PREDICTING COLLABORATIVE ARTIFICIAL INTELLIGENCE (AI) ADOPTION AMONG OPERATIONS MANAGERS IN MALAYSIA

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Abstract

This study examines the factors influencing collaborative artificial intelligence (AI) adoption among operations managers. The study examines the importance of understanding the willingness and obstacles faced by operations managers in integrating collaborative artificial intelligence into their daily work processes. This study collects data from operations managers across Malaysia through online survey questionnaire to evaluate the hypotheses. The 183 valid responses were analyzed using structural equation modeling software SmartPLS v4.1.0.0. This empirical study identifies perceived ease of use (PEOU), perceived usefulness (PU), and perceived trust (PT) as salient independent variables influencing attitude (ATT) toward the adoption of collaborative artificial intelligence (AI). Furthermore, attitude (ATT) significantly mediated the relationship between these independent variables (PEOU, PU, and PT) and behavioral intention (BI) to adopt collaborative AI. However, the moderating effect of technology knowledge (KT) on the relationship between attitude (ATT) and behavioral intention (BI) was not statistically significant. This study contributes to the technology acceptance model (TAM) framework by examining the impact of perceived ease of use (PEOU), perceived usefulness (PU), perceived trust (PT), attitude (ATT), and knowledge in technology (KT) on operations managers' behavioral intention (BI) to collaborative AI adoption. Unlike prior research, this study specifically investigates the determinants of collaborative artificial intelligence adoption within operations management, a domain increasingly reliant on technological advancements for strategic planning and decision-making.

Keywords: Collaborative, artificial intelligence (AI), operations managers, Malaysia.

Introduction

The size of manufacturing plants, project management approaches, and the development of information technology networks are just a few of the strategic issues that operations managers handle. In order to achieve the company's long-term objectives and profitability, operations managers are in charge of monitoring these procedures and making critical decisions (Heizer et al., 2020). The quick changes in schedule are also covered by operations managers, who have to act swiftly to fulfill schedules. Individuals and organizations typically adopt a preparedness mindset while addressing problems in a rapidly evolving business environment. The global COVID-19 pandemic was one major issue in recent years. The cessation of all operational movement significantly disrupted established company operational management standards. Traditional operational protocols and systems proved inadequate in accommodating the rapid and unpredictable shifts occasioned by the pandemic.

Managing the constantly changing company environment and effectively utilizing modern information technology can assist operations managers in making up for the obstacles. This study uses a quantitative method to examine how the determinants of collaborative AI can

enhance traditional operations management in a number of ways. Collaborative of artificial intelligence presents a significant advancement in operations management, yielding demonstrable improvements across diverse industries. These enhancements typically encompass increased data accountability, enhanced transparency, improved correctness, greater robustness, and optimized decision-making capabilities (Rodríguez-Espíndola et al., 2022). The global COVID-19 pandemic, which stopped all movement activities and had a significant impact on the standard business operations management norm, was one of the major obstacles encountered in recent years. Collaborative of AI can be utilized to improve the resilience and recovery of operations management. Artificial intelligence empowers organizations to foresee and anticipate client demand with almost perfect accuracy, while also improving scientific research and manufacturing processes with lower costs and higher quality (Javed et al., 2024).

Manufacturing was heavily affected due to the remote workers during the pandemics which made communication and teamwork more challenging (Agarwal & Malhotra, 2024). Urgency of optimizing digital transformation against conventional operations became a priority in this situation as it requires agile and swift decision-making. However, current decision-making structures and procedures were often too slow to respond effectively (Agarwal & Malhotra, 2024).

Research Objectives

This study investigates the determinants of collaborative artificial intelligence (AI) adoption among operations managers. Specifically, it aims:

RO1: To investigate the impact of perceived ease of use of AI technology on operations managers' behavioral intention to adopt collaborative AI.

RO2: To investigate the impact of perceived usefulness of AI technology on operations managers' behavioral intention to adopt collaborative AI.

RO3: To investigate the impact of perceived trust of AI technology on operations managers' behavioral intention to adopt collaborative AI.

RO4: To investigate whether operations managers' knowledge in technology moderates the relationship between their attitude and behavioral intention to adopt collaborative AI.

RO5: To investigate whether attitude mediates the relationship between perceived ease of use of AI technology and operations managers' behavioral intention to adopt collaborative AI.

