

An investigation into the Impact of Artificial Intelligence on the Future of Project Management

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Abstract— The purpose of the study is to investigate the impact of Artificial Intelligence on the future of Project Management. This study provides detailed conceptual information about Artificial Intelligence and different perspectives. Artificial Intelligence is defined as the new technical discipline, which would develop an application system, a technological method in order to simulate the expansion and extension of human intelligence. This research is a review that discusses how artificial intelligence affects project management. The paper has discussed various benefits of AI adoption and its implementation. The results show that technology and AI cannot replace the human mind. Machine and other AI robots can automate tools and tasks, but at the end of the day, machines need human help to operate and monitor.

Keywords—Artificial Intelligence, Automation, Project Management, Machine Learning.

I. INTRODUCTION

Under the umbrella of an Information and Communication Technology world revolution, AI presents many new tools and techniques to ensure higher quality and cost-effectiveness within the business environment. As well, AI applications are now increasingly making use of these new technological developments, and this trend appears likely to continue at a great pace in the future as seen in [Fig.1]. the evolution of AI through the years.

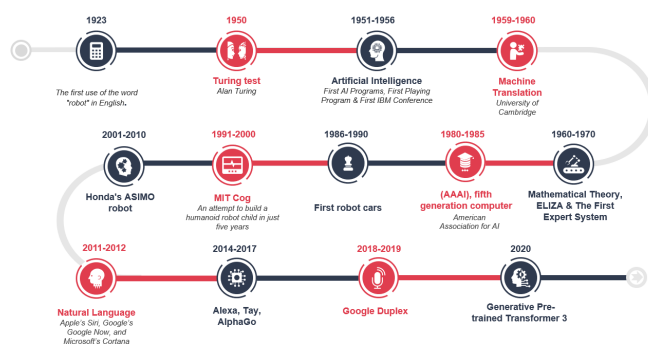


Fig. 1. Evolution of AI

In addition, AI integration in the business has led to the launch of smart environments, such as smart project management monitoring systems. Likewise, Project management has adopted Artificial Intelligence, which would provide positive outcomes in the future of project management activities.

However, Project Management (PM) is still young in the field of AI and needs more and more work in order to reach its primary goals. To this end, this research aims to find out answers to the main questions: What does AI mean from different perspectives? Why do we need AI in project management? What is the expectation of performance AI in automating project management tasks and activities? Moreover, does AI have the ability to reduce the need for human resources? And finally, how to get the maximum advantages from the new technology such as AI to support the delivering of better services?

Possible answers to these questions are summarized and planned as follows: definitions of the main concepts, the future of AI tools and techniques affecting the Project Manager role, and the last section will conclude this study with limitations and future research.

II. LITERATURE REVIEW

A. Definitions of Artificial Intelligence and Perspective

Artificial intelligence considered to be a part of computer science. Artificial intelligence (AI): In a purpose is to develop intelligent machines for the benefits of a human being [1]. Furthermore, due to the short life of Artificial Intelligence, there has been much argument among researchers about the definition of Artificial intelligence. There are numerous definitions of Artificial intelligence that exist in the published literature tending to reflect the researcher's specializations and their interests. Moreover, all of them are attempting to explain the concept of Artificial intelligence in the context of Artificial intelligence, in order to offer a broad range of technology that enhances performance and interaction with the organizations [2], [3], [4].

According to [5] Artificial intelligence is a branch of the computer science field. Different scientists are trying to improve and enhance intelligence in the field of computer systems. However, Artificial intelligence is not a new concept. With the emergence of electrical computers in the late 1940s and early 1950s, new concepts have appeared 'Electronic' or 'Digital.'

This is to distinguish between machines and humans. In the mid-1950s, Turing pointed out in his research that new electronic machines were designed to perform any operation performed by humans [6]. In this section, an organized comprehensive review and analysis presented with respect to the various perspectives and aspects. According to [7] Artificial intelligence (AI) defined as "applies advanced analysis and logic-based techniques, including machine learning, to interpret events, support and automate decisions,

and take actions.” The English Oxford Living Dictionary [8] provides an explanation of Artificial Intelligence and suggested that “The theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages.”.

