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A Systematic Literature Review: The Role of Big Data on Project Management and Project Sustainability

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Abstract:
Technological developments place demands on human work to be able to adapt quickly in processing data by utilizing big data. Big data has a role to increase productivity and reduce risks associated with projects. Utilizing the advantages of Big Data can reduce these losses and maximize productivity with existing materials. Effective project management can be achieved through the use of Big Data to enhance stakeholder engagement and project planning. Moreover, the use of Big Data to improve project management and promote project sustainability is still considered the pinnacle of value that can be achieved by its implementation. Big data is still not widely used, and most initiatives rely on more abstract concepts. Although several studies have looked at how Big Data can be used in many industries, the results are still not considered very thorough or clear. Therefore, the purpose of this study is to identify the benefits of big data for project management and project sustainability, so that later the strongest aspects will be found which make the reasons why the use of big data is needed in all industrial or corporate projects. This research method uses systematic literature. The sample in this study included 20 identified articles out of 171 articles taken by purposive sampling through journal indexing portals in the form of Google Scholar and Scopus. Data collection techniques used PICOS and a Systematic Review Diagram based on PRISMA with data analysis in the form of mapping using the Systematic Review model. The results state that the role of big data in project management can be seen when a company is successful in running an information acquisition system easily and quickly to reduce risks in the projects it designs. Any company can use this work to improve project management and sustainability, enabling more efficient structuring and planning.

Keywords: big data, project management, project sustainability.

系统的文献回顾：大数据对项目管理和项目可持续性的作用

摘要：
技术发展对人类工作提出了要求，以能够利用大数据快速适应处理数据。大数据可以提高生产力并降低与

项目相关的风险。利用大数据的优势可以减少这些损失并最大限度地提高现有材料的生产率。通过使用大数据来加强利益相关者的参与和项目规划，可以实现有效的项目管理。此外，使用大数据改善项目管理和促进项目可持续性仍然被认为是其实施可以实现的最高价值。大数据仍未得到广泛应用，大多数举措都依赖于更抽象的概念。尽管有几项研究着眼于如何在许多行业中使用大数据，但结果仍然不够彻底或清晰。因此，本研究的目的是确定大数据对项目管理和项目可持续性的好处，以便稍后找到最强大的方面，这就是为什么所有工业或企业项目都需要使用大数据的原因。本研究方法采用系统文献。本研究中的样本包括171篇文章中的20篇已识别文章，这些文章是通过谷歌学术和斯科普斯形式的期刊索引门户网站进行有目的的抽样。数据收集技术使用"人口、干预、比较、结果和研究"和基于系统审查和元分析的首选报告项目的系统审查图，并使用系统审查模型以映射形式进行数据分析。结果表明，当一家公司成功地轻松快速地运行信息采集系统以降低其设计项目的风险时，大数据在项目管理中的作用就可见一斑。任何公司都可以利用这项工作来改进项目管理和可持续性，从而实现更高效的结构和规划。

关键词：大数据、项目管理、项目可持续性。

1. Introduction

The understanding of the term "Sustainability" or sustainable development has existed for a long time, but the importance of sustainability in projects allows for the development and increases the sustainability of projects in the years to come. Project sustainability includes three main interrelated and supportive pillars, namely economic development, social development, and environmental preservation (Priyanto et al., 2021). Almost a third of the world's Gross Product (total global GDP) is realized through projects, which shows a significant impact on a more sustainable future by incorporating the principles of sustainability in project management (Økland, 2015).

By paying attention to the pillars or principles of sustainability of a project, it is easy to pay attention to the process and project design properly for the future (Wirawan, 2021). The concept of project management can be defined as a process of how an organization or company can do something with a systematic approach to achieve project results with existing constraints such as budget, schedule, and quality in planning, organizing, leading, and controlling project activities, managing resources, human resources and other resources so that they can achieve the project goals that have been determined with the aim that they can be managed effectively and efficiently to be able to manage management functions optimally and achieve organizational goals (Arianie & Puspitasari, 2017).

Aspects of project management that need to be considered are technical aspects, managerial and administrative aspects, organizational aspects, commercial aspects, financial aspects, and economic aspects (Slamet, 2016). In a project, inefficiency problems often arise that cause low productivity, the global economy that reduces costs up to trillions per year makes project management required to utilize various technologies, one of which is Big Data (Barbosa et al., 2017).

Big Data is defined as high-volume, high-speed, and diverse information assets that demand innovative, cost-effective forms of information processing that enable enhanced insight, decision-making, and process automation (Hassani & Gahnouchi, 2017).

