in the project is important to determine the attitude of the various project participants on risk management. Almost a quarter of respondents are project managers, and about one third are made by programmers. The rest of the respondents are: one test engineer, one configuration management engineer, two technical documentation writers, one quality control manager and one program manager.

The third part of the questionnaire, which relates to project risks, which methods and tools should be used to implement risk management in projects, indicates that risks are considered on all projects covered by the survey. However, the analysis shows that 82.36% of cases take into account potential risks, while in 17.64% of cases, the risk is considered only occasionally.

The results also indicate that almost half of the respondents do not know the risk management rules for projects that are prescribed and easily accessible on the Internet.

More than 76% of respondents are implementing risk management planning. Most respondents answered that their risk management plan contained a P–I matrix, that is, a matrix of probability and risk impact. A complete risk management plan relates to only a few projects. None of the examined projects has planned the costs and time necessary for the realization of risk management, nor also the probability and impact. This could be compensated by the improvement of the risk management process on the project.

The presented results unambiguously prove the hypothesis that inadequate project planning, an insufficiently prepared project plan and a poor risk management project lead to the collapse of the IT project.

The obtained results of the analyzed agricultural schools in Serbia provide explanation that the to make successful IT project there is need adequate planning and projecting before its implementation. Also, since the IT projects are complex there is need for a number of improvements in the IT project management. Especially it is important for schools in Serbia since most of the schools are in process of digital reorganization and there is need for precise IT project management. This could has impact in the future industry development since IT industry became large part of Serbia economy.

4. Conclusion

Information technology (IT) projects have brought new challenges in project management. In addition, we have a steady increase in complexity of projects, which requires careful and detailed planning.

That is why, many companies that are involved in IT projects, spend half of the funds on the project and plan the project time before the implementation of the project, i.e. phases of project realization.

The results of this research lead to the conclusion that the success of the IT project requires adequate project planning and a prepared project plan. The risk management project is a factor of great importance for the success of the IT project.

In the IT project management, a number of improvements are needed. This is because these projects are classified in a more complex way, so their management is extremely difficult. The prescribed rules are often ineffective because they do not follow the constant change and development of new technologies. The rules and processes of project management in the IT sector will be necessary in the future, but their constant adjustment and improvement is necessary. In addition, risk management in IT projects will always have their particular place and importance.

The IT based projects could improve business success and ultimately impact global socio-economic dynamics as well. The socio-dynamics could happen both internally through how firms operate but also externally with connections to consumers and the digital world we live, work, and interact. Therefore, funding of techno-entrepreneurship projects could gain ground for the societies.

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References

[1] A Guide to the Project Management Body of Knowledge, PMBOK Guide, PMI, USA, 2008.
[2] R.K. Wysocki, Effective Software Project Manangement, Wiley Publishing, Indiana, 2006.
[3] R. Avlijaš, Upravljanje Projektom – Upravljanje Rizikom Na Projektu, Univerzitet Singidunum, Beograd, 2009.
[4] K. Schwalbe, Information Technology Project Management, fifth ed., Thomson Course Technology, USA, 2007.
[5] McKinsey & Company, Building Organizational Capabilities, McKinsey Global Survey results, 2010.
[6] The state of project management 2017 annual report, wellington, PPM intelligence. http://www.wellingtone.co.uk/the-state-project-management-survey-2017/.
[7] The state of project management 2018 annual survey, wellington, PPM intelligence. http://www.wellingtone.co.uk/wp-content/uploads/2018/05/The-State-of-Project-Management-Survey-2018-FINAL.pdf.
[8] L.A. Siddique, A qualitative study of success criteria in Norwegian agile software projects from suppliers' perspective, International Journal of Information Systems and Project Management 4 (2) (2016) 63–79.
[9] S. Sankaran, R. Müller, N. Drouin, Cambridge Handbook of Organizational Project Management, Cambridge University Press, Cambridge, 2017.
[10] M. Spenser, Understanding the Software Development Process, 2010, in: https://www.projectsmart.co.uk/understanding-the-software-development-process.php.
[11] D.G. Kilibarda, M.V. Šobajić, M.I. Berić, M.P. Jovanović, Upravljanje softverskim projektima, Tehnika – Menadžment 66 (2016) 145–152 (Beograd).
[12] Project Management Institute, A Guide to the Project Management Book of Knowledge, Project Management Institute, Inc, Newton Square, 2013.
[13] A. Taylor, The Challenges of Complex IT Projects, 2004.
[14] N. Denic, D. Petković, B. Spasic, Global economy increasing by enterprise resource planning (ERP). Reference Module in Materials Science and Materials Engineering, 2019, https://doi.org/10.1016/B978-0-12-803581-8.11590-5.
[15] M. Safa, P.A. Sari, M. Shariati, M. Suhatril, N.T. Trung, K. Wakil, M. Khorami, Development of neuro-fuzzy and neuro-bee predictive models for prediction of the safety factor of eco-protection slopes, Phys. Stat. Mech. Appl. (2020) 124046.
[16] M. Shariati, M.S. Mafipour, J.H. Haido, S.T. Yousif, A. Toghroli, N.T. Trung, A. Shariati, Identification of the most influencing parameters on the properties of corroded concrete beams using an Adaptive Neuro-Fuzzy Inference System (ANFIS), Steel Compos. Struct. 34 (1) (2020) 155.

