Interaction between project tasks and risk management tasks in software development

Khansaa Azeez Obayes Al-Husseini[1], Ali Hamzah Obaid[2]
[1] Al-Furat Al-Awsat Technical University, Babylon Technical Institute
[2] Al-Furat Al-Awsat Technical University, Babylon Technical Institute

ABSTRACT

In software development processes, there is a clear challenge to the application of danger organization in projecting organization, especially the integration of danger organization with projecting organization in understanding the requirements and discussions during the developing procedure. Though, the benefit of applying the interaction of risk management tools with project management tasks is very good in reducing losses, especially when reviewing risks and management practices in identifying risks for each project assignment. Here, scheme and risk organization functions in theory are discussing, interrelationships, and practices in software development. Where we focus on the assumptions that we assume that the risks of developing software can be in one of the project tasks (main task or sub-task). And we show that there is an interactive relationship within the project tasks and the danger organization tasks. As a result, we obtain that using an interactive approach between project management tasks and project tasks in light of the excitement and catalytic goal of software development operations reduces expected losses.

Keywords:	Software development, Projecting Tasks, Danger Organization Tasks, Software risk, risk management, project software development, project management

Corresponding Author:

Author Name, Khansaa Azeez Obayes Al-Husseini
Departement, Babylon Technical Institute
University, Al-Furat Al-Awsat Technical University
Address, Babylon, Iraq.
E-mail, inb.khanssa@atu.edu.iq

1. Introduction

The relationship among the projecting organization tasks and the danger organization tasks has received a lot of attention from not many researchers and scholars to study the details of this relationship. This relationship is of great importance in making decisions that achieve the goals for the success of the project taking into consideration the risk element[1, 2]. Software development projects are considered of a special nature due to the many factors affecting them during the development period, which exposes them to risks as a result of the length of the implementation period or a change in requirements. Risk management in software development has many positives and has influenced software development projects, which makes the management of these projects give great importance to risk management and adoption as it has a significant role in improving the schedules and costs allocated to the project[3]. Therefore, risk management in software development contracts has become a feature known to stakeholders and it is known that software development projects consist of three main parties (stakeholders, project management, and teamwork). The software development industry suffers from risks that arise during the developing procedure due to the lack of interaction of project management with the resulting risks, and Misunderstanding of the risks during the development period, and a lack of awareness that the risks that may arise during the period of software development with unexpected periods may cause losses in time and cost. In software development projects, there is always uncertainty in the environments surrounding the project, which may affect in one way or another in changing the project plans in terms of costs or resources, which negatively affects the final product and the reason is the lack of knowledge of potential events related to the risks of uncertainty. The time and cost of the project that is being developed or constructed. The project may include some external risks that contribute to increased risks, such as the lack of coordination between project management and developers because some of the project participants are outside the company and are difficult to communicate or control during the project's work time. On the other hand, a misunderstanding of the requirements between customers and developers, which leads to a misunderstanding of the business needs of its project structure and planning and control of the development process, which negatively affects the software development methodologies. Often, danger organization is used in the software

developing industry to measure the effects of risks according to international standards (PMBOK Guide) such as (budget, time, cost, and quality). Through these criteria, the project goals can be achieved. At present, software development projects focus on risk management and interactive analyzes in the information that accompanies the project phases where all the variables that occur during the work are recorded and published on the work team. It requires the team to estimate the possibility of the risks that may occur with the variables that occur in the project. Naturally, the group works to estimate the degree of risk affecting the scheme criteria to develop a proactive plan. Also, it intends to address potential risks after identifying weaknesses in project task operations and apply systematic risk management in the current project.