Big Data is one of the technologies that change business dynamics by facilitating innovation in products and services, increasing productivity, decision-making, and organizational capabilities in carrying out a project (Ram et al., 2019). In achieving efficiency and reducing the negative impact on a project, Big Data becomes a logical way to relieve some of the pressures faced by companies (Barbosa et al., 2017).

Big Data collected at various stages in the project cycle can provide new insights, thereby enhancing predictions and better decision-making (Bilal et al., 2017). The benefits of using Big Data can minimize such waste and increase resource efficiency. Using Big Data to gain insight into stakeholder engagement and project planning can lead to productive and efficient project management (Ekambaram et al., 2018). The use of Big Data discussed above is still considered the highest peak of value that can be created by its use in improving project management and stimulating project sustainability. There are still very few projects that adopt Big Data and usually only use general knowledge or insights. Although several studies have examined the application of Big Data in all industrial contexts, these studies are still not considered very in-depth and unclear (Ram et al., 2019). Therefore, in this study, a literature review will be conducted to identify the benefits of big data on project management and project sustainability. So that later the strongest aspect will be found that makes the reason why the use of big data is needed in all industrial projects or companies. This review of literature reviews can be used by every company to improve project management and project sustainability so that they can be structured and planned effectively and efficiently.

2. Background Theory

2.1. Big Data

In general, big data can be interpreted as a very large data set (volume), very fast changing/growing (velocity), comes in various forms/formats (variety), and has a certain value (value), provided that if it comes from accurate source (veracity) (Yu & Zhou, 2019). The main thing that distinguishes big data from conventional data sets lies in the management mechanism (Mikalef et al., 2018). Relational database systems, which are currently commonly used, have been felt unable to handle the complexity of big data optimally (Intezari & Gressel, 2017). Some researchers and practitioners consider big data (Joseph et al., 2018) to be data that comes from various data sources including sensor data, satellites, social media, photos, videos, etc., and data from mobile phones. Structured data comes from sales and production transactions, while unstructured data from social media such as Twitter, Facebook, WhatsApp, Instagram, CCTV, and other social media can be processed by this technology. The benefits of Big Data technology have been widely felt in various sectors. Companies engaged in the business sector can take advantage of the valuable information generated by Big Data to optimize the decision-making process so that the target of maximizing profit can be achieved (Wang et al., 2018). Meanwhile, institutions engaged in public services can use information output from Big Data to maximize the level of service satisfaction to their clients/customers (Depari et al., 2022). Structured data comes from sales and production transactions, while unstructured data from social media such as Twitter, Facebook, WhatsApp, Instagram, CCTV, and other social media can be processed by this technology. The benefits of Big Data technology have been widely felt in various sectors. Companies engaged in the business sector can take advantage of the valuable information generated by Big Data to optimize the decision-making process so that the target of maximizing profit can be achieved (Wang et al., 2018).

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2.2. Project Management

Project management is the process of planning, organizing, leading, and controlling the activities of organizational members and other resources so that they can achieve predetermined organizational goals (Zasa et al., 2020). The purpose of project management is to be able to manage management functions to obtain optimum results following existing and predetermined requirements and to be able to manage resources as efficiently and effectively as possible (Zidane & Olsson, 2017). Project management is designed to avoid or minimize project failures and risks (Kerzner, 2017). Companies need to strive to improve the quality of services provided through structured planning so that it is more optimal in the use of resources which will have an impact on the efficiency of the company's internal performance. Without good project management, the company's work performance can decrease to meet customer demands. Good project management can make the project implementation phase more detailed and efficient (Wideman, 2022).

2.3. Project Sustainability

There are many definitions of Sustainability, but it is generally assumed that Sustainability means a balance of economic, social, and environmental objectives and the impact of human activities (Kuchta & Mrzygłocka-Chojnacka, 2020). Project sustainability is also used in project management which defines the ability of the team to carry out the project (Pade-Khene et al., 2011). It refers to how a management team can design, complete, and decommission a project while ensuring that the company's current needs are met and planning how people in the future can manage the outcomes of the project. There are several main types of this concept. Sustainability principles must dominate every business context and organizational management (Wiek et al., 2012). The project management area is no exception. Even if projects are increasingly globalized, they also pose challenges for communities and local governments, with sustainable development being one of these challenges. Sustainability means that a project cannot be considered successful if the main project stakeholders are not satisfied with the project's results and impacts at an adequate level (Turner & Zolin, 2012).

