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Risk Management in Software Development and Software Engineering Projects

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ABSTRACT - The main goal of risk management is to identify risks at an early stage of the project and to counteract them with appropriate measures. This article discusses a tool-based risk management process in software development. The procedure is intended to help projects to organize the ways of dealing with risks. It is characterized by providing
Keywords─ Software projects, risk, software risk, risk management, risk in software projects

I. INTRODUCTION

One of the most beneficial innovations of the industrial revolutionare computers. Computer as the technology of the ageit has changed our lives a lot. Computers active andwell realized to use it beneficiallysoftware, in which software projects are requiredneeds to be managed like. Software projectproject management first to define its managementneeds to be defined. Project management projectactivities to meet your needsknowledge, skills, tools and techniques to projectimplementation. Project management, initiation, planning,through execution, monitoring, auditing and closing processesperformed. Project manager from project managementindividually responsible. Project management, time, money,While making effective use of resources such as people and spaceIt is the discipline of defining goals and achieving them. ItTherefore, time, cost, scope and intangiblecan be classified as assets.Software Project Management is an important part of project management. Because software projects are more uncertain, they often involve more risk and need higher costs. This means that risk management is more important in software projects.

II. LITERATURE REVIEW

The studies discussed in this article aimed at determining the stages of software projects and the type of risk they are exposed to. The ranking of the management stages and risks of software projects in order to realize the classification is given below.

a list of risks that often arise in software development as a basis for identifying project-specific risks, creates a risk plan as a basis for risk management and control, creates a platform for identifying weaknesses in development. software and thus improvement can serve the development **process.**

Types of Risks in Software Projects

Finding and managing risk is one of the most important issues in software projects. Effective software risk analysis allows for an effective software planning and implementation. In the sources examined within the scope of this study, we can generally divide the risks encountered in software projects into five parts.

Time risks: This is the type of risk that affects the progress of the project, arises from incorrect assignment of tasks and equipment, and consequently prevents or prevents the project from being completed on time.

Budget (cost) risks: Cost risks often arise from incorrect project costing or project scope expansion, and lead to cost overruns.

Management risks: It leads to project failure due to incorrect operation application caused by project managers and executors. These include misleading priorities, failure to fulfill responsibilities, lack of resources, lack of experience or inexperience.

recruiting staff, not planning resources and not being able to communicate between the team and similar reasons.

Technical risks: Technical risks generally arise from lack of functionality and performance. It is due to the constant change of demands, lack of advanced techniques, the demanded project requiring difficult operations and a difficult project model.

Program risks: The type of risk arising from events beyond the project boundary and out of control. Risks arising from a decrease in capital or a change in customer priorities

Software Project Stages

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It is the path the software takes from planning, developing, testing and even ending its life. In fact, it can be called the life cycle of the software. Software Projects are realized in five stages [1]. These; Requirements analysis phase: At this stage, the functional and operating requirements of the software to be developed are determined.

Design phase: The software is designed in detail and made ready for implementation. Implementation phase: Coding, compiling, debugging, creating human machine interfaces, defining databases and
It includes activities such as placing in databases.
Test phase: Each software unit implemented is passed through an isolated unit test independently from other units.

Correction phase: It includes the correction of errors that occurred in the previous stage and the activities that ensure the efficient operation of the system.

III. RESEARCH METHODOLOGY

In this article, 20 different source projects were examined for studies on risk management in software projects [2- 21]. The resource distribution of the examination results according to the stages determined in the previous section is shown in Figure 1.

As seen in Figure 1, the "Maintenance and correction" phase has been intensely included in the studies. Again, according to the same figure, "Requirements" is the least studied development stage compared to other stages (4 studies, 12%).

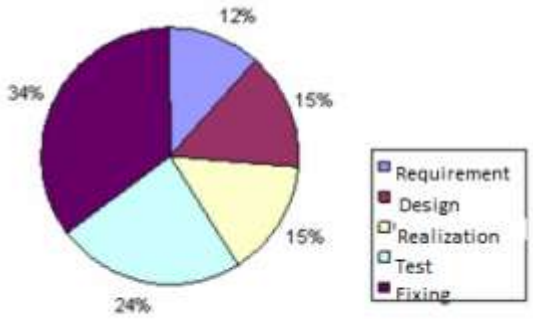
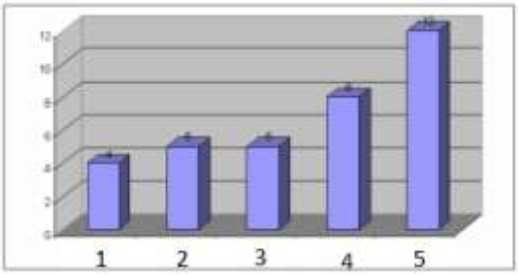


