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The Role of Artificial Intelligence in Enhancing Decision-Making Processes in Management: A Strategic Perspective

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ABSTRACT

Management sciences have also found Artificial Intelligence (AI) as a revolutionary influencing factor to improve the decision making. This paper aims at discussing the place and importance of AI in enhancing precise, fast and effective decision-making within the framework of organizational management. AI means making use of machine learning, predictive analysis, natural language processing so that managers can make decisions based on data that helps to mitigate risks and enhance performance. The strategy of data processing, as well as pattern recognition and timely delivery of insights beneficial for both tactical and strategic decision making is also examined in the study. In addition, the paper result provides social implication such as ethical issues, required human supervision, and problematic aspects of artificial intelligence decision-making. Based on the studies of the case of different industries, this research points out that AI is a valuable tool for improving the managerial decisions and innovation, establishing competitive advantage. Thus, the results support the hypothesis that the organisations open to the application of AI in its decision making will have a more effective control over the business environments and increased overall performance.

Keywords: Artificial Intelligence, decision-making, management, strategic perspective, machine learning, predictive analytics, business performance

Introduction

In the modern world that is characterized by high levels of dynamism, most decisions made are complex, faster, and based on computer-generated information. It is always overwhelming for managers to sort out the relevant

information to enable them make sound decisions for the organization within the required time. There is a shift from conventional decision making frameworks because despite their efficiency, the fast-changing business environments have not been adequately matched by the standard conceptual models. It has therefore created a way that helps to incorporate the AI into management practices that help to offer different patterns of improving decision making systems.

AI known to be a technique that enables a system to mimic human intelligence through factors like pattern recognition and analysis of big data is transforming the management world. A recent trend noted about the emulation of intelligent systems is that different applications, including machine learning, natural language processing, and predictive analytics offer managers the insights that were a real enigma before. These technologies unlock the power of big data analysis and also uncover trends, future scenarios, and advisable approaches to enhancing decision making.

AI does go beyond simple automation of decisions; it augments human decision making by supplying accurate data in real time, free of prejudices that come with intuitive reasoning. This paper aims at discussing the ways in which artificial intelligence is initiating a revolution in management and organizational performance. This study, therefore, seeks to fill this gap by investigating AI in various management domains including resource management, risk management, and customer management, and seek to establish the extent and form of contribution to efficient management decision-making for today's organizations.

Furthermore, the paper will elaborate the concerns, as well as the ethics of applying the AI technologies to managerial decisions. It will also reveal how organisations can benefit on one hand from the analytical capabilities of AI APPLICATIONS while, on the other hand, retain human intervention in decision making as a key component in adoption of AI applications. This paper therefore highlights the importance of the evaluation of the use of artificial intelligence in enhancing the future management decision-making for firms that seek to harness the potential positive impacts of the technology.

Literature review

The contribution of Artificial Intelligence (AI) in supporting decision making in management has become a subject of extensive discussion in current literature especially because of the rise in application of AI technologies in organizations. This paper is a systematic literature review, providing a synthesis of the identified literature concerning the application of AI in the management decision-making process, the related effects on managerial strategies, and the novel issues arising in relation to AI implementation.

Current research corroborates the increasing role of AI in support of strategic management decision. Sun et al. (2021) noted that AI's capability to process large and diverse data flows and proactively forecast eventualities has turned into a potent tool to set overarching strategic courses. Use of artificial intelligence technologies including machine learning leads to development of prognostics, evaluation for risks and formulation of strategic plans that enhance accuracy and timeliness of decisions made by managers. Likewise, Kusiak (2021) to Kusiak (2021) underscored that AI enable organizations to make value-added decisions in the course of understanding opportunities and threats in rapidly evolving markets, with a positive impact on competitiveness.

In the same year, Madakam and Tripathi showed how valuable AI was for enhancing operational–tactical decision making. The usual processes of daily management have been optimised by various AI applications including RPA and smart maintenance systems. With the help of AI amounts of homogenous and time-consuming activities can be done by machines while managers are free to take challenging decisions that certainly lead to productivity and operational performance enhancement. In addition, AI applications for supply chain, inventory planning, and customer relationship applications are critical for tactical AI planning and execution, according to Reddy and Prasad (2021).

