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Role of Big Data - Shaping the Future of Project Management

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Abstract. Big data is reshaping the future of the project management by ushering in new era of data driven decision-making processes and improving efficiency in the organization. It is through the transformative force of big data that it has revolutionized the way in which projects are conceived and executed in different sectors. Project managers can rely on big data in integrating real-time data into the project management's operations and gain historical insights on the trend and successes of the projects. In this article, the aim is to assess the role of big data in shaping the future of the project management initiatives. Key concepts are discussed including the role of big data in planning and delivery, and this involves identifying the possible bottlenecks affecting the success of the project. It outlines the significance of big data in the project team environment, with the big data encouraging collaboration among the project team improving their productivity level and efficiency in conducting their activities. It is also integral in knowledge management with project managers relying on big data analytics in understanding the market trends and analyzing historical data. Other issues discussed relevant to the future of project management is efficient risk management and quality management, which are critical aspects in improving success of the projects and reducing cost of operations. As such, the future of project management is big data analytics.

Keywords. Big Data Analytics, Knowledge Management, Quality Management, Risk Management

I. Introduction

In the modern dynamic and data-driven sector, technology has helped to shape project management initiatives. Traditionally, project management did not rely on technology in the analysis of data. Still, the advent of big data analytics has meant that project managers have a wealth of opportunities to make informed decisions, enhance efficiency, and realize success in the projects initiated (Duan, Edward & Dwivedi, 2019). The aim of this article is to explore the role of Big Data in shaping the future of project management, including information on planning and delivery, project team environment, knowledge management, risk management, resource management, and quality management.

II. Big Data Analytics

Big Data analytics is viewed as a holistic perspective utilized by project managers in data collection, handling, and evaluation based on the 5V dimensions of big data – variety, volume, veracity, value, and velocity (Bragazzi et al., 2020). For the project management team,

the focus should be on generating practical concepts and determining the continuity of the project implemented. Some experts have suggested that big data analytics will be the next biggest concept facilitating innovativeness, productivity, and competitive edge among organizations (Pan & Zhang, 2021; Urbinati et al., 2019; Deepa et al., 2021). It is also considered as the paradigm of new knowledge assets, which can be derived from knowledge exploration (Ferraris et al., 2019). The decision-making process for the project managers can be improved when there is a selection of a project team that is knowledgeable and skilled in applying big data analytics tools to assess the projects and improve the overall productivity in the industry (Ferraris et al., 2019). Understanding the changing trends in the industry and the need for implementing big data analytics in managing projects can be effective for the implementation of different projects while integrating the services of the team (Duan, Edward & Dwivedi, 2019).

Bragazzi et al. (2020) outline that decision-making is an intricate and multi-dimensional process, which often occurs naturally and spontaneously, but in some instances, it requires considerable time and systematic planning. Moreover, Duan, Edward & Dwivedi (2019) mention the usability of big data in the decision-making process, which is integral in the implementation of different initiatives and achieving the intended objectives for multiple organizations. It is necessary to determine the usability and effectiveness of the data selected in making informed decisions, which can be integral for the project managers in implementing such initiatives (Ferraris et al., 2019). The quality management process requires the collection of a large volume of data for ease of assessment and determining the trend of such data in the industry (Ly et al., 2019). Data-driven entities tend to integrate their existing models with modern technologies and innovative models to understand the trends and patterns for project management and coherent analysis of the information. With the level of competition being high for resources and attracting customers, big companies will invest in Big Data analytics tools in the implementation of policy frameworks and models, capitalizing on the available resources in the industry (Ferraris et al., 2019).

III. Big Data Deluge and Project Management Planning and Delivery

Bag et al. (2020) mention the significance of planning to project management, as this is integral in realizing successful projects. In the planning phase, significance is placed on Big Data analytics in providing insight into the effective projects developed and the planning initiatives undertaken during this period (Ly et al., 2019). With the implementation of the Big Data analysis, there is the possibility of identifying potential bottlenecks in the project, which can be integral in the implementation of the project and addressing the effectiveness of the strategy in the completion of the project (Schniederjans, Curado & Khalajhedayati, 2020). Bilal et al. (2019) mentioned the effectiveness of the Big Data initiatives towards enhancing project efficiency and performance while reducing the cost of operations for such projects. Modern organizations are interested in cost reduction initiatives towards making their projects competitive, and this can be achieved by assessing the current trends in the industry and implementing measures to improve its productivity level (Schniederjans, Curado & Khalajhedayati, 2020). Big Data analytics tools are relevant in the planning phase, with the project managers proactively involved in addressing these issues.