RO6: To investigate whether attitude mediates the relationship between perceived usefulness of AI technology and operations managers' behavioral intention to adopt collaborative AI.

RO7: To investigate whether attitude mediates the relationship between perceived trust of AI technology and operations managers' behavioral intention to adopt collaborative AI.

Scope of the Research

The scope of this study encompasses operations managers in Malaysia with at least one year of experience and current employment in business operations management. The unit of analysis is the individual operations manager.

Literature Review

This research draws upon the technology acceptance model (TAM) framework theory to study the determinant of collaborative of artificial intelligence into operations management. Relevant research articles focusing on the technology acceptance model (TAM) were reviewed

to develop a comprehensive understanding of their scope, encompassing study settings, factors, and outcomes. Subsequently, a research framework was developed, and hypotheses were formulated.

TAM, a research framework discussed the process by which users adopt and utilize a technology developed by Davis in 1989 (Davis, 1989). According to the theory, a person's decision-making process about when and how to use technology is influenced by a few factors. TAM has been thoroughly examined in a number of fields as it possesses a high degree of predictive power in assessing information technology user adoption.

Behavioral intention (BI), the dependent variable in this study is the degree to which a person has formed deliberate goals to participate in or refrain from a specific activity in the future. This component acts as the main predictor of the system's actual use within the TAM. The model states that users are more likely to want to use a technology if they believe it to be both useful and simple to use, and this intention is a significant predictor of their actual usage behavior (Davis, 1989).

The technology acceptance model (TAM) posits that two primary factors influence an individual's intention to use and acceptance of a technology i.e., perceived usefulness (PU) and perceived ease of use (PEOU), both serve as the independent variables in this research. Perceived usefulness (PU) refers to the extent to which an individual feels that utilizing a certain system will enhance the execution capability. Perceived ease of use (PEOU), refers to the extent to which an individual perceives that utilizing a specific system would require less work (Davis, 1989). Perceived trust (PT) an independent variable discussed in this research, defined as the willingness to deal with how other people's actions affect them, particularly when those people are unable to monitor or control the results of those actions (Liu et al., 2022).

Impact of AI technology advancement is evident but not all consumers of AI services are equally aware of these developments. This study proposes that knowledge in technology (KT) moderates the relationship between attitude and behavioral intention to collaborative AI adoption. Specifically, the level of technology knowledge influences the relationship between attitude and user intention (Rahman et al., 2023).

Attitude (ATT) towards a system represents their assessment of the system's adoption, whether positive or negative. The successful deployment of information systems is directly impacted by an attitude of openness and acceptance toward new technology (Rahman et al., 2023). Attitude acts as the mediator and study the individual's attitude towards technology might affect how valuable they think it is and, in turn, whether they choose to embrace the new technological establishment (Farooq et al., 2024).

This study aimed to investigate the determinants of collaborative of artificial intelligence in operations management using the technology acceptance model (TAM) methodology and hypotheses developed based on a thorough evaluation and analysis shown in Figure 1.