Among the important concepts already discussed in the recent literature, there is the problem of AI and human decision-makers' interaction. Taddeo and Floridi (2022) looked at the influence of AI in improving judgment in

place of replacing it. In one particular study they established that, AI works hand in hand with the human expert since it furnishes a workable solution within a shorter time and with a higher accuracy as compared to the human manager, in addition to providing the human aspect of the skin, the experience, the hunch, and the compliance among other things. Decision-making support models involving AI and human decision-makers were identified as providing greater decision decision quality and effectiveness. In line with that, a study by Coombs et al. (2021) confirmed that companies investing in human–AI association noted increased innovation and decision improvement.

On the one hand, as discussed above, AI has the ability to improve decision-making potentials; on the other hand, research in the recent past has also highlighted problems of ethics. This work aligns to Smith et al.'s (2021) observation that biases are common in AI algorithms. As with any other systems, ensembles based on artificial intelligence can make decisions that are unfair or unethical if the AI systems used in the process have not been trained correctly or are supervised inadequately. These biases may be as a result of the training data used in the development of AI models which may well reflect prior injustice. In prevention of this, Su and Lee (2022) emphasized on the need for the organizations to include fairness, transparency and accountability measures when deploying the artificial intelligence systems. The principles of ethical usage of AI include human supervision of use of AI and inspections of use of AI on a regular basis as part of good managerial practice.

AI in risk management and especially in decision making under risk and uncertainty has become more popular after the year 2021. As pointed by Jain and Agarwal (2022), in conditions of risk, AI has the capacity to play out several options using predicted models. Risk management is another area where organizations use AI or machine learning to review different risks, simulate the possible scenarios and design strategies for handling each of them. For instance, in banking and healthcare; the use of risk assessments that employ Artificial Intelligence in providing an accurate evaluation of voluminous and intrinsically variable datasets, has elevated decision-making acumen (Mishra et al., 2022). Such tools enable organization to be highly protective of its future and take decisions regardless the state of uncertainty and therefore reduce weaknesses as well as strengths.

In its broader sense, numerous scholars identified a relationship between AI technological influences on decision making and organisational performance. Zhang et al. study (2021) revealed several benefits of adopting AI for enhancing several KPIs like profitability, customer and operational satisfaction and efficiency. The results showed that through the use of AI to analyze customer data the system presented was efficient at generating recommendations that would prompt customers to stay loyal to the retail merchant or service provider. Lastly, Ransbotham et al. (2021) proved that companies that involve AI into their decisions are more adaptable and have more competitive advantage when it comes to market volatility.

On the one hand, the concept of using AI in making decision is well understood and less contentious. According to Gartner (2021), it was identified that many organisations failed to integrate AI because they lacked the right skills and implemented massive resistance from management. Other issues have to do with dependence on AI in that a surplus of dependence on this technology entails less human engagement in vital choices. In their works, Davis and Patel (2022) paid a lot of attention to the manner in which the human capital needed to be trained to deal with AI technology at workplaces. However, the costs incurred in implementation of AI and issues to do with data privacy also limit its adoption more broadly.

(Chib, et al., 2024) The research focuses on how technology in particular Artificial Intelligence (AI) is influencing management processes. Here, the author uses the automata terminology where automata means the use of AI in automation where human work is replaced by machines, and Augment means when use of AI in augmentation results in better organisational performance. This paper describes how AI strategies improve functionality, management, work output, and related processes based on research data compiled from multiple domains, such as manufacturing, banking, municipal, and remote-work sectors. It also examines how big data and analytics may transform managerial work through AI and finds that organizations should adopt an intelligent integrated system of automation that is complemented by people's cognition to foster innovation and sustainable development.

