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REVIEW

Design of AI in leadership

Diseño de IA en liderazgo

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ABSTRACT

The present research aims to demonstrate the dominance of AI-based technologies over the Leadership sector in Industry 4.0 by combining the two main industries, such as “artificial intelligence” and “leadership.” Artificial Intelligence (AI) has had a notable impact on the technical and social working environment due to the growing use of AI-supported technology. In particular, to recognise and address the needs and difficulties faced by leaders in the majority of organisations. The current essay emphasises how crucial leadership is to the adoption and use of AI in business. It has been thought that a thorough examination of the literature studies now in existence would demonstrate the need for AI-supported leadership techniques in businesses. The research divided leadership into four categories: the Process of Strategic Transformation, Competencies and Qualification, Culture, and the Interaction of Human-AI. This division was made based on the analysis of the literature review. The study’s findings provide potential paths for further research and growth, as well as a thorough view.

Keywords: Artificial Intelligence; Strategic Transformation; Leadership; Leaders; Culture; Competencies and Qualifications; Human Interaction.

RESUMEN

La presente investigación pretende demostrar el dominio de las tecnologías basadas en la IA sobre el sector del liderazgo en la Industria 4.0 combinando las dos industrias principales, como son la «inteligencia artificial» y el «liderazgo». La Inteligencia Artificial (IA) ha tenido un notable impacto en el entorno laboral técnico y social debido al creciente uso de la tecnología apoyada en la IA. En particular, para reconocer y abordar las necesidades y dificultades a las que se enfrentan los líderes en la mayoría de las organizaciones. El presente ensayo hace hincapié en lo crucial que es el liderazgo para la adopción y el uso de la IA en las empresas. Se ha pensado que un examen exhaustivo de los estudios bibliográficos existentes en la actualidad demostraría la necesidad de técnicas de liderazgo apoyadas en la IA en las empresas. La investigación dividió el liderazgo en cuatro categorías: el Proceso de Transformación Estratégica, las Competencias y la Cualificación, la Cultura y la Interacción del Ser Humano con la IA. Esta división se realizó a partir del análisis de la revisión bibliográfica. Las conclusiones del estudio ofrecen posibles vías de investigación y crecimiento, así como una visión exhaustiva.

Palabras clave: Inteligencia Artificial; Transformación Estratégica; Liderazgo; Líderes; Cultura; Competencias y Cualificación; Interacción Humano.

INTRODUCTION

The ongoing digitalisation process, which has already seen significant change, has a significant influence on the industrial environment. Among other things, the growing use of cyber-physical systems and IT system networking are producing a large volume of data. Businesses are using artificial intelligence (AI) methods more and more to analyse this massive amount of data in a methodical way and to profit from the results. AI is being characterised more and more as a continuation of previous digitalisation (Terstegen et al., 2018). From this vantage point, more AI application and integration have a big impact on corporate work environments. In addition to the workforce, executives and leadership are significantly impacted by the adoption and implementation of AI. This presents new challenges and expectations for leaders (Frost et al., 2019). Thus, a comprehensive strategy has to include many different aspects. This essay aims to provide fresh perspectives on the challenges and requirements facing leadership as a result of the integration and use of AI. This discussion will cover the needs and challenges around the subject of AI and leadership, as well as how to enhance the current body of research with practical recommendations.

While research on artificial intelligence and, more particularly, the relationship between AI and leadership has just recently emerged, research on leadership has been conducted for over a century. Industry 4.0, automation, machine learning, and big data are four key ideas in artificial intelligence (AI). A wide range of businesses use artificial intelligence (AI), including education, entertainment, healthcare, and the service industry (which includes banking, marketing, logistics, e-commerce, agriculture, and accounting). The scholarly community has so only just started to carefully investigate the relationship between artificial intelligence and leadership, or more specifically, "Leadership in an Artificial Intelligence based economy." (Et al., Moldenhauer 2018). "The cognitive transformation is sweeping through the global economy, and it is not like anything traditional leaders have ever experienced before," according to Naqvi et al. (2018), which is the problem.

According to (De Cremer, 2019), 85 % of the CEOs surveyed said they planned to make significant investments in AI-related technology over the next three years. Therefore, the research focusses on whether existing leadership will be relevant in the future and how the introduction of AI-based technologies would affect the foundation of organizations—their leadership. As far as this article is concerned, the goal of the study is to address the dearth of significant empirical research and literature reviews that provide a fair representation of different points of view about the influence of AI-based technologies on leadership in modern organisations. The present research aims to provide an initial assessment of the literature on leadership in Industry 4.0, a field dominated by AI-based technologies, with a focus on the effects of these technologies on leaders in contemporary organisations.