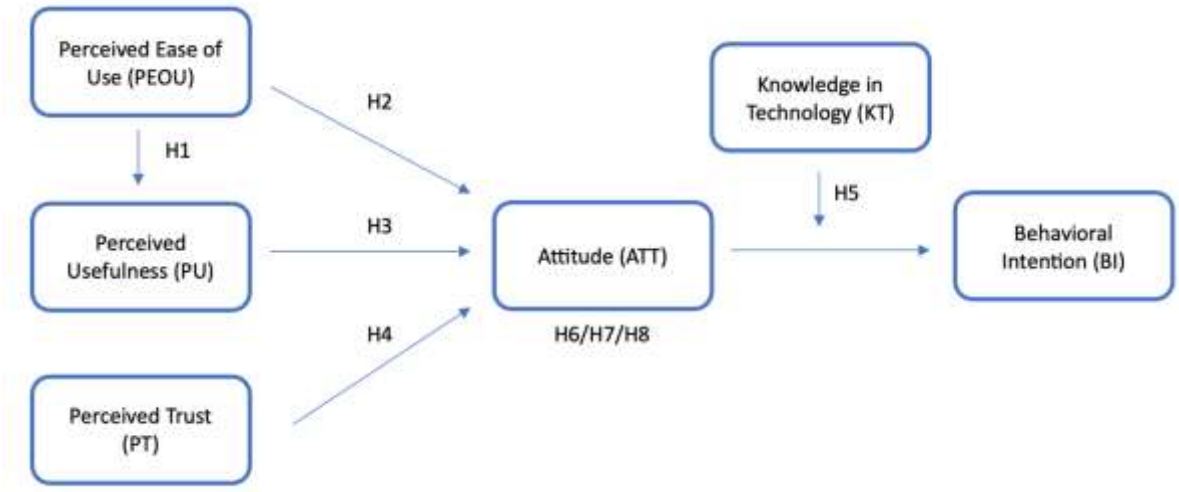

Figure 1: Conceptual Framework

The hypotheses as follow have been developed and examined.

Hypothesis 1: Perceived ease of use of AI technology will positively influence the perceived usefulness to adopt collaborative AI among operations managers.

Hypothesis 2: Perceived ease of use of AI technology will positively influence the attitude to adopt collaborative AI among operations managers.

Hypothesis 3: A positive relationship exists between perceived usefulness of AI technology and operations managers' attitude toward adopting collaborative AI.

Hypothesis 4: A positive relationship exists between perceived trust of AI technology and operations managers' attitude toward adopting collaborative AI.

Hypothesis 5: Higher levels of AI technology knowledge will strengthen the positive relationship between attitude and behavioral intention to adopt collaborative AI among operations managers.

Hypothesis 6: Attitude mediates the impact of perceived ease of use of AI technology on behavioral intention to adopt collaborative AI among operations managers.

Hypothesis 7: Attitude mediates the impact of perceived usefulness of AI technology on behavioral intention to adopt collaborative AI among operations managers.

Hypothesis 8: Attitude mediates the impact of perceived trust of AI technology on behavioral intention to adopt collaborative AI among operations managers.

Research Methodology

This study examines the impact of variable on the adoption of collaborative artificial intelligence (AI) among operations managers using a quantitative research methodology. Data collected via online survey questionnaires and analyzed to test hypothesized relationships. The resulting model will be empirically evaluated.

In order to identified the appropriate sample size for this study, G*Power methodology is deployed. It takes the greatest number of predictors, effect size and significance level into account and the minimum sample size calculated is 102. A set of 34-question questionnaires are developed starting with screening session having only the intended responders, who are operations managers with a minimum of one year's experience in Malaysia before proceeding into constructed variables related questions. Following two screening sessions and a total of 387 sample responds, 183 valid samples were kept. Demographic data were collected from 183 valid respondents, and a summary of these characteristics is presented in Table 1.

Table 1: Respondent Demography Profile Summary

Gender	%	Age	%	Years of Exp.	%
Female	55.74%	21~28	14.75%	1~3	39.89%
Male	39.34%	28~35	47.54%	4~6	20.77%
Preferred not to say	4.92%	35~43	30.60%	7~10	23.50%
		43~51	4.92%	10~15	11.48%
		51~60	2.19%	>15	4.37%

Industry sector	%	Industry location	%
Healthcare	11.48%	Penang	30.60%
Logistics	2.19%	Melaka	25.14%
Manufacturing	44.81%	Kuala Lumpur	17.49%
Semiconductor	12.57%	Selangor	10.38%
Others	28.96%	Johor	5.46%
		Others	10.93%

Research Results

SmartPLS v4.1.0.0 is employed to analyze the information gathered for this paper. Variance inflation factor (VIF) is less than 3.3 indicating the model exhibited no evidence of common method bias or multicollinearity. The model is satisfied convergent validity as all the factor loading data are greater than 0.72. All the composite reliability (CR) values exceeding 0.90 indicating the model having excellent reliability values and reaching good average variance extracted (AVE) as it exceeding 0.69. Discriminant validity was confirmed, as all Heterotrait-monotrait ratio of correlations (HTMT) values were below the 0.90 threshold.

Path coefficient, a standardized value as it is derived from correlation represents the direct effect of a variable assumed to be a cause on another variable assumed to be an effect. All the variables except for moderator (KT) are significant as the t-statistic values >1.645 and p values < 0.05.