3. Methodology Review

This study uses a systematic review of the literature research approach that is guided by the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) by (Salameh et al., 2020). The existence of this research review allows researchers to identify and map similar research topics simultaneously. This study aims to generate and map variables related to the role of big data in Project Management and Project Sustainability. To answer the research questions, the researcher formulated a research question based on the structure of Participants, Intervention, Comparison, Outcomes, and Time/Study design-optional (PICOS), see Figure 1. Thus, the research questions obtained in this systematic review of the literature are as follows:

RQ1: What is the role of big data in Project Management?

RQ2: What is the role of big data in Project Sustainability?

Participants	All Companies
Intervention	The Role of Big Data
Comparison	N/A
Outcome	Mapping of The Bigger Role of Big Data in Project Management and Project Sustainability

Figure 1. RQ as structured by PICOS criteria

3.1. Overview of Systematic Literature Review Process

In the process of this systematic review of the literature, the researcher uses a journal indexing portal that is accessed through Google Scholar and Scopus. The article search process is tailored to the research topic, namely focusing on the role of big data in Project Management and Project Sustainability. The process of a systematic review of the literature in this study begins with determining the category of strings or coding used to search for related articles. In this case, the researcher uses the strings “The Role of Big Data on Project Management” and “The Role of Big Data on Project Management”. Through the search string, the researcher then began to search for articles using search engines and collected the articles before data reduction and extraction were carried out. The first discovery through Google Scholar, researchers obtained data from as many as 114 articles. While on Scopus, researchers obtained 57 articles. Furthermore, the researchers carried out data reduction and extraction by identifying the suitability of the topic, the completeness of the inclusion and exclusion criteria, and removing the duplication of topics. The detailed systematic review process is described in Figure 2. The final results of the extraction on the three journal indexing portals, researchers obtained 30 identified articles.

