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A STUDY OF ARTIFICIAL INTELLIGENCE AND ITS INFLUENCE ON LEADERSHIP

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Abstract
The current study attempts to combine the two major streams of industries, such as "leadership" and "artificial intelligence" to highlight the dominance of AI-based technologies over the Leadership field in Industry 4.0. Owing to the increased usage of AI-supported technologies, AI has achieved a significant effect on the social and technological working environment. Specifically, to identify and tackle the requirements and challenges of leaders in most organizations. The present article highlights the importance of leadership for the implementation and utilization of AI in the business. A comprehensive analysis of existing literature reviews has been considered to reveal the necessity of AI-supported leadership practices in organizations. Based on the literature review analysis, the study categorized leadership into four segments: Process of Strategic Transformation, Competencies and Qualification, Culture and Interaction of Human-AI. The study's results provide future directions to have a detailed outlook and further research for development.

Keywords: Leadership, Leaders, Artificial Intelligence, Strategic Transformation, Culture, Competencies and Qualification, Interaction of Humans.

Introduction

The industrial environment is strongly impacted by the current digitalization process, which has already undergone tremendous transformation. A significant amount of data is being produced, among other things, by the expanding usage of cyber-physical systems and the networking of IT systems. Companies increasingly employ artificial intelligence (AI) techniques to evaluate this vast quantity of data systematically and to benefit from the outcomes. As a continuation of earlier digitalization, AI is increasingly being defined (Terstegen et al., 2018). In this perspective, increased AI integration and application significantly influence workplace environments in businesses. The adoption and application of AI have a huge impact on leaders and leadership in addition to the workforce. For leaders, this poses new difficulties and demands (Frost et al., 2019). As a result, a holistic approach must take a variety of factors into account. The purpose of this article is to provide new insights into the leadership problems and demands brought on by the incorporation and application of AI. The issues and requirements related to the theme of AI and leadership will be discussed here, along with how existing research should be complemented with actionable suggestions for improvement.

While study on leadership has been going on for more than a century, research on artificial intelligence and, more specifically, how leadership and AI interact with one another, is just recently. Big data, automation, machine learning, and Industry 4.0 are four fundamental concepts related to artificial intelligence (AI). Artificial intelligence (AI) is employed in a variety of industries, including entertainment, healthcare, the service sector (including finance, marketing, logistics, e-commerce, agriculture, and accountancy), and education. As a result, the academic community has only just begun to cautiously examine the connection between leadership and artificial intelligence, or "Leadership in an Artificial Intelligence based economy." (Moldenhauer et al., 2018). As per (Naqvi et al., 2018), the issue is that "the cognitive transformation is sweeping through the global economy, and it is not like anything traditional leaders have ever experienced before"

(De Cremer, 2019) quoted that, "85% of the CEOs polled intended to spend heavily in AI-related technologies over the course of the following three years. Thus, the study concerns whether the introduction of AI-based technologies will impact the core of organizations—their leadership—and whether current leadership will still be relevant in the future". According to this paper's current understanding, this study seeks to solve a lack of major empirical research and literature reviews that offer a balanced picture of various viewpoints on the impact of AI-based technologies on leadership in contemporary organizations. The goal of the current study is to perform a preliminary evaluation of the literature on leadership in Industry 4.0, which is dominated by AI-based technologies, with special attention to how these technologies have an impact on modern organizations' leaders.

2. Literature Survey

2.1. AI (Artificial Intelligence)

Both the word and the area of AI study cannot be reliably defined. Therefore, at this time, a precise definition is not attainable. This is a result of the many impacts of technology. AI integrates elements of cognitive science and engineering. The several fields where AI is applied make this obvious. The need for the various scientific fields varies according to the application. One such is voice recognition systems, which need an in-depth understanding of the neurology discipline (Terstegen et al., 2018). However, artificial intelligence (AI) is typically referred to as a distinct area of computer science study. As a result, a precise categorization is now required. Different stages of AI development can be distinguished. There are three types of artificial intelligence: artificial general intelligence, artificial superintelligence, and artificial narrow intelligence. Artificial Narrow Intelligence is the only kind used in industrial applications currently. Artificial Narrow Intelligence is not superior to Human Intelligence in this instance. Because of this, Artificial Intelligence's application fields are quite narrow (Liebert et al., 2018).