2. Project management concept

2.1. Project concept

The first phase of any project is the project concept, there are many ways definitions of projects. According to PMBOK, "A project is temporary in that it has a defined beginning and end in time, and therefore defined scope and resources". In other terms, each project has a set of activities and processes that are interrelated to reach the final product within a specified period. From the above, the project has three main characteristics, see figure (1).
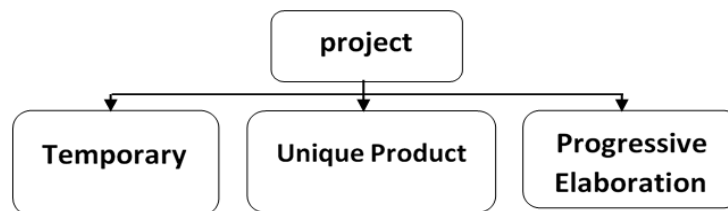

Figure 1. Project characteristics

2.2. Project managing

Projecting administration is the application of strategies, information, devices, aptitudes, and strategies to venture exercises to meet the extend Goals requirement, according to the project acceptance criteria. Project management has the ultimate goals restricted by a specific time and cost. Each project has a working team that may consist of one person or many people who are active in making the project successful and have administrative competence, this team is called project management. Project management is a set of regular activities to facilitate the process of employing tasks and setting appropriate resources to achieve project goals using various effective methods within small groups that depend on the effectiveness within pre-established restrictions. PMBOK defined it as an activity for any project from its inception until its completion to achieve the achievement of goals. Whereas, project management is responsible for managing the tasks and activities that are determined by specific periods and help to understand and define the project goals and work to achieve these goals at the specified time. That is, it determines the tasks of the project, planning, and organization of all project activities as it is considered an essential part of the work department in distinguishing, dividing, and completing all the tasks related to the project. The project management divides large tasks into small tasks to facilitate control and organization.

2.3. Project tasks

Project tasks and Project management are words that can create confusion, as most students and readers or stakeholders think these two words to be similar in a project. The difference between project management and project tasks can be illustrated by the following points:

❖ **Project management**

- It is overall management.
- It focuses on the fulfillment of all project goals.

- It defines the overall structure for the project
- It is responsible for managing the project team
- It is responsible for risk management.

   ❖ **Project tasks**

- It is a part of a project management
- It is a single unit of work
- It must contribute toward objectives.

Project tasks, simply, divide the project into steps that facilitate the achievement of the required goals, and there is always a fellow of the group who is accountable for the work and monitor.
Project management processes, divided into five interrelated steps as characterized by the PMBOK Direct (Starting, Arranging, Executing, Checking and Controlling, Closing). These processes provide basic guidelines for project management .