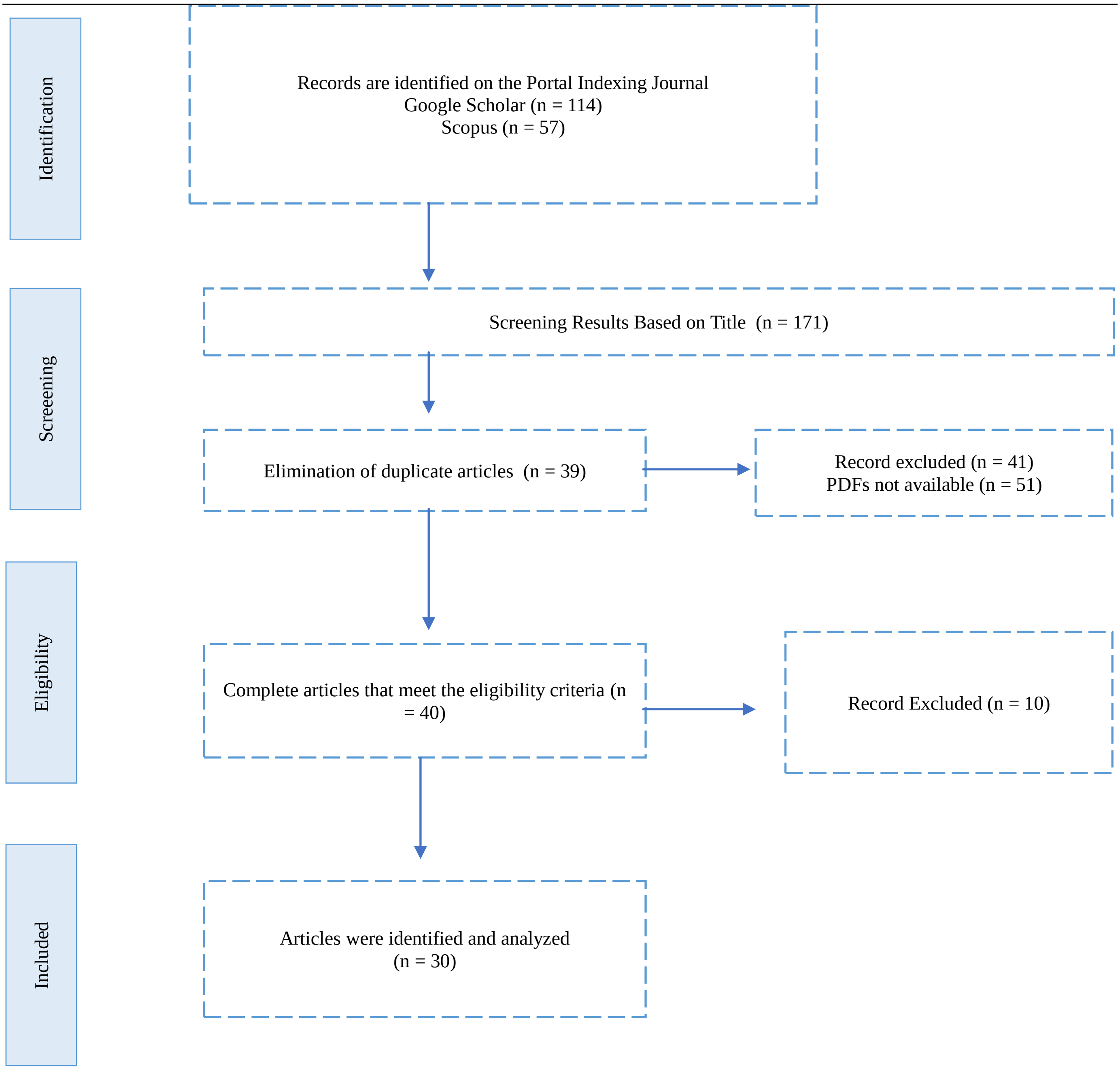

Figure 2. Systematic review diagram based on PRISMA

3.2. Data Extraction

The data extraction process in this study focuses on the role of big data in Project Management and Project Sustainability. Extraction was carried out on 40 articles that were identified according to the criteria. By extracting data, researchers can map the dominant and significant role of big data from article search results. The final result of this process is the identification result in the form of mapping the role of big data in Project Management and Project Sustainability.

3.2.1. Search String

In this study, string search is the initial stage to identify articles that are appropriate to the research topic. The string used is based on the keywords contained in the article title, which is focused on the role of big data in project management and project sustainability. In using the keywords “Big Data on Project Management” and “Big Data on Sustainability.” Researchers experience a bit of difficulty when identifying articles with keyword strings. Therefore, the researcher uses an additional string in the form of "The Role of Big Data" which provides an overview of the existence of other related variables. The application of this search is carried out on the Google Scholar and Scopus indexing journal portals.

3.2.2. Inclusion and Exclusion Criteria

In this study, there are inclusion and exclusion criteria set with the aim of limiting the space for identifying articles so that in the process of mapping the results, researchers can map factors that are relevant to the research topic. The criteria shown in Table 1 are determined in this study.

Table 1. Inclusion and exclusion criteria

Inclusion	Exclusion
- Articles in English	- Article using a language other than English
- Articles are included in the category of journals and proceedings	- Articles are not included in the category of journals or proceedings
- The article focuses on the research topic, namely the role of big data in Project Management and Project Sustainability	- The article is relevant to the research topic but does not address its intended role
- Articles published in the range 2016 -2022	- There are duplicate articles
- Articles can be downloaded to simplify the analysis process	- The article is relevant to the research topic but cannot be downloaded so it cannot be analyzed

4. Results and Discussion

4.1. Distribution of Papers

Based on the results of research data extraction, researchers obtained 30 identified articles on the Google Scholar and Scopus journal portals with a range of 2016 – 2022. The distribution of these articles can be seen in the following figure 3. Based on the table 1 above, the final reduction results were obtained at the article extraction stage.