Consequently, Wang and Xu (2023) anticipate that the use of AI in decision making in the future will be facilitated by generative AI and self-learning algorithms to boost the capability of human decision making. These models will allow for organizations enhancing their personalization and flexibility in achieving their goals, and making the needed decisions in the context of ever-growing complexity. Same as for precautionary measures, the relationship between AI and ethical actions is also expected to change over time, due to emerging more complex AI governance frameworks that are being designed to assure fairness and accountability in processes.

The literature review shows that AI is changing decision making at both, a strategic and an operational level across organizations. The benefits of using AI in the workplace are evident for enhancement of effectiveness, precision, and information-based guidance; nevertheless, ethical issues, biasness, and organizational learning issues are vital. Therefore, there is need to extend the study on how human and AI can work together to achieve common goals, to examine how AI's can be fair and transparent in making decisions, and to find out how other AI's that can complement the existing ones to improve organization decision making can be developed.

Objectives of the study

- To examine the role of Artificial Intelligence in enhancing decision-making processes in management.
- To identify the key AI tools and technologies used in strategic, operational, and tactical decision-making.
- To explore the impact of AI-driven decision-making on organizational performance and competitiveness.

Hypothesis of the study

H_0 (Null Hypothesis): AI-driven decision-making has no significant impact on organizational performance and competitiveness.

H_1 (Alternative Hypothesis): AI-driven decision-making has a significant positive impact on organizational performance and competitiveness.

Research methodology

The research approach for the present study is a mixed-research one, which means that both quantitative and qualitative methods are used to investigate the impact of AI on the management decision-making process. First, an exploratory review of the existing literature introduces the most important AI instruments, techniques, and directions that condition decision-making. Primary data is gathered through questionnaires and managerial/interviews that are conducted with managers and AI specialists from a range of industries, inquiring on their AI experiences in relation to decision making processes. Self-generated numerical data collected from the questionnaire that explores the effects of AI on decision making and overall organizational performance are statistically tested. Interview data is analyzed thematically to identify concernsociated with future work, ethical apporach and collaboration with AI in decision making. Thus, to justify the hypotheses and provide practical examples of the industries using AI for managerial decisions, case studies of industries that successfully employed AI for administrative decisions are also presented. The study adopts a cross-sectional research design and employs advanced procedures to ensure data reliability namely pilot testing of survey instruments besides the use of qualitative and quantitative data.

Data analysis and discussion

Table 1 - Descriptive Analysis for 175 Samples

Variable	Mean	Median	Std. Deviation	Minimum	Maximum	Frequency (n)
Age of Respondents (Years)	35.6	34	6.5	25	55	175
Years of Experience (Years)	10.2	10	4.3	2	20	175
AI Adoption Level (Scale 1-5)	4.2	4	0.8	2	5	175
Organizational Performance (Scale 1-10)	7.8	8	1.2	5	10	175
Competitiveness (Scale 1-10)	8.3	8	1	6	10	175

AI's Contribution to Decision-Making (Scale 1-10)	8.1	8	1.1	5	10	175
Sector (Categorical: IT/Manufacturing/Finance/Other)	N/A	N/A	N/A	N/A	N/A	IT: 45, Manufacturing: 50, Finance: 55, Other: 25

Data from 175 samples, analysed descriptively, shed light on important factors pertaining to AI-driven decision-making. A workforce with intermediate experience is indicated by the average age of respondents, which is 35.6 years, with a median of 34 years. With a standard variation of 6.5 years, the ages range from 25 to 55, indicating considerable heterogeneity. Respondents' levels of professional experience range from 2–20 years, with an average of 10.2 years, a median of 10, and a standard deviation of 4.3.

The majority of organisations have made substantial use of AI, as shown by the average level of 4.2 on a scale from 1 to 5. There is some variance in adoption levels, as shown by the standard deviation of 0.8. The replies range from 2 to 5. On a scale from 1 to 10, the average organisational performance score is 7.8 with a standard deviation of 1.2, suggesting that overall, organisations function pretty well. With an average score of 8.3 and a standard deviation of only 1.0, competitiveness ratings also show outstanding results, indicating that the majority of enterprises see themselves as very competitive.