2.4. Preliminary bases of coordinating the project management views

Successful development cannot be unthinkable professionally for any development process without creating mandatory plans for the development stages. As a sample of verification and understanding of requirements, project management plays a key role as it provides correspondence and approximation of views between risk management and the team in the development process. ISO 31000: 2018 aims to clarify the terms, definitions, and general principles associated with risk management. It recommends developing and improving the framework. It can be applied to many software and systems development processes[4]. Therefore, designing a self-contained system of risk information at the stage of understanding the requirements that the project manager to choose an appropriate set of views and develop it so that, it forms a balanced system. The great reason of this activity is to characterize the essential necessities for the development process and express them visually. Such requirements must be organized and fulfilled into a workable form, as they may need to separate the main tasks into subsets of development tasks with specific and distinct characteristics. Figure (2) shows the basic rules of the project management cycle in the development process.
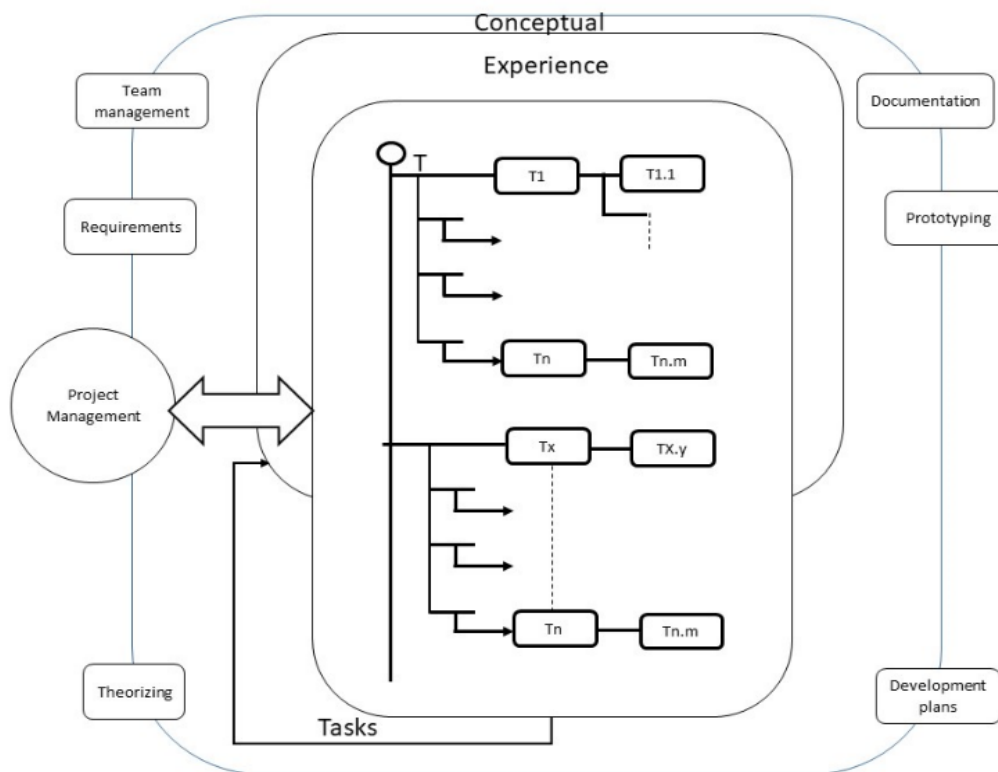

Figure 2. Basic applications of project management

3.   Software development project management

In the sixties of the last century, the problems of managing software projects, especially large software development projects that had low-performance indicators, were suffering from delays in completing the design and creation of programs, or that development costs are higher than the initial estimates of management, and the reason for the failure is often due to the methods used in project management that were based on the technical expertise that was not effective in the development process. The Software Development Project Management has specific features and tools for development operations. Is one of the most important of these tools that the software market is concerned about the ability for high profits, schedule, and cooperation with the development work team. Therefore, when developing any software product, a product model is required to identify resources and make appropriate decisions to set development standards, which gives assurance of interaction with development teams. To achieve these requirements, specific criteria must be established for effective control of the development process.

3.1. Software development projects

The software development projects are defined as a set of tasks that starts and ends in a specific time and that produces usable software[5]. In other words, Software Development is a set of processes like examination, necessities, communication with the clients and clients, planning, assessing and testing program items, introducing and keeping up the application, giving bolster, organizing end-training. "Software development projects on implementation provide information to support, analysis, and decision-making within the organization[6]

3.2. Project management concept in software development

PMI defines project management is managing all the aspects of a project from inception to end using a structured methodology. It, then, is "the application of knowledge, tools, skills, and techniques to project activities which meet the project requirements". The advantages of Software Project Management, planning for software development, Implementation of software development, monitoring and controlling, manages to save time and cost [7].

3.3. Project Risk Concept

Risk management is a structured application of a set of policies and procedures used to define tasks, analyze, evaluate, and address the risk[8]**.**
Definition of risk, in ISO 73: 2002 manual, "A Mixture of Event Possibility and Its Consequences" [ISO02]. It consists of three basic concepts: event, probability, and severity. However, the focus is on unwanted events that constitute the loss. Among the most important risks of loss, is the excess of the prescribed budget or the prepared schedule, customer dissatisfaction, or poor product quality, or because of an unexpected event in the project life cycle. The risks in managing program development projects can be identified through the use of the necessary technologies by scheduling tasks for project activities and adhering to the basic rules of the project life cycle.

In Software Development projects, risk team greatly influences project and organizational performance. where the risk team it gives data for chance administration and an indispensably portion of the Venture Administration Arrange. In addition, it claims the chance report and comes about to assist them create a plan of activity to reply to the recognized risks. The report composed from the hazard examination isn't a choice record, it is a data report for decision-makers.