Figure 1.Risk. Management resource in software projectsstage percentage in screening

This is followed by "Design" and "Application" 5 studies (15%) equally. "Maintenance and remediation", on the other hand, is the most studied development stage in the research (34%). In Figure 2, the distribution of the studies according to the developmental stages and stages is shown.



1 – Requirement, 2 – Design, 3 – Realization, 4 – Test, 5 -Fixing
Figure 2.Software project risk management in resource search tier value distribution

Types of risks considered in risk management studies in software projects As seen in Figure 3, in 10 of 20 studies, cost risks have been the most studied subject with a rate of 27%. With an average of 21% following that, management risks were addressed, technical and time risks were Likewise, it followed them evenly with an average of 18% and the least important risk type was the software risks arising from the program code with an average of 16%.

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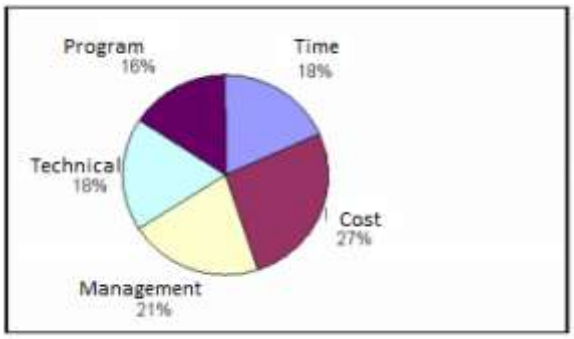

Figure 3.Rate of risk types addressed in software projects.

In Figure 4, software projects are handled according to resources.
The numbers of risk types are shown.

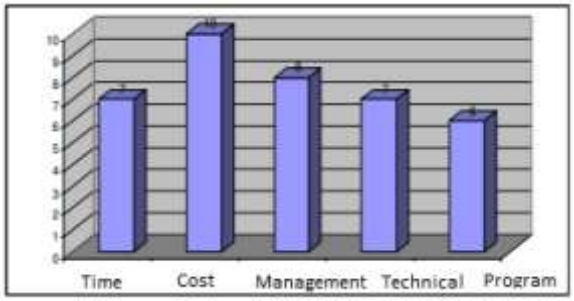

Figure 4. Handled by resources in software projectsnumbers of risk types

A. Comparison Result

As can be observed, the most common stage of risk management that needs to be examined is maintenance. The least studied stage is software development requirements. In fact, this is a serious vulnerability that will affect risk management. However, software projects are more important than all projects.
The fact that it is affected by the risks that occur in the early stages seriously affects the cost and project success.

B. Review Result

The software project risk management studies used for comparison [2-21] focused on some common issues and criteria. Understand that risk management is more than just a process or methodology, such as project management, within an organization through learning, implementation and other mechanisms over an extended period of time.

It is a developed real-time risk management skill. Risk management does not only cover the identification, evaluation, mitigation and adherence to terms strategies and implementation issues of risks. It also includes the ability to respond quickly and effectively to emerging dangers. Whether these hazards were anticipated or not, they have the potential to significantly affect the project and its results. they have.

According to the results of the analysis, it has been observed that risk management skills play an important role in the management of software projects. Conceptualizing and developing the risk and risk management theory in research requires the uncertainties faced by software projects to be clearly identified. As a result of this process, it has been observed that the application difficulties that may arise in the management of the threats related to the software project can be eliminated.

One of the challenges of risk management practice in organizations is that managers are often focused on demonstrable results related to performance. If a significant project is successful, it is difficult to unquestionably base the outcome or any part of it on risk management. It is extremely unusual to attribute project success to risk management as well. Instead, success depends on a good trend overall. Sometimes it depends on luck. In these cases, some people claim to be successful because of their skills and their unique contribution to the project.

Based on this, an organization that has a project success may ignore the importance of risk management in the next project and as a result fail to implement risk management processes.