Respondents generally acknowledge the beneficial influence of AI on decision-making, as seen by an average rating of 8.1 and a standard deviation of 1.1. There is a wide sample of participants from various economic sectors, as seen by the industry breakdown: 45 are from IT, 50 are from manufacturing, 55 are from finance, and 25 are from other industries. Taken together, these results provide a picture of the general public's impression of AI and its effects on business efficiency and success.

Table 2: Regression Analysis of AI-driven Decision-Making on Organizational Performance and Competitiveness

Dependent Variable	**Organizational Performance (Y_1)**	**Competitiveness (Y_2)**
Independent Variable	**Beta Coefficient (β)**	**p-value**
AI-Driven Decision-Making (X_1)	0.48	0
Age	0.12	0.034
Years of Experience	0.09	0.042
Sector (IT)	0.22	0.005
Constant	4.56	0
R^2	0.62	
Adjusted R^2	0.6	
F-Statistic	23.45	0

The regression study that looked at how AI-driven decision-making affected organisational performance (Y_1) and competitiveness (Y_2) is shown in Table 2. Both organisational performance and competitiveness were positively affected by AI-driven decision-making (X_1), according to the results. The beta coefficients for these two dependent variables were 0.48 and 0.48, respectively. With a p-value of 0, there is a very significant association when it comes to AI-driven decision-making.

Furthermore, additional independent variables that enhance the model's explanatory power are identified during the study. The results show that older respondents have a tendency to perceive greater organisational performance, since there is a positive association between age and organisational performance (beta coefficient of 0.12 and p-value of 0.034). With a beta coefficient of 0.09 and a p-value of 0.042, years of experience also reveals a significant positive impact. This suggests that people with more experience regard their organisations as having greater performance and competitiveness.

Respondents in the information technology (IT) sector report higher levels of competitiveness than respondents in other sectors (p 0.005), suggesting that sector has a significant positive effect on competitiveness. When controlling for all other factors, the constant term reflects the initial state of the organization's performance and is statistically significant at 4.56 (p = 0).

An R^2 score of 0.62 indicates that the independent variables explain 62% of the variability in organisational performance, showing a solid model fit overall. The model's robustness is maintained after taking the number of predictors into consideration, as shown by the corrected R^2 value of 0.60. Overall, the statistical significance of the regression model is further confirmed by the F-statistic of 23.45 and the p-value of 0. Collectively, these findings highlight the crucial role of AI in modern management practices and provide credence to the concept that AI-driven decision-making has a favourable impact on organisational performance and competitiveness.

Conclusion

In this research, the effectiveness of the application of AIDM for improving the organizational performance and competitiveness was investigated Furthermore, this research has uncovered a wealth of insight towards appreciating how the adoption of artificial intelligence is changing the face of modern management. The regression analysis analysis showed that the AI decision making plays a strong positive role in relation to the performance and competitiveness of the organisation with highly statistically significant impact. This drives the need and option for incorporating such technologies in AI technologies in decision making with functional organizational effectiveness in mind.

The study also establishes that demographic factors, including age, and experience, and the nature of employees' workplace sector have a positive impact on the views of employee organizations' performance and competitiveness. More importantly, the respondents from the IT sector expressed higher competitiveness which highlights that the context at which AI is applied can impact the AI decision-making outcomes.

An R^2 of 0.62 reveals that the organizations' performance is influenced significantly by AI decisions and all the other relevant factors, to a sufficient degree (Shmueli and Kopczak 2018). However, this paper finds support in the significant F-statistic showing that the regression model fits the various observations correctly and describes the relations between the variables to the best of its ability.

In conclusion, this study establishes that those organizations in which decision-making making is informed by artificial intelligence are likely to see improvements in performance and competitiveness. New market conditions and the growth of competition therefore the use of artificial intelligence technologies and the development of data-orientated cultures will become the key factors in maintaining competitive advantage in the long term. Another direction for future research can be associated with the identification of detailed effects of the AI integration in different industries and the examination of the mediators of AI's effects on decisions.

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