It cannot be seen as a device for anticipating the long, run but or maybe a instrument to encourage the venture to create way better choices based on sufficient information. In other words, it can be said that it is the strategy that does not permit choices that don't depend on adequate data[9]. The extend hazard administration prepare incorporates the following:

- Risk administration planning.
- Hazard identification.
- Qualitative chance analysis.

- Quantitative chance analysis.
- Risk reaction planning.
- Control and control of risks

3.4. Risk management of software development projects

There are several models of projecting danger administration and one of them is software development projects, all models are comparable to each other. PMBOK-2000 Publications, it is "systematic processes related to identifying, analyzing risks, making decisions that minimize the negative consequences of risk events , increase the likelihood and consequences of positive events."

With the rapid development of the software industry and its success, however, the software development process cannot be considered very successful due to the existence of relatively many failures and a reason due to the conclusion of programming is a risky work that is in the programmers that cannot be controlled for several reasons including what are time commitments or exceeding the human cost of the development process. Some of the difficulties that accompany the development of programs can be summarized:

1- There are no standard processes or clear relationships in software development
2- -The growth of the program is not tangible since the program cannot be touched or seen.
3- Continuous technological changes and developments in computer equipment.
4- The project manager's inefficiency in developing plans or lack of experience and skill.

This leads to exceeding the ceiling set for the project or adding a new cost that exceeds the allocated budget.

In the database (Chaos) for software projects from 2011 to 2015, you refer to the results of software projects according to the table (1) traditional resolution for all projects on budget on time on target the traditional resolution of all software projects from 2011–2015 within the new chaos database.

Table 1. Database (Chaos) for software projects from 2011 to 2015

	2011	2012	2013	2014	2015
SUCCESSFUL	39%	37%	41%	36%	36%
CHALLENGED	39%	46%	40%	47%	45%
FAILED	22%	17%	19%	17%	19%

We note from the results that failure rates in 2011 reached 22% of projects, while the highest success rate in project implementation was in 2013 with a success rate of 41% and the largest percentage of challenges were in the year 2014. A failure to reply to changing client necessities was cited as one cause of major venture disappointments, counting those in budget taken a toll invades, destitute item quality, and extend plan overwhelms.

3.5 Project risk management team

Essentially, the project risk management team has to make a comprehensive list of all the project's potential risks (internal and external), this includes identifying, the probability of their occurrence, the impact of the risks on the project success, reaching the required goals, and proposed procedures. By developing successful project strategies. In software development projects, many decisions are made by teams and not by individual members of the group, because group decisions are more consistent than individual decisions[10]. From this concept, we obtain different roles, such as collecting information, evaluating project risk information to be shared with the project risk management, and understanding the risk management approach requires a clear and detailed understanding of the ongoing project approach. Software development tasks are characterized by the ambiguity of the task, whereby the set of tasks necessary to accomplish the development process and the relationships between tasks at the beginning of the project are unclear and incomprehensible and appear only with the development of the development process and during the progress of the development process. During the software development process, tasks may expand which leads to a process of changing the task structure and can be defined in general (dividing the task into small tasks, collecting tasks, sorting tasks, replacing tasks), as