Literature Survey

AI (Artificial Intelligence)

It is impossible to define the term or the field of AI research with accuracy. As such, a precise definition is not achievable at this moment. This is the outcome of the many effects of technology. Engineering and cognitive science are integrated into AI. This is evident from the many sectors in which AI is used. Depending on the application, several scientific backgrounds are needed. One example of this is speech recognition systems, which need a thorough knowledge of the field of neurology (Terstegen et al., 2018). However, most people refer to artificial intelligence (AI) as a separate field of research within computer science. This means that a precise classification is now needed. AI development may be divided into several phases. Artificial general intelligence, artificial superintelligence, and artificial limited intelligence are the three categories of artificial intelligence. As of right now, only artificial narrow intelligence is used in industrial settings. In this case, artificial narrow intelligence is not better than human intelligence. As a result, there are very limited application sectors for artificial intelligence (Liebert et al., 2018).

It's also critical to keep the different AI techniques apart. AI systems nowadays make use of machine learning methods. As a result, they are cognitive systems. Machine learning is a branch of artificial intelligence that makes use of artificial neural networks. Artificial neural network topologies may have varying degrees of complexity. Deep learning methods are used when the network's structural complexity is quite high. Consequently, Terstegen et al. (2018) assert that deep learning is a separate subfield of machine learning. Deep learning and neural network training may be done in a number of ways, such as reinforcement learning and supervised learning. AI can use these techniques to do a wide range of tasks. The AI can survey its environment and collect, interpret, and analyse relevant data. This allows AI to make its own decisions, control itself, and advance (Heidelberg, 2018).

In charge

Leadership as an idea and research subject may be interpreted and described in a variety of ways. There is a more limited relationship between responsibility and leadership. A leader oversees several responsibilities. This encompasses both the company and the employees. For workers, the categories of qualification,

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communication, and information may be mentioned. Diverse viewpoints about staff leadership are conceivable. The wide spectrum of accepted leadership traits demonstrates this. Furthermore, a manager's position within an organisation determines their style of leadership (Ueberschaer, 2014). Different behaviours are shown by leaders while they are producing value. It develops, selects, and generates unique objectives and strategies. Leadership is the ability to simultaneously generate and organise. It thus creates an atmosphere that encourages achieving objectives. Leadership also controls and guides via vital communication (Heidelberg, 2018).

There may be a wide variation in the style and nature of leadership in this context. Leaders may exhibit both people- and goal-oriented behaviours. It is always the individual's particular circumstances that will dictate the proper interpretation. Both personnel orientation and task orientation have advantages and disadvantages. However, both are necessary for successful leadership (Hettl, 2013). For leaders, leading employees is always a process. Figure 3 illustrates this procedure, consists of four essential parts. Throughout the leadership process, the leader demonstrates a certain set of leadership behaviours. The objective is to use one's leadership style to influence the led persons. However, each leader has a distinct set of beliefs and traits of their own. They therefore have an impact on each leader's leadership styles. The fourth element is the achievement of leadership. A leader strives to achieve an objective in a leadership situation. When this goal is accomplished, leadership success ensues (Frost et al., 2019).

AI's Function in Leadership

"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," according to a survey conducted by the World Economic Forum Global Agenda Council on "The Future of Software and Society" and its results (De Cremer, 2019). Under the heading "algorithmic leadership," which integrates "components of e-leadership" (Avolio et al., 2000), (Harms et al., 2018) integrated previous research works and related terms of leadership and added the elements of AI.Under the umbrella term "algorithmic leadership," which incorporates "elements of e-leadership" (Avolio et al., 2000), disseminated or shared leadership (Carson et al., 2007), and alternatives to leadership, (Harms et al., 2018) combine the prior research and terms related to leadership in this regard. They also add components of AI.

"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," according, as referenced. According to (Harms et al., 2018), just three of the 14 essential leadership tasks (networking, representing, and visualising change) are thought to be immune to the imminent threat of human replacement by robots.(Samani et al., 2012) also defined the phrase "robotics leadership," arguing that rather than only being machines that manage resources in industries to ensure steady, logical, and stress-free decision making, robots should also be seen as "robot leaders." According, technological improvements have made it necessary for humans to be ready for the problems that come with robot leadership. According to (Brynjolfsson et al., 2017), the majority of businesses are using AI, but "most big opportunities have not yet been tapped."