Separating the various AI approaches is also crucial. Modern AI systems use machine learning techniques. They are therefore cognitive systems. Using artificial neural networks, machine learning is a subset of artificial intelligence. Different complexity levels are possible for artificial neural network architectures. Deep learning techniques are used when the intricate nature of the network's structures is quite great. Therefore, deep learning is a distinct branch of machine learning, (Terstegen et al., 2018). There are several methods, including supervised learning and reinforcement learning, for using deep learning or training neural networks. AI can do a variety of tasks by using these approaches. The AI is equipped to examine its own surroundings and gather, decipher, and process crucial facts. Due to this, AI is able to decide for itself, regulate itself, and develop (Heidelberg, 2018).

2.2. Leadership

Different interpretations and descriptions may be made of leadership as a concept and study topic. Leadership and accountability are related in a more constrained sense. A leader is in charge of many tasks. Both the business and the staff are included in this. The categories of information, qualification, and communication might be mentioned for employees. Different perspectives on employee leadership are possible. This is seen in the broad range of established leadership characteristics. Additionally, leadership varies inside an organization based on each manager's position (Ueberschaer, 2014). During the process of creating value, leadership behaves differently. It formulates, chooses, and produces distinct goals and tactics. Leadership both organizes and produces at the same time. As a result, it creates an environment that fosters goal attainment. Through essential communication, leadership also regulates and directs (Heidelberg, 2018).

In this setting, there can be a broad range in the kind and manner of leadership. In their behavior, leaders can be both goal- and people-oriented. Always, a person's specific circumstances will determine the appropriate interpretation. There are strengths and weaknesses in both task orientation and staff orientation. But effective leadership needs both elements in order to succeed (Hettl, 2013). Employee leadership by leaders is always a process. As seen in Figure 3, this process

consists of four crucial components. The leader exhibits a certain leadership conduct while in the leadership process. The goal is to influence the led personnel through one's leadership style. But every leader has their own unique set of ideals and characteristics. As a result, they affect each leader's leadership behaviors. Leadership success is the fourth component. In a leadership scenario, leaders work towards a goal. Success in leadership follows when this objective is attained (Frost et al., 2019).

2.3. Role of AI in Leadership

The survey of (WEF) World Economic Forum Global Agenda Council on "The Future of Software and Society" and the outcomes of the survey indicate that "people expect AI machines to be part of a company's board of directors by 2026 and algorithms are thus expected to take up leadership roles in the future" (De Cremer, 2019). In consideration of the survey, (Harms et al., 2018) combined the past research works and related terms of leadership and included the elements of AI under the term "algorithmic leadership" that collaborates "components of e-leadership" (Avolio et al., 2000).In this regard, (Harms et al., 2018) combine the previous research and terms related to leadership and add components of AI under the roof term "algorithmic leadership" that combines "elements of e-leadership" (Avolio et al., 2000), disseminatedor shared leadership (Carson et al., 2007), and alternatives for leadership (Kerr et al., 1978).

As cited by (Harms et al., 2018), (Kotter, 1990) states, "It is argued that algorithmic leadership, where machines or programs assume activities ordinarily associated with leaders, such as motivating, supporting, and developing workers, will also become more prevalent in the future" (p. 74). (Harms et al., 2018) continue, "Of the 14 core functions of leadership identified by (Yukl, 2012), it is argued that only three (networking, representing, and envisioning change) are not immediately in danger of having humans replaced by machines".(Samani et al., 2012) also described the term 'robotics leadership', where robots should be considered as 'robot leaders' not as only machines that manage resources in industries in order to maintain stable and rational as well as stress-free decision making. Because of technological advancements, (Samani et al., 2012) pointed out that humans must be prepared for the challenges associated with robot leadership. (Brynjolfsson et al., 2017) implied that AI is being used by most the companies, "most big opportunities have not yet been tapped".

The development of AI capabilities is in its infancy for humanity. The term "weak AI" is still used to describe AI in 2020. In addition, (Smith et al., 2018) add that "AI followers" will unavoidably replace human employees owing to the growth in retirees and the aging population in the West and China - the two countries that have been at the forefront of AI innovation. Therefore, AI adoption is not an option but rather a need for nations with an aging population. According to (Smith et al., 2018), With this freshly created role, artificial intelligence leaders will be involved in activities that concentrate on directing the developers of the artificial intelligence machines and impacting judgments made by AI machines after programming.