the success of any project depends on interaction, communication, and knowledge between teams Tasks in solving problems that may occur in the life of the project development. The expansion of tasks or the expansion of the project sometimes increases the state of ambiguity and risks as the expansion of the development process or the expansion of tasks leads to an increase in the scope of the project during the development process and thus increases the risks that may occur which in turn may be a reason for changes in time or cost. Project planning revolves around tasks such as a technology to evaluate and review the project program, which in turn determines relationships and tasks to clarify the specific requirements for project completion. It explains the interconnection between project tasks and manage risks that have a major impact on task completion and project effectiveness to achieve the goal between tasks[11, 12]. In addition, it analyzea methods and management tools Risks in software development projects and identifying their main characteristics, strengths, and weaknesses. The division of tasks can be represented in the software development process in the form of a tree where the tree root is the development project and the peaks are the project tasks and the edges are the means or small tasks that may consist of assembly units. As shown in Figure 3.
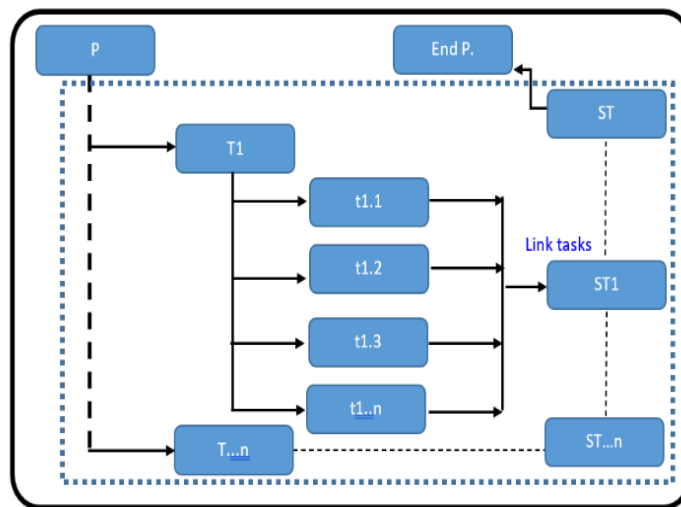

Figure 3. Product structure as a tree

We assume that (P) is the development project and (T) is a task that must be accomplished from the project and therefore this task may be divided into many tasks (t1, t2, t3, .. n) where the original task can be divided into several tasks that perform a role Certain aims to complete the development process.

P = Project
Where P={T1,T2,T3,…Tn}
T=Task
Where T={t1,t2,t3,…tn}
t= Sub task
St =Link tasks
Where St={T1+T2+T3,…Tn)

For example, project management considered that the development process needs external sources and that some tasks must be within a third party to be implemented by sub-tasks (t). This means that there are a set of tasks within different levels that can be distinguished within the project and that we're not at the beginning of the project among the development requirements due to the ambiguity of the requirements. Here it can be seen that the project management may think about ambiguities in the requirements and wonder about the possibility of solving this ambiguity and whether it is applicable. Changes in tasks during the development process that are divided into smaller tasks can be grouped after regrouping to be an integrated task and depend on the type of task and its links to other tasks to get the integrated task. The ambiguity in (ST) is the relative change of time or coordination between implementers of the tasks in the delivery of the final product. The risks facing the division process are the process of grouping tasks and their association with work on the one hand, and the process of communication between working groups on the other hand, especially if one of the tasks is from an external medium. In the environment of software development, there may be different tasks in the project life cycle which may cause a set of problems which in turn are a risk factor for the project, Sometimes the problems are a danger to the project, which may be at any stage of the project and to treat the risks that occur. There are

basic rules for the solution, which makes the project managers decide to solve the problem. The developmental model is defined as a methodology to analyze the problem as a potential risk or ignore it. However, the management challenge is faced with confrontations in choosing the method or means to solve the problem before it is a threat to the project's tasks, as in Figure 4, and using problem analysis, decision-making processes are permanent to form a base of appropriate solutions and the correct and decisions must take into account many of the variables that may happen while continuing the tasks. As the search for a source of risk leads to decision-making in risk investigations that cause the recurrence of the risk. The time management of tasks and their relationship with the project environment delays in carrying out the task generates a cumulative effect, which causes a delay in delivery time.
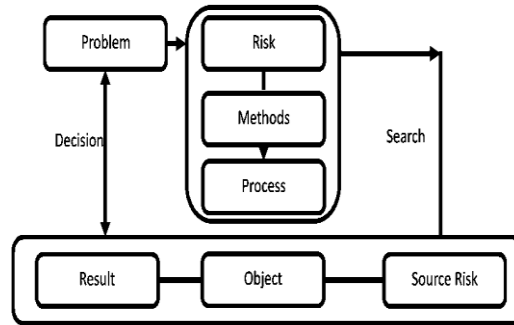