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Finally, in practice-oriented managements, it is not customary to search for the delay of implementation requirements. Researchers consider risks of effective practices from observations.

they learn and generalize them with the necessary developing information. Risk managers and project managers should not expect research to reach their needs. Rather, experience with what works and what doesn't work in specific situations and experiences should be used. Normative

In cases where approaches do not improve project performance, new ideas should be tried. In this way, applications will encourage people to research.

Among the issues discussed in software projects other than risk management, and the issues that may cause risks are generally due to the following reasons as a result of the research.

Managing projects: Contradictory observations in research may raise questions about the traditional perspective of project management as a formal science of defined methods and practices that are critical to project success. For example, any picture of whatever type in a project is formatted

Although the project management methodology or practices were not used, it was successful and in another project it failed despite all project management rules. As mentioned earlier, project management is necessary but not sufficient for success

These observations, contrary to the findings of the article, may raise questions as to whether project management, as formally established, is essential for project success. This is the official project

It is consistent with a view that supports the claim that its management leads to better project results [22].

Change of management: Many projects in research may encounter application and user-related problems due to improper management of institutional effects (almost 70% of projects dealing with administrative risks have not explicitly included management change in their scope). Typically, these projects saw their role as the creation of a software system rather than a new commercial solution. In these cases, managing the organizational impacts of the change is perceived as a separate responsibility, or it is required by the business user to be resolved after the project is concluded.

has been left. In various cases, the transition to post-project operational and technical support arrangements has been ignored.

Since the beginning of the project, when successive organizational changes are managed well, projects are faced with less implementation problems. In these cases, the project enables a computing option and mandates a mandatory institutional change [23].

Project setup: Many projects may run into problems due to poor project setup. Critical activities determined to make a good start of a software project are as follows; the most suitable project design and

determining the development method, establishing the right budget, obtaining the necessary funds, selecting the right vendor partners and realistically assessing the risks. Risk from strict plan-based methods, for example, when the compatibilities are high and / or the scopes are rather uncertain.

and problems arose [24, 25]. In addition, some projects have been constrained by fund allocation arrangements that allow the project to end up incorrectly from the outset, allocating funds before the project costs are fully known. Other risks and issues are those that do not comply with commercial purposes that add value or

This occurs when the project set-up is left to a dominant vendor, whose primary actions are more directed towards their own interests.

IV. RESULT

In this study, researches on risk management in software projects have been examined. As a result of investigations, although risk management is a process of project management, it consists of sub-processes such as project management

is a real-time hazard management skill. Risk management studies show that the earlier the risk is identified and intervened, the more likely it is to prevent project failure and cost loss.

While most of the research focuses on the post-onset stages, it has been observed that less work has been done in the stages before starting the study. In this study, 20 research projects related to software project risk management have been examined and compared. According to the comparison result, the "Maintenance and Correction" phase in risk management has been the most studied subject.

In terms of "Budget and Time", software is the projects most affected by risks compared to other issues.

It has been observed that definition and management of risk in software projects are limited only by theory in most of the research.

Transforming risk studies into practice in existing software projects

It will give more efficient results in conducting research.

V. CONCLUSION

In software projects in the future, high number of risk management researches will increase the production of successful projects. For this, the following points should be considered. First, the risk should be limited as a probability of impact and by definition. In addition, project managers need to be more aware of the magnitude of potential impacts. It should be known that the impact in question can be an issue that needs to be evaluated in terms of both anticipated and unforeseen hazards. Better quality risk in software projects

It can be predicted that it would be more efficient to fully implement risk practices in line with the current view than to adopt the assessments. The second point is that, based on the literature review, the scope of risk management is compared with the potential dangers that may affect software projects

It should be considered that it is rather narrow and a broader and integrated perspective in risk management may be more appropriate.

The research has shown that more research is needed in terms of risk integration of risk and project management and the interaction between the two aspects in implementation. There are many sources of risk in both research and projects, and each project

It has been observed that the studies required to define it are specific to the scope of the project.

REFERENCES

[1]. İnternet: LLC Digital Publications, "Software developmentlifecycle phases", www.shellmethod.com/refs/SDLC.pdf, 2005.

[2]. T. W. Kwan, H. Leung, "A risk management methodology forproject risk dependencies", IEEE Transaction on SoftwareEngineering, 37(5), 635-648, 2010.

[3]. S. Rivard, Y. St-James, A. F. Cameron, "Software project riskdrivers as project manager stressors and coping resources",Proceedings of the 44'th Hawaii International Conference onSystem Sciences, Kauai,1-10, 2011.