3. Conceptual Framework

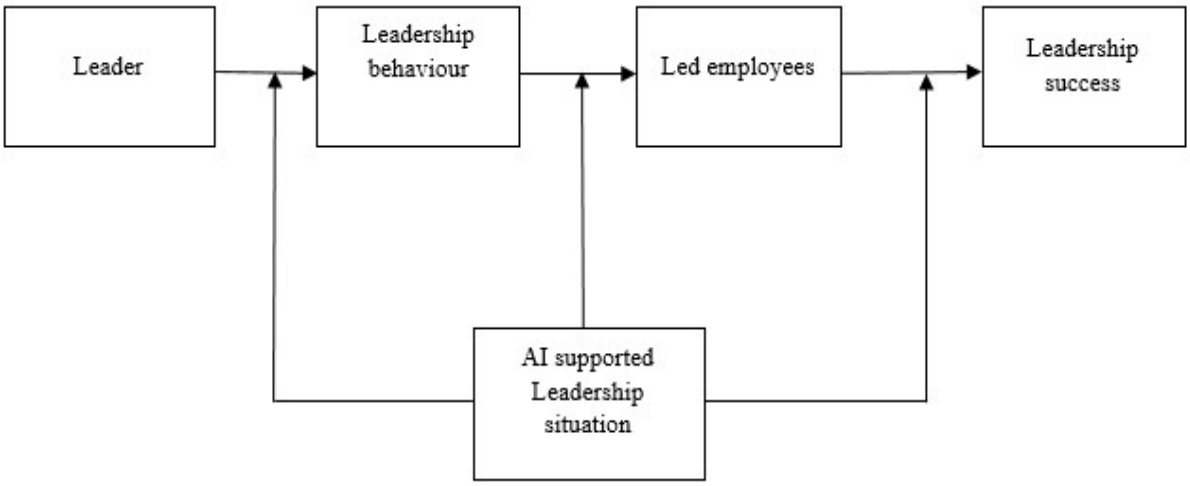

Figure 1: Conceptual framework of the study (Yannick et al., 2022)

4. Research Methods

An analysis of the literature has been done in order to review the state of research today. The literature was chosen and evaluated based on predetermined criteria to produce high-quality research. For the selection of literature, several databases were examined. In addition to scholarly online databases, the repertory also featured open-access databases, university libraries, databases for consultancies, and databases for conferences. The research employed a variety of source formats in order to get thorough results.The different criteria and problems were classified based on predetermined characteristics after the research and choosing the literature. Examples include grouping together the summaries of related study topics. The methodical approach was meant to be strengthened by this categorization. A preliminary categorization was created in the first stage by condensing the data into a number of subgroups. This led to the creation of four result clusters for the literature review, each with their own set of obstacles and criteria among the many theme subcategories.

5. Results

The study's result attained from the literature review analysis is four-folded: "Process of strategic transformation, Competencies and Qualification, Culture, and Interaction of Human-AI"

5.1. Process of Strategic Transformation

A strategic aspect study is necessary for deploying and using AI in businesses. An important component ofadopting and using AI is conceptualizing the transition process. Leaders' realization that a strategic transformation process is a lengthy undertaking needs to be the beginning point. The leaders must all have a common knowledge of AI. A goal that outlines whether AI should be used in the future must also be defined (Pokorni et al., 2021).An important aspect of the strategic transformation process is identifying and developing the aim. A formed vision might be the beginning point for this approach. A vision provides direction and forms the foundation for strategic implementation. Additionally, the planned change must be properly communicated. Leaders in this situation are responsible for conveying and demonstrating the vision and plan (Appelfeller et al., 2019).

5.2. Competencies and Qualification

AI's capabilities will significantly impact the development and qualification of critical competencies. AI's autonomous conclusion- and decision-making capabilities play a role in this. Over time, this will enable AI to replace leaders in a variety of roles. Leaders and AI now do different jobs consequently. Leadership competencies and the needs for them will evolve over time (Frost et al., 2019).Professional, methodological, and social competencies have all changed, as have

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personal and social competencies. Leaders don't require in-depth technical expertise in the technology to deploy and use AI. It only needs to be understood fundamentally. Instead, they ought to understand the nature of data as well as how to use it. Additionally, they need to understand the entire procedure toassess the risks associated with their choices. The consequences of their actions become more significant due to the processes' more intense interconnectivity.