Figure 4. Decision-making processes

3.6. The Impacts of Risk Management Tasks on Project Tasks

One of the challenges facing software development project management is risk management. To succeed in the project, the risk barrier must be overcome, as most project managers refer to reducing time in identifying risks and giving a lot of time in mitigating risks since risk mitigation is often not specified. Which causes a loss in the time of the project, so the project management must develop scalable plans suitable for risk management, which in turn seek to understand the project goals to develop an effective plan to manage risk activities. Here we propose a model for sharing risk management with project management in achieving the product goals (Figure 5). Most project risks arise when there are no clear goals for the requirements of stakeholders. Therefore, project management is required to clarify these requirements to manage risks through repeated meetings and use brainstorming to ask questions to reach the best results to understand the requirements. Risk planning is an integral part of project goal plans, and it is known that the main objective of risk management is to eliminate or reduce the impact of risk on the project life cycle.
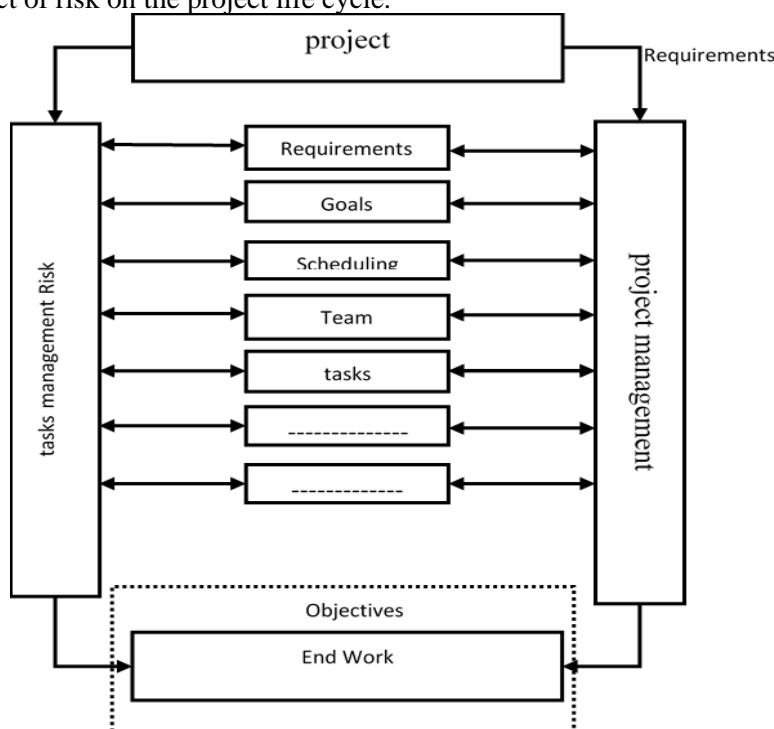

Figure 5. Model for sharing risk management with project management

3.7. The relationship of risk management tasks to project management tasks

The question here is what is the relationship between risk management and project management? To answer this question, we can say, Project management fits in project risk management like Holding hands. Where Project management can explain the goals and objectives of the project well with risk management to develop proposals and solutions to avoid potential risks. Good risk management begins with a clear understanding of the goals and objectives of the project. The previous question can also be answered: is the extent to which project management can benefit from its experience and capabilities in risk management in transferring the risks it faces during the product life cycle to the proposed feature. Risk management is of great importance for the success of project management behavior as well as for the behavior of individuals and groups in work teams. As risk management tasks are tantamount to controlling the target until the desired performance is achieved for customers (Andrzej Jankowski, Andrzej Skowron, Piotr Wasilewski). Risk management is a close relationship with the project manager and his ability to benefit from shifting risks to the advantage of not affecting (the project cost schedule, communications). It is known that risk management has a prominent role in project management to increase the chances of success, and here the project team must Always plan for certainty and be on managing the risks associated with the project[13, 14].