Table 2: Path Coefficients and Hypothesis Summary

	Hypothesis	Relationship	T statistics	P values	Decision
H1	Perceived ease of use of AI technology will positively influence the perceived usefulness to adopt collaborative AI among operations managers	PEOU -> PU	16.776	0.000	Supported
H2	Perceived ease of use of AI technology will positively influence the attitude to adopt collaborative AI among operations managers	PEOU -> ATT	2.471	0.007	Supported
H3	A positive relationship exists between perceived usefulness of AI technology and operations managers' attitude toward adopting collaborative AI	PU -> ATT	4.909	0.000	Supported
H4	A positive relationship exists between perceived trust of AI technology and operations managers' attitude toward adopting collaborative AI	PT -> ATT	2.555	0.005	Supported
H5	Higher levels of AI technology knowledge will strengthen the positive relationship between attitude and behavioral intention to adopt collaborative AI among operations managers	KT x ATT -> BI	0.952	0.171	Not supported
H6	Attitude mediates the impact of perceived ease of use of AI technology on behavioral intention to adopt collaborative AI among operations managers	PEOU -> ATT -> BI	2.374	0.009	Supported
H7	Attitude mediates the impact of perceived usefulness of AI technology on behavioral intention to adopt collaborative AI among operations managers	PU -> ATT -> BI	4.524	0.000	Supported
H8	Attitude mediates the impact of perceived trust of AI technology on behavioral intention to adopt collaborative AI among operations managers	PT -> ATT -> BI	2.579	0.005	Supported

The results suggest that the independent variables are reasonably good predictors of attitude, explaining 56.3% of the variance. Furthermore, attitude is a strong predictor of behavioral intention, accounting for 69.2% of the variance. The Q^2 value of 0.5 indicates moderate predictive relevance for behavioral intention.

Discussion and Conclusion

This study having a good indicator as the R^2 value of behavioral intention is 69% (Ozili, 2023) and aligned with previous study (Chatterjee et al., 2020). Attitude significantly impacting the user behavioral intention as the effect size f^2 is 1.494, showing attitudes greatly effect on the user behavioral intention of AI adoption.

All four direct hypotheses (H1, H2, H3, H4) are well supported and align with existing literature (Chatterjee et al., 2020; Emon et al., 2023; Rahman et al., 2023). These statistics demonstrate that respondents frequently use AI and think it could be helpful to them. Moderator (H5), knowledge in technology (KT) does not significantly influence attitude toward AI adoption, consistent with the literature (Rahman et al., 2023). Four mediators (H6, H7, H8, H9) have significant relationship and aligned with literature (Cao et al., 2021; Chatterjee et al., 2020; Na et al., 2022; Rahman et al., 2023).

The data captured backs up the conceptual model proposed in this study clarifies the factors influencing the adoption of collaborative AI, particularly in Malaysia's manufacturing operational sector.

This research attempts to investigate the factors found in collaborative of AI and the tendency of operations managers to adopt AI in the operational sector. Thus, this study employed the technology acceptance model (TAM) as a framework and a quantitative approach to investigate the influence of PEOU, PU, PT, ATT, KT, and BI on collaborative AI adoption. The results indicated that PEOU, PU, PT, and ATT significantly influenced AI adoption, while KT did not. This lack of a significant effect for KT is potentially attributable to the underdeveloped AI infrastructure within Malaysia's operational sector.

This study enhances our understanding of AI by providing useful advice to the operational business sector in creating AI strategy. ATT is significantly influenced by PEOU and PU; relationship between PEOU and PU and BI are strong per the mediator ATT results. User confidence in continuously utilizing AI technology is increased by system trust PT. The general acceptance of AI technology in day-to-day operational tasks can be progressively improved with the right training and adoption strategy. The operational sector's long-term growth depends on integrating AI technology, which is also seen as a good return on investment.

Recommendations

This study has a number of limitations, particularly its narrow scope on geographically focusses only in Malaysia. One significant limitation is the deliberate choice of the targeted respondents in order to gather input from operations management professionals who have never used AI solutions before. In addition, only 183 valid responses were used in the analysis. In order to boost the research's statistical power, a bigger sample size is suggested.

Researchers in the future could consider about using offline platforms to collect data but it could take more time and effort to compile the final data. The study may be biased as a result of different perceptions of the questionnaire caused by time constraints, cultural differences, language barriers, and the nature of business difficulties.

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