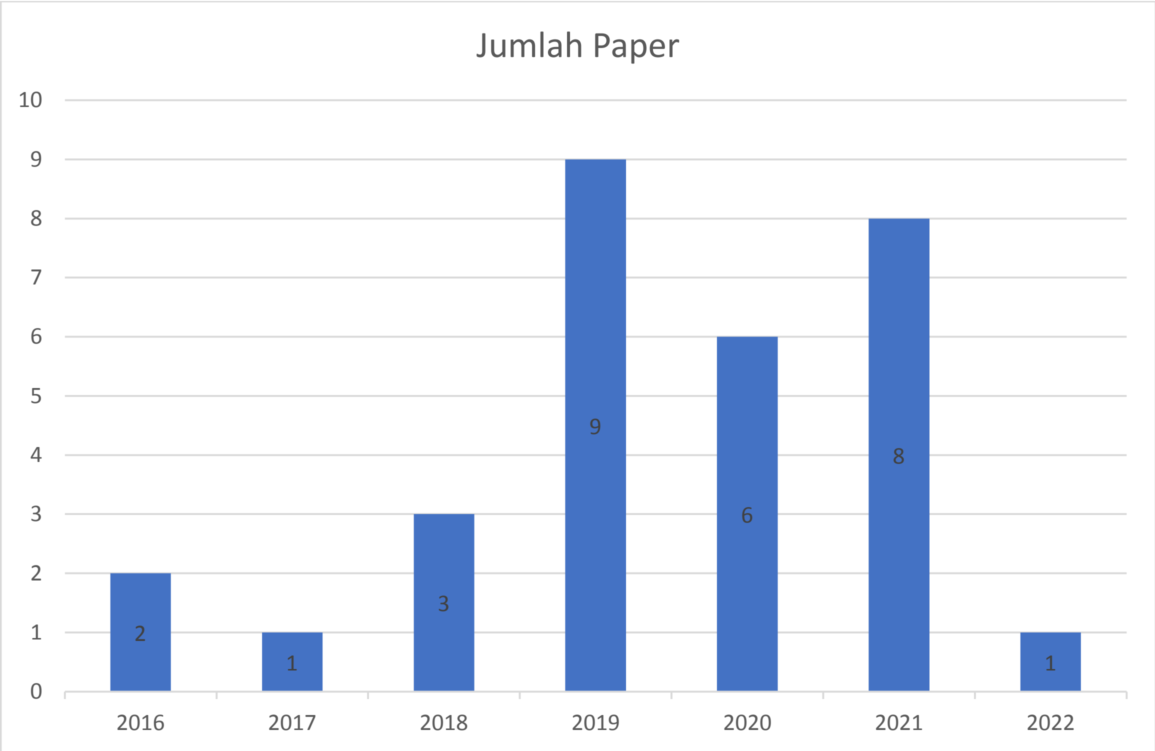

Figure 3. Article distribution

A total of 30 articles were collected and analyzed after going through a selection process based on inclusion and exclusion criteria. The results of paper distribution from 2016 – 2022 show that there are 9 articles related to the research topic, namely the role of big data in project management and project suitability in 2019, namely 9 articles with Scopus indexing. Then the lowest number of publications was in 2017 and 2022. Therefore, the role of big data in project management and project suitability needs to be further explained in this research.

4.2. The Role of Big Data in Project Management

Big data is a form of progress in the field of technology that is developing and needed at this time where its role is to store large data and integrate one data with other data. In project management, big data is used in various fields to help manage company databases effectively. The results of the study show that several management projects prefer to use big data to help manage and summarize their databases so that it makes it easier for companies to organize and manage their data. Here are some management projects that involve big data in their projects.

Table 2. Big data used in the projects

PID	Author	Title	Kinds of Project
5	(Franková et al., 2016)	Agile project management approach and its use in big data management	Agile project management

Continuation of Table 2

9	(Miller, 2019)	Quantitative Comparison of Big Data Analytics and Business Intelligence Project Success Factors	Business Intelligence Project
15	(Batkovskiy et al., 2019)	Sustainable Project Management for Multi-Agent Development of Enterprise Information Systems	Multi-Agent Development of Enterprise Information Systems
21	(Papadaki et al., 2019)	Big data from social media and scientific literature databases reveals relationships among risk management, project management, and project success	Big data from social media and scientific literature databases
23	(Ram et al., 2019)	Adoption of Big Data analytics in construction: development of a conceptual model	Augmented BDBIM integration, BD relative advantage, Improved design and execution efficiencies, Improved Project Management capabilities, Augmented availability of BD-related technology for construction
77	(Piyathanavong et al., 2022)	Role of project management on Sustainable Supply Chain development through Industry 4.0 technologies and Circular Economy during the COVID-19 pandemic: A multiple case study of the Thai metals industry	Sustainable Supply Chain development

Based on the table 2 (Storey & Song, 2017), using big data in project management is useful for making projects on the system operate more quickly. Big data in their research is implemented by improving the data in small cases that occur especially in data analysis errors. Not much different, (Sharma et al., 2021) shows that big data has a big role in identifying BI (Business Intelligence) projects. The big data utilized in Gloria's research plays a role in providing analytical algorithms to the system so that the operation of large amounts of BI protection can be carried out in correlation with one another. In BI projects, big data correlates with BI project systems which consist of strategic and operational benefit items from cost and revenue performance. Meanwhile, project complexity is driven by the characteristics of BI projects. In other words, each correlated item in the system can be read by big data analysis, where operating the system makes it easier for companies to analyze data. In line with (Raguseo, 2018) which revealed that the use of big data at the international level was carried out by several companies where the achievement stages were 29% (in the planning stage), 24% in the implementation stage, and 13% (in the utilization stage). This statement implies the important role of big data in managing a company's project management.