On the other hand, from a business perspective, Finlay [9] in his book titled Artificial Intelligence and Machine Learning for Business defined Artificial Intelligence as “... the replication of human analytical and/or decision-making capabilities” Ema and her Colleagues [10] introduced another definition for Artificial Intelligence, which is defined as “intellectual machines and systems that could automatically sense people’s situations or expectations and offer necessary information before it is required.”.

In terms of Project management, the Project Management Institute gives a comprehensive definition for project management, which is “the tools, approaches, techniques, skills, and knowledge to meet the project requirements.” [11]. On the other hand, Automated Project Management (APM): Is a set of tools or approaches to automating project management activities and tasks [12].

As a result of the above discussion of Artificial Intelligence definitions in the literature, it can be observed that there is no standard single definition for Artificial Intelligence that can encapsulate what exactly Artificial Intelligence represents.

B. Benefits of Artificial Intelligence Adoption and Implementation

Artificial intelligence plays an important role at the edge of the technological world. It has both a bright side and a dark side. Therefore, the advantages and disadvantages are highlighted in this discussion below. Artificial intelligence or the adoption of artificial intelligence is used to process human intelligence to make effective decisions or solve problems.

AI gives the benefits of cost-effectiveness, reliability and permanency, and addresses some issues of uncertainty by drawing a conclusion or solving a problem [13].

Moreover, the adoption of AI and its implementation provide different types of benefits to different sectors and areas.

C. Barriers and Challenges of Artificial Intelligence and Implementation

The growing interest in Artificial Intelligence has positively influenced different industrial sectors, policy analysts, and the responsibilities of decision-makers. Similarly, the use of AI has disadvantages. Some of the disadvantages of AI and implementation as follows: One of the major implementing AI barriers is data availability. Data is inconsistent and siloed due to poor quality. AI can perform only those types and tasks that are programmed or designed. Adoption and implementation of AI are not so easy to develop due to expensive operation costs and equipment.

It takes lots of time to implement, repair, rebuild, and also to create. The rate of unemployment will be increased dramatically as the majority of the industry will replace the staff and workers with AI robots. Likewise, the adoption of AI will make a human being lazy as the bulk number of works will be completed by the machines without a very short period of time [14].

This leads us to say that the Adoption of AI will not work properly if there is no availability of the technical staff and shortages of skills. Technical staff with well-trained and experienced is required to operate and implement the AI in the business. If they cannot operate, the company will not be able to get lengthy implementation time. Lack of understanding of state systems and integration challenges. Interoperability and usability with other platforms and systems. On the other hand, Industries face challenges in different sectors due to AI adoption and implementation, which are as follows: as in the health care workers, many stakeholders in this field perceive the automated robotics differently, and they have feared that such AI automation will eventually replace the work of human staffs in the healthcare sector [15] influenced Intelligence plays a major role on the verge of the technological world. It has both a bright side and a dark side. Thus, both benefits and shortcomings are highlighted below in this discussion.

Adopting artificial intelligence or AI utilized to deal with human intelligence to make efficient decisions or solving a problem. AI gives the benefits of cost-effectiveness, reliability, and permanency, and addresses some issues of uncertainty by drawing a conclusion or solving a problem [13].

D. Artificial Intelligence and Project Management Best Practice

The emergence and application of Artificial Intelligence (AI) have been only limited to academic research in the past. As the description of AI continues to increase, success and the development of computer technology have aroused people's interest in the application of AI in various management fields. Project management needs a large amount of knowledge and expertise. There are three main issues that the project management face, which are:

- Analyzing many data, but there is no sufficient human resources and time available. This can be achieved by implementing AI.
- Rule-based schedule with the use of AI to get the solution.
- Computers can be manufactured by establishing sub-projects or project networks that demonstrate different manufacturing methods of AI. AI can make the entire process faster and easier [16].