Kamble & Gunasekaran (2020) mention the significance of real-time in the planning process, with the project manager relying on various sources in the project planning process. It allows the project manager to implement measures critical to improving the success of the

project. This can include undertaking dynamic adjustments based on the data available towards completing the project on time and maximizing the resources allocated to such a project (Ly et al., 2019). Bilal et al. (2019) indicate that this enhances the adaptability and agility of the project towards realizing the intended delivery. In ensuring that the plans are aligned with the changing business environment, the project manager should be adaptive to changes in the industry, and relying on Big Data helps in formulating mechanisms to improve its efficiency in the industry (Schniederjans, Curado & Khalajhedayati, 2020). With such initiatives, the project manager can utilize the information collected to determine the appropriate to achieve the intended goals and resource utilization.

Project Team Environment

The project team environment plays a crucial role in increasing productivity and facilitating collaboration among the members. With the implementation of policy frameworks, the project manager should consider the need for developing productive and reliable measures that are capable of necessitating interactions among team members and improving their commitment to the goal (Ly et al., 2019). Mikalef, van de Wetering & Krogstie (2021) emphasize the significance of big data in building dynamic capabilities by evaluating the previous and actual information related to the project and estimating the possibility of the project team maximizing their capabilities and improving the decision-making process. On the same note, Bag et al. (2020) mention the role of Big Data analytics in helping the project management team with resource allocation and optimization. Big companies rely on this information to increase their efficiency in resource allocation, and they might find Big Data analytics efficient in undertaking such initiatives (Schniederjans, Curado & Khalajhedayati, 2020).

Big Data tools are effective in skills matching and assisting the project manager in identifying specific employee's skills and competencies that will make them successful in the implementation of the project. Pan & Zhang (2021) outline the significance of skills matching and effective communication or team collaboration to complete the project. Basing the argument on multiple case studies, Urbinati et al. (2019) indicated that Big Data platforms have been effective in sharing real data and encouraging collaboration among the project team. Big Data analytics enables the project teams to share information seamlessly while staying connected, which can be integral in improving the overall productivity of the entity. An important aspect considered in project management is performance monitoring, which can be enhanced when using Big Data analytics (Mikalef et al., 2019). It can be effective in tracking team progress, identifying areas for improvement, and providing timely feedback. Such initiatives provide an avenue for maximizing the productivity of the project team members and increasing the efficiency of the operations.

Knowledge Management

Big companies can rely on Big Data analytics in knowledge management. It is through Big Data analytics that project managers can implement data-driven decision-making processes, especially with the project managers having a wealth of information in which they can easily analyze market trends and historical project data (Schniederjans, Curado & Khalajhedayati, 2020). This is relevant in guiding the project manager's needs in project planning and effective execution of the project. Another important aspect considered in Big Data analytics is risk management, where the future project manager will be based on identifying potential project

risks and implementing mechanisms towards maximizing its productivity level (Bragazzi et al., 2020; Bag et al., 2020)). For the project managers, using Big Data analytics helps in developing proactive risk mitigation strategies, which can be integral in realizing the effectiveness of the project management and increasing the commitment of the team.

Mikalef et al. (2019) mention the relevance of Big Data analytics in resource optimization, where knowledge management initiatives can be integral in improving the efficiency of operations. Project members are tasked with quality control initiatives in which there is monitoring of the project deliverables and quality issues. Big Data analytics is automated, and the quality control processes can be essential in detecting the possibility of deviations and defects by achieving the intended quality standards (Schniederjans, Curado & Khalajhedayati, 2020). Project managers rely on this information to realize continuous improvement of the project management initiatives. Bag et al. (2020) mention that there are two categories utilized in knowledge management initiatives, including knowledge exploration and knowledge exploitation. In the project settings, they are often dealing with ambidexterity of knowledge management, and it is necessary to understand the dynamic nature of the project management in influencing project success. As such, Duan, Edward & Dwivedi (2019) assert the significance of knowledge sharing realized from Big Data analytics, which reduces time and cost related to creating new knowledge in the project. There should be a flexible configuration in the sharing of knowledge for ease of aligning the demands of the project and the knowledge or skills required to complete the project (Ly et al., 2019). Project managers can benefit from knowledge exploration in developing new ideas and concepts to guide in the implementation of new projects.

Risk Management

The project risk factor analysis is critical in defining possible strategies for achieving the intended success of the project implementation (Pan & Zhang, 2021). Big Data analytics provide an assessment of risk identification by allowing organizations with the real-time identification of risks (Faroukhi et al., 2020). Information can be generated from the industry patterns and the key external factors in influencing the project implementation. It is through sentimental analysis, including social media and project documentation, which can be integral in addressing the emerging issues affecting project management. Considering the volume of the modern data and the significance of assessing the trends and patterns in the data towards improving its efficiency (Taleb et al., 2021). In conducting the real-time risk monitoring process, the project management can understand the performance of the previous projects, which can make it easier to implement early detection measures for risk towards improving the efficiency of the project (Pan & Zhang, 2021). The deterministic nature of the historical data helps the project manager to be certain of the changing trends in the project management initiatives and advise the key stakeholders on the potential outcomes of the project.