Furthermore, (Nagoev et al., 2021) stated that there was the development of support for algorithmic decision-making based on multi-agent simulations. The company is also testing a heuristic method intended to rationalize the parameters of the model. The advantage of the developed multi-agent model compared to models referred to by similar studies lies in the high level of detail in the information system building process (task setting, requirements review, development, familiarization, etc.) taking into account personal preferences. Aleksandr offers a hybrid method, which makes it possible to identify preferences for multi-criteria analysis of options for multi-agent models of the development process. It covers the entire expert scoring system in terms of high dimensional criteria, including both qualitative and quantitative components. The software developed includes independent services that interact with each other using network data transfer protocols, which makes it easy to adapt and upgrade models to meet changing needs. The integration of multi-agent decision support and simulation methods within the framework of a common system provides a synergistic effect in the development management and introduction of enterprise information systems. This is where the utilization of big data intended by Aleksandr is in the form of a support system based on multi-agent simulations. Big data makes multi-agent systems have a preference for identifying and reviewing information systems running within the company. Similar research was conducted by (Duan et al., 2019) who examined the data governance of a company where big data plays its role by providing new techniques in terms of managing, providing, and processing company data. The presence of big data as a storage space for company data makes it easier for system operators to collect data and provide accurate and more transparent data.

Research by (Lai et al., 2018) shows the benefits of big data which helps company managers to understand the factors that drive big data in reconstruction and plans to adopt sustainable policy-making to increase the company's economic, social and environmental benefits. Jiwat said that there are several factors in the adoption of big data in corporate construction including technology, increased integration, organization, and corporate environment, where the role of big data can build project management, project success, and structured risk management. Not much different, research by (Willumsen et al., 2019) was able to identify patterns and practitioners' opinions originating from Twitter media in project management, project success, and risk management by operating the system using big data analysis. The latest research related to big data in project management was conducted by (Piyathanavong et al., 2022). He explained the use of Big Data and data analytics to manage and analyze collected data to optimize the production process. It should be noted that Industry 4.0 technologies such as Big data, data analytics, cloud technology, IoT, automation, robotics, and simulation have been implemented to support company operations.

Based on the findings above, researchers understand that big data has a large role in the data management process for companies and other industrial institutions. Big data has a positive influence on the continuity of the accessibility revolution, processing and managing large amounts of data more efficiently and effectively, without requiring a long time to identify information in the system. Big data correlates a searched problem with other factors to identify information in the data collection system, making it easier for operators to find the data analysis. Therefore, the use of big data in project management needs to be matured, especially in terms of operating data which is far more complex.

4.3. The Role of Big Data in Project Suitability

Based on the following data, it can be seen that big data has various roles and can be found in various sustainability projects in the following 2016-2022 range (Table 3).