Leaders need to be able to plan the company's transition process and handle complex situations. Individual abilities are increasingly important in this situation. The successful management of the transformation process will be emphasized. The fourth and most relevant category is a leader's social ability. Leaders are required to deal with AI and workers more and more as a result of the development and application of AI. Leaders must consider the unique qualities of both AI and workers. Leaders are becoming into relationship and interaction designers. They should develop their position in connection to the AI in collaboration with the staff. Additionally, staff members need to be aware of how they fit into the process (Heidelberg, 2018).

5.3. Culture

Leadership and company culture are crucial factors for the successful introduction and usage of AI. Based on suitable business culture, stakeholders must participate as required (Stowasser et al., 2020). An essential need for fostering acceptability among stakeholders is the business culture. Additionally, it encourages the adoption of change (Odgers, 2020). When implementing change, the corporate culture should be open to failure and mistakes (Appelfeller et al., 2019). In this setting, corporate cultures can be further distinguished. The organization must have a suitable leadership, preventive, work, and communication culture (Heidelberg, 2018). AI will increasingly impact the management of a company's personnel. Thus, there will be significant changes as a result of the application and use of AI. Due to its traits, AI will become ingrained in the interaction between leaders and employees as a component of the leadership process. The results, nevertheless, can vary. On the other hand, decision-makers can use AI results as a basis. On the other side, AI is also capable of taking over management responsibilities. In this regard, the impacts are clear. If AI eventually takes throughout tasks, leaders can concentrate more on leadership related to their employees. Because of this, leaders play a more important role in this process as designers (Frost et al., 2019).

5.4. Interaction of Human-AI

Leadership decisions must be made on which humans should perform jobs and which must be left to artificial intelligence (AI). Leaders in this scenario must be mindful of and utilize the distinctive abilities of each actor. The goal should be to employ AI to boost the firm's competitiveness. Nevertheless, it is crucial to keep in mind the social characteristics of people working throughout the process. They enhance the company's ability for development. The procedure must also consider ethical issues (Heidelberg, 2018). Leaders using AI should consider certain ethical values. These values can be categorized as "self-determination" justice and the"protection of privacy and personality are preserved" (Heesen et al., 2020). Considering the implementation of AI, leaders should act together with employees as well and employees need to support the AI-supported leadership process along with their experience (Heidelberg, 2018).

6. Discussion and Conclusion

The workplace environment in businesses will be significantly impacted by artificial intelligence (AI), a further evolution of the earlier digitalization. This covers both the actions of leaders and leadership itself. Major obstacles will be presented to leaders, and they will also need to meet many demands. Specifically, this relates to the clusters of the process of strategic transformation, competencies and qualifications, culture, and interaction of Humans. During the process of change, they must play a shaping role by developing goals and apparitions and developing a strategic process. Stakeholder involvement and the establishment of transparency are crucial in this situation. They also must deal with altered standards for their own skills. Thus, additional training is

imperative. The emphasis will move more toward social capabilities in the leadership position. A positive business culture is increasingly necessary for the effective use of AI. Leaders will establish this culture.

At the same time, AI will broaden leadership as a role and transform it by adding a new element. Their actions will gradually alter. The primary way in which this will be apparent is through the role that leaders play in shaping how people engage with AI. Behavior will be essential for the application and usage of AI to be successful. The study recommends it is critical to undertake a comprehensive understanding and approach to the application and utilization of Artificial Intelligence. On the other hand, managers can act as AI users as well. As a result, they would play two roles, which would increase the difficulties. Additionally, leadership can be offered within a company at various levels.

This also implies that the difficulties and needs brought on by AI are probably going to be unique. Additionally, it can be thought that modifications will vary depending on the individual's leadership style, particularly whether the leader is more employee- or task-oriented. Further investigation is therefore needed to determine the possible changes in demand. Generally, a technologically focused approach would be sufficient on considering the contemporary situation. Therefore, the study suggests that AI development and application must prioritize the needs of people.

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