Social media companies, including Facebook and Twitter, rely on Big Data for predictive analytics and forecasting the perspective of individuals and their commitment to a project. Management can determine the possibility of risks by assessing relevant variables determining the position of the company in the industry (Pan & Zhang, 2021; Batistič & van der Laken, 2019). Another significant role of big data analytics in future project management is in risk scenario analysis, in which it is involved in simulating risk situations. Using the Monte Carlo Simulations, Big Data analytics will assess the different risk scenarios and their probability of occurrence in the implementation of the policies (Alzoubi, 2022). With such a

risk assessment plan, there is a possibility of improved productivity level and potential financial effect on the project (Batistič & van der Laken, 2019). In the case of supplier risk management, Big Data analytics can be influential in assessing the project's performances for the vendors and suppliers (Taleb et al., 2021). It is important to track their previous performances as a measure for improving productivity through the implementation of the project, which reduces the risks with the implementation of the project initiatives.

The service-oriented concept in modern organizations is becoming one of the fastest-growing models, which organizations can capitalize on in initiating their competitive growth models (Pan & Zhang, 2021). With this model, the decision-making process is fast and reliable, and it requires accuracy in the assessment of big data and the implementation of a decision-support system aligning with the needs and interests of the organization (Batistič & van der Laken, 2019). Furthermore, organizations are interested in keeping themselves up to date with the trends in technology and the latest initiatives through investing in data analytics and making informed decisions on their future development. Without considering the changing trends in the competitive landscape, organizations can find it challenging to focus on maximizing their productivity level or increasing their commitment to high-level performances in the industry (Alzoubi, 2022). It is necessary to improve the performance of the organization while considering the emerging trends in the dynamic industry. Project managers can focus on the right path to organizational success by developing mechanisms for handling the complexity and challenges of future organizations.

Quality Management

In the project management literature, the concept of total quality management (TQM) has been popularized, but organizations are still finding it difficult to implement in their projects (Huang et al., 2021). This can be partly due to a lack of innovative measures and technologies integrating the role of data analytics in the decision-making process (Mangla et al., 2021). Some organizations are still relying on the traditional methods of data collection, which is often not real-time, and it influences the overall effectiveness of the project. TQM has experienced a significant revolution, with the initial companies considered to be reactionary, but the fourth industrial revolution will see the implementation of TQM in changing the project management initiatives (Huang et al., 2021; Kastouni & Lahcen, 2022). This is realized by creating new values and improving the quality of project management initiatives. Project leaders can rely on the TQM model in establishing direction for adopting the Big Data analytics tools, and this can be based on its effectiveness in increasing customer satisfaction levels (Escobar, McGovern & Morales-Menendez, 2021).

The increasing demand for deep learning has meant that business initiatives are targeted at using big-data-related technologies and AI to improve their business operations (Kastouni & Lahcen, 2022). Big data analysis is integral in improving the efficiency of operations and creating value for the customers. Often, it can exceed customer expectations, but it is beneficial to the organization when it is extracting hidden information and creating disruptions that can trigger strategic responses toward implementing quality measures, which is integral in the implementation of a policy framework (Mangla et al., 2021). In modern organizations, artificial intelligence and machine learning are actively used in the analysis of data and visualization of the trends in the customer's reported demands (Nallaperuma et al., 2019). This will be integral in increasing the competitive edge of the company while prioritizing the quality of services offered to the consumers (Sang et al., 2021). As such, Big Data analytics

will be relied on in organizations and project management to ensure that there is continuous improvement and necessitate innovation in the operations of the company.

IV. Conclusion

Modern organizations appreciate data and its effect on influencing product development and the provision of services to the target consumers. Maximizing Big Data analytics and providing project management with data relevant to making informed decisions is the future of most organizations globally. Although there have been recent challenges facing organizations when implementing technology, consideration should be on mechanisms that can achieve a competitive edge in the industry while focusing on improving productivity in the industry. Through continuous improvement of organizational activities and decision-making processes, big data analytic tools can help shape the future of organizations by ensuring they remain competitive and meet the emerging needs and demands of consumers. Starting from the planning phase of the project to quality improvement, big data analytics will improve the project implementation process, and it will be integral in achieving a competitive edge in the dynamic industry.

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