Table 3. Sustainability projects in 2016-2022

PID	Author	Title	Project Types
16	(Bibri, 2019)	Big Data Science and Analytics for Smart Sustainable Urbanism (Unprecedented Paradigmatic Shifts and Practical Advancements)	Analytics for Smart Sustainable Urbanism
17	(Moro Visconti & Morea, 2019)	Big Data for the Sustainability of Healthcare Project Financing	Healthcare Project Financing
33	(Beier et al., 2022)	Potentials of big data for corporate environmental management	Corporate environmental management
43	(Zhang et al., 2020)	Achieving the Success of Sustainability Development Projects through Big Data Analytics and Artificial Intelligence Capability	Big Data Analytics and Artificial Intelligence Capability
51	(Andronie et al., 2021)	Sustainable Cyber-Physical Production Systems in Big Data-Driven Smart Urban Economy: A Systematic Literature Review	Sustainable Cyber-Physical Production Systems
52	(Andronie, Lăzăroiu, Iatagan, Uță, et al., 2021)	Artificial Intelligence-Based Decision-Making Algorithms, Internet of Things Sensing Networks, and Deep Learning-Assisted Smart Process Management in Cyber-Physical Production Systems	Artificial Intelligence-Based Decision-Making Algorithms, Internet of Things Sensing Networks, and Deep Learning-Assisted Smart Process Management
54	(Chalmeta & Barqueros-muñoz, 2021)	Using Big Data for Sustainability in Supply Chain Management	Supply Chain Management
62	(Choi et al., 2021)	The Engineering Machine-Learning Automation Platform (EMAP): A Big-Data-Driven AI Tool for Contractors' Sustainable Management Solutions for Plant Projects	A Big-Data-Driven AI Tool
68	(Hinojosa-Palafox et al., 2021)	An Analytics Environment Architecture for Industrial Cyber-Physical Systems Big Data Solutions	Industrial Cyber-Physical Systems Big Data Solutions
75	(Mandičák et al., 2021)	Supply Chain Management and Big Data Concept Effects on Economic Sustainability of Building Design and Project Planning	Supply Chain Management and Big Data Concept
78	(Gunasekaran et al., 2017)	The impact of big data on world-class sustainable manufacturing	world-class sustainable manufacturing
80	(Papadopoulos et al., 2017)	The role of Big Data in explaining disaster resilience in supply chains for sustainability	disaster resilience in supply chains for sustainability
81	(de Pablos & Lytras, 2018)	Knowledge management, innovation, and big data: Implications for sustainability, policy-making, and competitiveness	Sustainability, Policy Making, and Competitiveness
87	(Zeng, 2018)	Fostering path of ecological sustainable entrepreneurship within big data network system.	Ecological sustainable entrepreneurship
88	(Belaud et al., 2019)	Big data for agri-food 4.0: Application to sustainability management for by-products supply chain	Big data for agri-food 4.0
89	(Ren et al., 2019)	A comprehensive review of big data analytics throughout product lifecycle to support sustainable smart manufacturing: A framework, challenges, and future research directions	Big data analytics
114	(Hao et al., 2019)	Big data, big data analytics capability, and sustainable innovation performance	big data analytics
121	(Dubey et al., 2019)	Can big data and predictive analytics improve social and environmental sustainability?	Social sustainability and environmental sustainability
123	(Zhang et al., 2020)	Achieving the success of sustainability development projects through big data analytics and artificial intelligence capability	Sustainable Innovativeness
135	(Lucivero, 2020)	Big data, big waste? A reflection on the environmental sustainability of big data initiatives	Environmental Sustainability

Continuation of Table 3

137	(Zhang et al., 2020)	Achieving the success of sustainability development projects through big data analytics and artificial intelligence capability	Sustainable Growth and Performance
157	(Allen et al., 2021)	A review of scientific advancements in datasets derived from big data for monitoring the Sustainable Development Goals	Sustainable Development Goals (SDGs)
171	(Chalmeta & Barqueros-muñoz, 2021)	Using big data for sustainability in supply chain management	Sustainability in Supply Chain Management

Some of the roles of big data in project sustainability can be identified from research conducted by (Bibri, 2018) regarding Analytic for Smart Sustainable urbanism which suggests that the role of big data, in this case, is related to the complexity of urban technology which relates to the creation of smart cities which have high levels of system complexity related to scientific relevance and usability. Furthermore, in another study conducted by (Moro Visconti & Morea, 2019) regarding Healthcare Project Financing, it was stated that big data has a large role in health care which is included in the industry category which is very networked and systemic. Big data is used to provide timely feedback for continuous business model re-engineering, reducing the gap between forecasts and actual events. Then in research by (Beier et al., 2022) regarding Corporate Environmental Management, it was stated that big data is the first orientation of companies where potential benefits can be made for corporate environmental management. Furthermore, in another study conducted by (Zhang et al., 2020) on Big Data Analytics and Artificial Intelligence Capability, it is known that Big Data has a role in increasing the sustainability of innovation and organizational growth, where BDAC and AIC increase sustainability design skills and commercialization, with AIC have a greater impact on commercialization ability. Another study conducted by (Andronie, Lăzăroiu, Iatagan, Hurloiu, et al., 2021) on Sustainable-Cyber Physical Production Systems demonstrated that sustainable smart manufacturing platforms can be networked to assimilate value chains across businesses and are a form of innovative industry assisted by cognitive decision-making algorithms.