Thus, the adoption of AI in project management is imperative and standard networks are not always suitable tools to create a new project network. Moreover, the use of AI and its methods can well meet business needs [16].

E. Impact on Project Management of Artificial Intelligence

Project management gets insight and support into possible outcomes through the adoption of AI. This will help to boost decision-making quality. The system helps to eliminate unnecessary and redundant information. Project planning uses auto-scheduling to make the plan more robust. PwC paper, for instance, mentioned that they use task status and progress status, which can be tracked very easily. This helps to provide an alert for the project manager [17].

AI uses different types of planning tools to support project management. The hybrid computer systems have been developed by using different knowledge processing techniques along with procedural techniques like network-based scheduling and decision analysis, which can provide some useful decision support for project control and project objective setting [18].

Predictive analytics and machine learnings are considered to have a positive impact on the outcomes of the project through the key areas of KPIs, resource management and estimation. Modern management techniques such as continuous allies and agile help eliminate some uncertainties [19].

The revolution of AI leads to the fear of reducing manpower and replacing it with the machines using AI. According to [20] in their research in team of the growth of automation, it will be in three different waves starting from early 2020 through late 2020 and mid of 2030.

As shown in [20, Fig.2], It is starting from the algorithm wave in early 2020 which focuses on the automating of analysis of structured data as well as automating simple and basic computational tasks. Second augmentation wave in late 2020 that focuses on the automating of repeatable tasks such as exchanging data, filling forms as well as communicating through dynamic technology and the analysis of unstructured data [20].

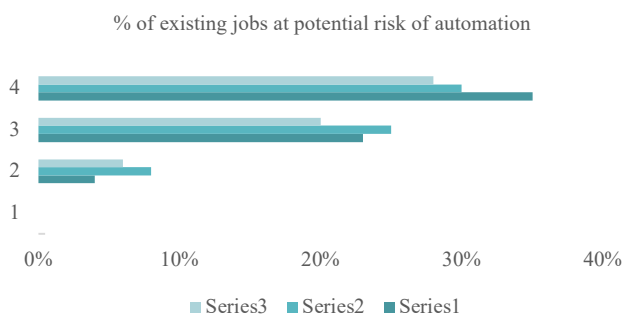


Fig. 2. Potential job automation rates by gender across waves

Last but not least, the autonomy waves in the mid of 2030 focus on the automating of manpower and manual dexterity besides the ability to solve problems efficiently and in a timely fashion without any difficulties in real-world situations that require responsible activities. Through the three waves from a gender perspective, male jobs might be at risk in the longer term, but female jobs could be more effective by automation.

According to [20] analysis, manpower could have a higher impact on automation rates. Among these three waves, the industry with the highest degree of automation is the manpower from the perspective of conventional processes, exchange of information and basic computing tasks. The nature of work for Senior managers, senior officials and professionals might be changed due to AI.

They tend to be highly educated and this will help them to adapt to the new waves of automation rather than being replaced with the machines they will remain to complement it. According to [7] 80% of daily work will be eliminated, such as data collecting, reporting and tracking by AI, as well as we will witness how the role of project managers will shift in order to integrate their skills and professionalism with AI capabilities into a new way of procedures and practices. Even more than that, transforming routine tasks to the machine will allow manpower to perform their ability to do other tasks that cannot be managed by AI.

From the project management perspective, AI can copy human minds like decision making and problem-solving. AI method is being used in search engines and speech recognition

systems like Siri and Google Search [21]. As shown in Table I. Munir [21].