For humans, the development of AI capabilities is still in its early stages. Even in 2020, AI is still referred to as "weak AI". Furthermore, "AI followers" will inevitably replace human workers because to the ageing population and the rise in retirees in China and the West, the two nations that have led the way in AI innovation (Smith et al., 2018). As a result, adopting AI is imperative for countries with ageing populations rather than a choice. As tO, this newly established position will include artificial intelligence leaders engaging in tasks that primarily focus on providing guidance to the developers of AI machines and influencing their decisions post-programming.

Conceptual Framework

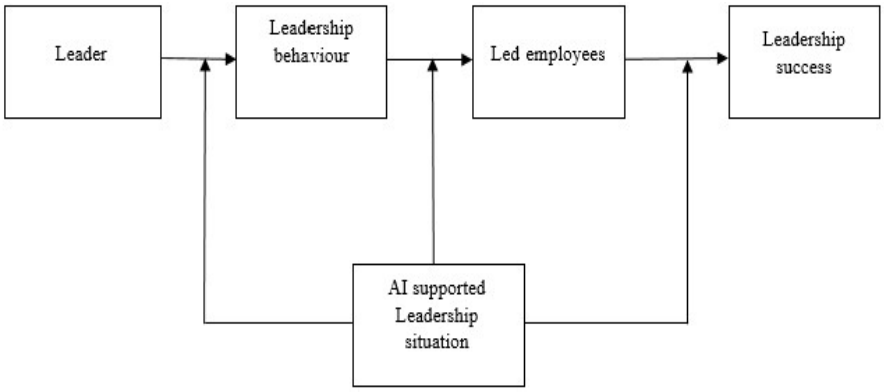

Figure 1. Conceptual framework of the study (Yannick et al., 2022)

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.

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"

Process of Strategic Transformation

A strategic aspect study is necessary for deploying and using AI in businesses. An important component of adopting 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).

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 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).

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).

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Interaction of Human-AI

Decisions on which tasks should be completed by people and which should be left to artificial intelligence (AI) must be made by leaders. In this situation, leaders need to recognise and capitalise on each actor's unique skills. Utilising AI to increase the firm's competitiveness ought to be the aim. However, it is important to remember the social traits of those engaged in the process at all times. They improve the business's capacity for growth. Ethics must also be taken into account in the process (Heidelberg, 2018). Leaders who use AI should think about some moral principles. According to Heesen et al. (2020), these values fall under the categories of "self-determination," "protection of privacy and personality are preserved," and justice. When it comes to the use of AI, leaders and workers should collaborate, and employees must provide their expertise to the AI-supported leadership process (Heidelberg, 2018).

Analysis and Remarks

Artificial intelligence (AI) is an extension of digitalisation and will have a big influence on the job environment in enterprises. This includes leadership itself as well as the deeds of leaders. Leaders will face significant challenges and have a lot of responsibilities to fulfil. This pertains specifically to the clusters of human interaction, competences and credentials, culture, and the process of strategic change. They have to take a leading position in the process of transformation by creating objectives and visions as well as a strategic plan. In this case, stakeholder participation and the creation of transparency are essential. They also have to contend with changed expectations for their own abilities. Therefore, more instruction is essential. In the leadership role, the focus will shift more towards social skills. Utilising AI effectively is becoming more and more dependent on having a healthy corporate culture. This culture will be established by leaders.

AI will also expand the function of leadership and give it a new dimension at the same time. Their behaviour will progressively change. The main way that this will become evident is via the influence that leaders have on how people interact with AI. The effective deployment and use of AI will depend on behaviour. The research concludes that a thorough knowledge and approach to the application and use of artificial intelligence are essential. However, managers are also capable of using AI. They would therefore have to play two roles, which would make things more difficult. Furthermore, a corporation might give leadership at several levels.

This suggests that the challenges and requirements posed by AI will most likely be distinct. Furthermore, it may be argued that changes will differ based on the leader's style of leadership, namely on whether the leader is more task- or employee-oriented. Therefore, further research is required to ascertain any potential shifts in demand. Generally speaking, taking into account the current circumstances would only need a technologically orientated approach. Thus, the research recommends that human needs should come first in the development and use of AI.

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