In contrast to some of the studies above (Zhang et al., 2020) argue that big data plays a role in increasing the sustainability of innovation and organizational growth, BDAC and AIC increase sustainability and commercialization design proficiency, with AIC having a greater impact on commercialization capabilities. The research conducted by (Sharon & Lucivero, 2019) argued that big data has a very big opportunity to use for the needs of public institutions. Furthermore, (Zhang et al., 2020) through their research regarding Big Data Analytics Capability (BDAC) and Artificial Intelligences Capability (AIC) again revealed that BDAC and AIC have equally sustainable performance growth. Furthermore, in research conducted by (Allen et al., 2021) regarding Sustainable Growth and Performance, data in the form of Big Data from a country can be used as a reference for measuring the level of poverty and opportunities for a sustainable life in that country. Whereas (Chalmeta & Barqueros-muñoz, 2021) revealed different things in their research on Sustainability in Supply Chain Management, namely managerial ability and technical skills are important things in managing big data.

In a different study, (Choi et al., 2021) suggested that big data contributes to strengthening risk response, increasing accuracy even in the development of more complex AI. Furthermore, (Marjani et al., 2017) argue that big data also has a very important role in the world of architecture. This is because the use of the latest architectural designs already involves the role of technological developments where big data is properly needed. In addition, (Kache & Seuring, 2017) in their research on Supply Chain Management and Big Data Concept suggest that big data is used in building design management and achieving the effectiveness of construction production cost parameters. Furthermore, in research conducted by (Dubey et al., 2021) regarding World Class Sustainable Manufacturing, it is known that social media on SNS has great opportunities in terms of opportunities for data collection, but its application is hindered by factors of data authenticity and ethical issues.

Finally, in the latest research conducted by (Abdullah et al., 2022), it is known that big data also has an important role in education, especially concerning the development of applications in mathematics education. Based on data from the various studies that the researchers described above regarding the role of big data in a sustainability project, it can be concluded that big data has a very important and diverse role, starting from the economic sector, information technology, artificial intelligence, architecture to the realm of education.

4.4. The Correlation between Big Data, Project Management, and Project Sustainability

Based on the previous research collected, it can be concluded that big data, project management, and project sustainability are interrelated in various ways. Big data refers to large volumes of data, both structured and unstructured, that can be analyzed to reveal patterns, trends, and associations (Kivilä et al., 2017).

Big data can be used to identify areas of improvement, make informed decisions, and predict future outcomes. Other than that, project management refers to the practice of planning, organizing, and managing resources to achieve specific project goals. Project management involves various activities, such as project planning, scheduling, risk management, budgeting, and communication. However, project sustainability refers to the ability of a project to meet the needs of the present without compromising the ability of future generations to meet their own needs. Project sustainability involves the identification of environmental, social, and economic impacts and the implementation of measures to minimize those impacts (Epstein et al., 2018).

Big data can be used in project management to analyze and predict project outcomes, improve decision-making, and identify potential risks and challenges (Duan et al., 2019). Project managers can use big data to gather insights into project performance, identify areas for improvement, and adjust project plans accordingly. Furthermore, big data can also be used to measure the environmental, social, and economic impacts of a project, which is a critical component of project sustainability (Bibri, 2018). By analyzing data on resource use, carbon emissions, and other environmental and social factors, project managers can identify ways to reduce the project's impact and ensure its long-term sustainability.

In turn, project sustainability can be integrated into project management practices to ensure that projects are designed, implemented, and managed in a way that minimizes negative impacts on the environment, society, and the economy. This can include setting targets for reducing carbon emissions, using sustainable materials and energy sources, and engaging with stakeholders to ensure that their needs are met (Karlsson et al., 2020).

Overall, big data, project management, and project sustainability are interconnected, and incorporating all three into project planning and management can help ensure the success and long-term sustainability of projects (Sánchez, 2015). Therefore, the collaboration of the three variables, based on the research result of this research, are selected to be a basic data for further research whose the researchers want to collaborate the use of three variables to develop any innovation.

5. Conclusion

Based on the findings of the study, experts concluded that big data plays an important role in the data management of companies and other industrial organizations. Big data is helping the accessibility revolution continue by processing and handling large amounts of data more effectively and quickly, without requiring lengthy processes to find information in systems. Big data makes it easier for operators to find data analysis by relating the searched problem to other criteria to identify information in the data collection system. As a result, big data needs to be used in project management more effectively, especially when it comes to operational data, which is much more complex. Big data plays a significant and diverse function in a sustainability project, ranging from the financial sector, information technology, artificial intelligence, and architecture to the education sector. As a result, according to the findings of the literature review, big data plays a role in project management when a business successfully operates an information acquisition system quickly and easily to reduce risks in the projects it develops. On the other hand, big data helps identify information in project management for sustainable projects so that plans can be implemented with minimal risk. This literature review can be used by any organization to improve project management and project sustainability, enabling better and more effective structuring and planning.

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