TABLE I.
Tools on Automating Project Management Tasks

Tool Name	Description
Chatbots	It is created by the team members with the Api.ai platform in order to develop a lot of messaging that helped in asking team members different things like 'What is urgent?' 'Show that what the team is working on?' and 'What is happening at this day?'.
Zivebox	The use of AI is to determine the duration of the time needed to complete the task. It helps to analyze the productivity of every member of the team and also helps in sorting through the communication databases at enterprise-level
Rescoper	Assist in handling the tedious management parts so that the team stays more targeted
Clickup	Helps in predicting the best member of the team for some particular task and helps in assigning the tasks. It helps in tagging users to leave comments, which depends on the relevant contexts. It is responsible for visualizing updates and notifications. It enables to predict deadlines that fails to meet. It helps in making correct time estimates for specific tasks.
Polydone	The objective is to maintain the budget and time in an accurate manner.
Clarizen	This process helps to track and share data. Moreover, this tool allows the information to be more accessible to the IT people in making the customized decisions and workflows based on the requirements.

III. METHODOLOGY

In this research, the authors used secondary data. The Secondary data has been collected from the academic and authentic sources such as: (I) reviewing and analyzing the current literature in the area of AI and project management to provide a systematic understanding in general, with specific focus on current state-of-the-art of the AI development in the real time environment. (II) Additional studies beyond the scope of the evaluation activities for AI regular literature review and Internet searches carried out to assess the current state of research into AI and project management design. These include official reports and studies in the public domain, especially those related to AI and project management developments.

Data Analysis Techniques: The results of these searches are in reference to the application of artificial intelligence to project management. In this research stage, the authors used content analysis technique by comparing the abstract, introduction, result, analysis, and conclusion can determine whether the reference is relevant to the research or not. Bibliographies taken into consideration as well as future research were also checked. The references have been evaluated according to the relevance to the treatise. There is a mix of articles that focus on Artificial intelligence in Project Management. They were chosen to grasp the whole point.

IV. RESULTS AND DISCUSSION

Besides financial, budgeting management, planning, monitoring, strategic management, soft and risk management skills, the most critical skills are leadership and management

skills. All of these are rated as essential skills by more than 80% of businesses. In the coming future, there are some AI tools and applications that can help project managers in their tasks and make their life easier [22].

According to PwC's survey, "The Workforce of the Future" has found that 73% of people think technology can never replace the human mind. In addition, AI tools strongly depend on data input from project managers. Without proper guidance, such AI tools will never execute correctly. In parallel, AI, and project managers depend on each other. Project managers must perfectly expand their skills to manage AI.

Artificial intelligence still requires skilled project managers to add value and investment. In the near future, both manpower and AI skills are required so that a positive outcome can be achieved. Thus, project managers need to build and develop the skills, which would focus on the areas where AI could not achieve it.

The use of AI will require a diverse and flexible skillset to cope with future challenges as demonstrated in [24, Fig.3]. While many of the daily tasks from project manager's aspects can be automated by using the tools of AI, but the exact value of project management lies in the higher level of soft skills where human interaction can be found.

The team needs to communicate properly and negotiate with the stakeholders. They must discuss human needs, judgments and guidelines so that they can communicate with each other unimpeded [23].

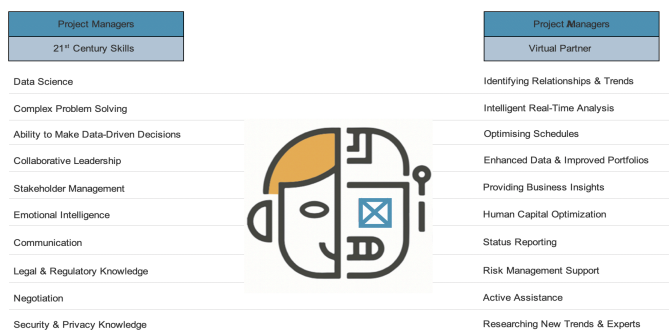


Fig. 3. Virtual Partner

V. CONCLUSION

Now is the era of technological progress, and it will continue to increase productivity in every field. The application of artificial intelligence is becoming more and more widespread. AI in project management is just a system that can help accomplish different project management tasks by using available resources.

As to the initial research question about the possibility of reducing the need for a human resource with AI, based on the investigation in this research, the expectation of performance AI in automating project management tasks and activities will be hard to meet the requirements of ambitious terms such as: Automated project manager.

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