[4]. Y. Hu, X. Zhang, X. Sun, J. Zhang, J. Du, J. Zhao, "A unifiedintelligent model for software project risk analysis and planning",3rd International Conference on Information Management,Innovation Management and Industrial Engineering, Kunming,110-113, 2010.

[5]. M. Sadiq, S. Zafar, M. Asim, R. Suman, "GUI of esrcTool: A Toolto Estimate the Software Risk and Cost", The 2nd InternationalConference on Computer and Automation Engineering (ICCAE),Singapore, 673 – 677 2010.

[6]. S. A. Susan, "The three dimensions of software risk: technical,organizational, and environmental", Proceedings of the 28thAnnual International Conference on System Sciences, USA,369-378, 1995.

[7]. D. Gupta, M. Sadique, "Software risk assessment and estimationmodel", IEEE Computer Science and Information Technology,Singapore, 963-967, 2008.

[8]. G. Mcgraw, "Risk analysis in software design", IEEE Security andPrivacy, 2(4), 79–84, 2004.

[9]. A. Hosseingholizadeh, "A source-based risk analysis approach forsoftware test optimization", IEEE 2nd International Conferenceon Computer Engineering and Technology, Chengdu, 601-604,2010.

[10]. İnternet: L. Westfall, "Software risk management",http://westfallteam.com/Papers/risk_management_paper.pdf, 2011.

[11]. M. Kajko-Mattsson, J. Nyfjord, "State of software riskmanagement practice", LAENG International Journal of ComputerScience, 35(4), 1-12, 2008.

[12]. S. C. Misra, V. Kumar, U. Kumar, "Different Techniques for Risk Management In Software Engineering: A Review", Conference ofthe Administrative Sciences Association of Canada (ASAC),Canada, 196-205 2006.

[13]. Y. Peng, G. Kou, G. Wang, H. Wang, F. S. Ko, "Empiricalevaluation of classifiers for software risk management",International Journal of Information Technology and DecisionMaking, 8(4), 749-767, 2009.

[14]. F. M. Dedolph, "The neglected management activity: software riskmanagement", Bell Labs Technical Journal, 8(3), 91-95, 2003.

[15]. C. F. Fan, Y. C. Yu, "BBN-based software project riskmanagement", The Journal of Systems and Software, 73(2), 193-203, 2004.

[16]. P. Cao, F. Chen, "A risk control optimization model for softwareproject", IEEE International Conference on ComputationalIntelligence and Software Engineering, China, 1 - 4, 2009.

[17]. S. W. Foo, A. Muruganantham, "Software risk assessment model",IEEE International Conference on Management of Innovationand Technology, Singapore, 536 - 544 2000.
[18]. Y. H. Wang, J. Jia, Y. Qu, "The "earth-moon" model on softwareproject risk management", Proceedings of the NinthInternational Conference on Machine Learning andCybernetics, Qingdao, 11-14, 2010.
[19]. X. Zhang, B. Yu, J. Zhang, "The application of fault tree analysisin software project risk management", IEEE InternationalConference on Management of Innovation and Technology,China, 1-4, 2009.
[20]. M. Keil, P. E. Cule, , K. Lyytinen, R. C. Schmidt, "A frameworkfor identifying software project risks", Communications Of TheAcm, 41(11), 76-83 1998.
[21]. L. Xiaosong, L. Shushi, C. Wenjun, F. Songjiang, "The applicationof risk matrix to software project risk management", InternationalForum on Information Technology and Applications, China,480-483 2009.
[22]. A. Mishra, D. Mishra, "Effective Communication in Collaborationand Coordination in Extreme Programming: Human-CentricPerspective in a Small Organization", Human Factors andErgonomics in Manufacturing, 19(5), 438–456, 2009.
[23]. M. Jrgensen, S. Grimstad, "Software Development EstimationBiases: The Role of Interdependence", IEEE Transactions onSoftware Engineering, in press, 2012.
[24]. U. Asklund, L.Bendix, "A study of configuration management inopen source software projects", IEEE Software proceedings,149(1), 40-46 2002.
[25]. F. Hovenden, H. Sharp, M. Woodman, "Using Metaphor toAnalyse Qualitative Data: Vulcans and Humans in SoftwareDevelopment", Empirical Software Engineering, 10(3), 343–365,2005.