Figure 5. Relationship of risk management tasks to project management tasks

4. Conclusion

The emergence of new project tasks is the uniqueness of any development process. Among these tasks, project management tasks occupy the principal place. In this paper, we also demonstrate the relationship of the risk management tasks with the project management tasks is an interrelation relationship, as the interconnection between them is effective in reducing losses in time and cost, also, the relationship between project management and risk management has an effective feature in practical application. Therefore, describing the tasks, designing models, and the relationships between them, determine the structure of any project activity. The risks lie in the distribution of tasks to multiple tasks to discipline at the time of delivery and to the assembly process according to the timeline drawn up for the task completion process

References

[1] E. N. Mikkelsen, B. Gray, and A. Petersen , "Unconscious processes of organizing: Intergroup conflict in mental health care," Journal of Management Studies, vol.57, no. 7, pp.1355-1383 2020.

[2] C. LeBaron, P. Jarzabkowski, M.G. Pratt, and G. Fetzer, "An introduction to video methods in organizational research," ed: Sage Publications Sage CA: Los Angeles, CA, 2018.

[3] C. Z. Li, X. Xu, G. Q. Shen, C. Fan, X. Li, and J. Hong, "A model for simulating schedule risks in prefabrication housing production: A case study of six-day cycle assembly activities in Hong Kong," Journal of cleaner production, vol. 185, pp. 366-381, 2018.

[4] N. Hussien, I. Ajlan, M. M. Firdhous, and H. Alrikabi, "Smart Shopping System with RFID Technology Based on Internet of Things," *International Journal of Interactive Mobile Technologies,* vol. 14, no. 4, pp. 17-29, 2020.

[5] A. H. Obaid, K. A. O. Al-Husseini, "Tools For Conceptual-Algorithmic Prototyping Of Project Solutions In Software Intensive Systems Design," International Journal of Engineering Technologies, and Research Management, vol. 5, no. 10, pp. 117-122, 2018.

[6] P.K. Dey, J. Kinch, S. O. Ogunlana, "Managing risk in software development projects: a case study," Industrial Management, and Systems Data , vol. 107, no. 2, pp. 284-303, 2007.

[7]   H. Abdulla, M. Al-Hashimi, "The impact of project management methodologies on project success: A case study of the oil and gas industry," Journal of Engineering, Project and Management Production, vol. 9, no. 2, pp. 115-125, 2019.

[8]   J. Y. Campbell, M. Lettau, B. G. Malkiel, and Y. Xu , "Have individual stocks become more volatile? An empirical exploration of idiosyncratic risk," The journal of finance, vol. 56, no. 1, pp. 1-43, 2001.

[9]   N. Popovic, T. Popovic, D. I. Rovcanin, and O. Cmiljanic, "A Moodle-based blended learning solution for physiology education in Montenegro: a case study," Advances in Physiology Education, vol. 42, no. 1, pp. 111-117, 2018.

[10] B. Rockenbach, A. Sadrieh, B. Mathauschek, "Teams take the better risks," Journal of Economic Behavior, and Organization, vol. 63, no. 3, pp. 412-422, 2007.

[11] D. K. A.-R. Al-Malah S. I. Hamed, H. T. S. ALRikabi, "The Interactive Role Using the Mozabook Digital Education Application and its Effect on Enhancing the Performance of eLearning," *International Journal of Emerging Technologies in Learning (iJET),* vol. 15, no. 20, pp. 21-41, 2020.

[12] D. Hillson and P. Simon, *Practical project risk management: The ATOM methodology*. Berrett-Koehler Publishers, 2020.

[13] T. Raz and E. Michael, "Use and benefits of tools for project risk management," International journal of project management , vol. 19, no. 1, pp. 9-17, 2001.

[14] L. Breslow, D. E. Pritchard, J. DeBoer, G. S. Stump, A. D. Ho, D. T. Seaton, "Studying learning in the worldwide classroom research into edX's first MOOC," *Research & Practice in Assessment* , vol. 8, pp. 13-25, 2013.