[17] I. Mansouri, M. Shariati, M. Safa, Z. Ibrahim, M.M. Tahir, D. Petković, Analysis of influential factors for predicting the shear strength of a V-shaped angle shear connector in composite beams using an adaptive neuro-fuzzy technique, J. Intell. Manuf. 30 (3) (2019) 1247–1257.
[18] M. Safa, M. Shariati, Z. Ibrahim, A. Toghroli, S.B. Baharom, N.M. Nor, D. Petkovic, Potential of adaptive neuro fuzzy inference system for evaluating the factors affecting steel-concrete composite beam's shear strength, Steel Compos. Struct. 21 (3) (2016) 679–688.
[19] M. Mohammadhassani, H. Nezamabadi-Pour, M. Suhatril, M. Shariati, An evolutionary fuzzy modelling approach and comparison of different methods for shear strength prediction of high-strength concrete beams without stirrups, Smart Struct Syst Int J 14 (5) (2014) 785–809.
[20] D.J. Armaghani, F. Mirzaei, M. Shariati, N.T. Trung, M. Shariati, D. Trnavac, Hybrid ANN-based techniques in predicting cohesion of sandy-soil combined with fiber, Geomechanics and Engineering 20 (3) (2020) 191.
[21] M. Shariati, M.S. Mafipour, P. Mehrabi, M. Ahmadi, K. Wakil, N.T. Trung, A. Toghroli, Prediction of concrete strength in presence of furnace slag and fly ash using Hybrid ANN-GA (Artificial Neural Network-Genetic Algorithm), Smart Struct. Syst. 25 (2) (2020) 183.
[22] M. Shariati, M.S. Mafipour, P. Mehrabi, A. Bahadori, Y. Zandi, M.N. Salih, S. Poi-Ngian, Application of a hybrid artificial neural network-particle swarm optimization (ANN-PSO) model in behavior prediction of channel shear connectors embedded in normal and high-strength concrete, Appl. Sci. 9 (24) (2019) 5534.
[23] A. Toghroli, M. Mohammadhassani, M. Suhatril, M. Shariati, Z. Ibrahim, Prediction of shear capacity of channel shear connectors using the ANFIS model, Steel Compos. Struct. 17 (5) (2014) 623–639.
[24] M. Shariati, M.S. Mafipour, P. Mehrabi, Y. Zandi, D. Dehghani, A. Bahadori, S. Poi-Ngian, Application of extreme learning machine (ELM) and genetic programming (GP) to design steel-concrete composite floor systems at elevated temperatures, Steel Compos. Struct. 33 (3) (2019) 319–332.
[25] N.T. Trung, A.F. Shahgoli, Y. Zandi, M. Shariati, K. Wakil, M. Safa, M. Khorami, Moment-rotation prediction of precast beam-to-column connections using extreme learning machine, Struct. Eng. Mech. 70 (5) (2019) 639–647.
[26] E.S. Chahnasir, Y. Zandi, M. Shariati, E. Dehghani, A. Toghroli, E.T. Mohamad, M. Khorami, Application of support vector machine with firefly algorithm for investigation of the factors affecting the shear strength of angle shear connectors, Smart Struct. Syst. 22 (4) (2018) 413–424.
[27] M. Shariati, M.S. Mafipour, P. Mehrabi, A. Shariati, A. Toghroli, N.T. Trung, M. N. Salih, A novel approach to predict shear strength of tilted angle connectors using artificial intelligence techniques, Eng. Comput. (2020) 1–21.
[28] N. Denic, V. Moracanin, M. Milic, Z. Nesic, Risk management in information system projects, Tehnicki Vjesnik-Technical Gazette 21 (6) (2014). ISSN 1330-3651 (Print), ISSN 1848-6339 (Online), (1239-1242), UDC/UDK 658.51.001.3:004.451 (IF 0,579 for 2014).
[29] M. Horwitch, From unitary to distributed objectives: the changing nature of major projects, Technol. Soc. 12 (2) (1990) 173–195.
[30] L. Novakova, The Impact of Technology Development on the Future of the Labour Market in the Slovak Republic, Technology in Society, 2020, p. 101256.
[31] Z.D.U. Durmuşoğlu, Assessment of techno-entrepreneurship projects by using analytical hierarchy process (AHP), Technol. Soc. 54 (2018) 41–46.
[32] H. Ahmed, T. Daim, N. Basoglu, Information technology diffusion in higher education, Technol. Soc. 29 (4) (2007) 469–482.
[33] M.N. Denic, V. Vujovic, V. Stevanovic, B. Spasic, Key factors for successful implementation of ERP systems, The journal Tehnički Vjesnik/Technical Gazette *23* (5) (2016) 1335–1341, https://doi.org/10.17559/TV20150618213311F0723M23. ISSN 1330-3651.
[34] Lazarikos Griffy-Brown, M.S. Chun, How do you secure an environment without a perimeter? Using emerging technology processes to support information security efforts in an agile data center, Journal of Applied Business and Economics 18 (1) (2016) 90–102.
[35] H. Miller, C. Griffy-Brown, Developing a methodology for assessing cyber risk for business leaders, Journal of Applied Business and Economics 20 (3) (2018) 100–114.