

ARTIFICIAL INTELLIGENCE AND EMPLOYEE PRODUCTIVITY IN MALAYSIA: A DOI-BASED CONCEPTUAL FRAMEWORK

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Abstract. Corporate Malaysians are embracing AI tools rapidly; however, this conceptual paper argues that the translation of these technologies into measurable employee productivity remains underexplored. This research aims to examine this disconnection through Rogers' Diffusion of Innovation theory. The framework incorporates five innovation characteristics, namely relative advantage, compatibility, complexity, trialability and observability. According to our framework, productivity gains from AI will depend on how workers assess the benefits of the technology and whether it is aligned, as well as whether its benefits are visible in practice rather than automatic. This research incorporates AI adoption and usage to mediate between the aforementioned perceptions and productivity. Although previous studies have examined AI adoption and performance outcomes, the mechanism linking innovation characteristics with employee productivity remains insufficiently explained, particularly in the Malaysian context. To narrow the gap in the Malaysian context, this research will shift from initial acceptance to actual work results. In doing so, the study extends DOI beyond behavioural acceptance by positioning AI adoption and usage as the mechanism connecting innovation characteristics with employee productivity. Managers and policymakers planning AI rollouts can take guidance from it. We close the study with a series of propositions that can be tested in future empirical research.

Keywords: *technology adoption, digital transformation, diffusion of innovation theory, organizational performance, innovation characteristics*

Introduction

Artificial Intelligence (AI) has emerged as a necessary commodity for organizations today. Firms are now deploying AI in their operations to leverage its features such as automation of tasks and decision-support activities to improve operational efficiency and decision quality (Akter et al., 2024; Shabbir and Anwer, 2018). In Malaysia, there is already a pattern of institutional commitment to accelerate the adoption of AI across sectors, as evidenced by national projects like National Artificial Intelligence Roadmap 2021 to 2025 (Ministry of Science, Technology and Innovation [MOSTI], 2021). The shift in technology corresponds with the UN Sustainable Development Goal 8 (SDG 8), which sets out to achieve sustained economic growth, decent job creation and technological progress. Furthermore, artificial intelligence (AI) has the potential to enhance productivity via innovation and digital transformation when introduced to organizations effectively. Earlier research suggests that AI can organize workloads, reduce operational errors and improve the well-being of employees which will offer better productivity outcomes (Akter et al., 2024; Luhana et al., 2023). A recent study revealed that AI adoption among Malaysian workers is beyond the global average. A large majority of employees now leverage AI tools in their daily tasks (Microsoft and

LinkedIn, 2024). The overwhelming use of AI has brought several efficiencies in work, technology, and social systems. However, little is known about the impact of AI on the productivity of individual workers. While improvements at macro level indicators, such as national labor productivity, abound, there is insufficient micro level evidence that shows how AI is actually impacting performance at individual work level (Department of Statistics Malaysia, 2024; TalentCorp, 2024).

Mixed findings on AI's effect on productivity found in existing studies. Some research has positive outcomes like improved efficiency and better task performance. Other research warns of AI causing what some label "efficient inefficiency." This refers to tasks getting done quicker without creating actual value (Mills and Spencer, 2025). AI systems ill-matched with user capabilities may also trigger technostress and cognitive overload which can prevent potential productivity gains from AI systems (Chuang et al., 2025). A key limitation of the literature is that there is insufficient theoretical integration to explain how employees perceive and adopt AI technologies to enhance their productivity. Some studies have examined AI adoption and performance outcomes, but the mechanism that links the characteristics of innovation with productivity was unknown. The gap is compounded in Malaysia due to a lack of localized empirical and conceptual research (Yusnilzahri et al. (2025). In order to fill this gap this research uses Diffusion of Innovation (DOI) theory of Rogers (1962) to serve as foundational and guide. According to DOI, employees will adopt an innovation depending on its relative advantage, compatibility, complexity, trialability and observability. Although they have been employed to some degree in past research, the utilisation of all five DOI dimensions collectively in explaining innovative productivity outcomes has yet to be fully explored. This framework establishes a theoretical gap of AI characteristics based on DOI theory with employee productivity in Malaysia. By shifting the focus of DOI away from its primary use in predicting the adoption of technological innovations and towards more productivity arguments, the framework helps advance both theory and practice. Through better productive employment, it explains in detail how AI can help achieve SDG 8 goals. Organizations and policymakers can learn from it and design more effective implementation strategies for Artificial Intelligence.

Review of literature and theoretical positioning

Review of literature

Employee productivity is one of the measures of the successful performance of organizations today, especially those in fast-evolving technological sectors. The term productivity typically refers to the employee's ability to produce good quality work in an efficient manner and still meet what the organisation expects (Luhana et al., 2023). Nonetheless, according to contemporary scholars, output volume should not be the only focal point on work performance. Indeed, resource optimisation, innovation encouragement, and employees' health are equally vital metrics (Chuang et al., 2025). A broader view of productivity fits the objectives of SDG 8 which is to promote sustained and inclusive economic growth, full and productive employment and decent work for all. This will be achieved through greater efficiency and new technologies. The increasing prominence of Artificial Intelligence has brought new perspectives to the study of productivity. AI technology allows automating repetitive tasks, support for decision-making, and achieving complex problem solving within organizations (Aker

et al., 2024; Shabbir and Anwer, 2015). According to studies, AI can improve operational efficiency and reduce errors, leading to enhanced employee performance (Assidi et al., 2025; Akter et al., 2024). The proper embedding of AI into work processes has been further associated with commitment and performance (Luhana et al., 2023).

Despite these potential benefits, previous studies have reported inconsistent findings regarding the relationship between AI adoption and employee productivity. While AI has been shown to improve work efficiency by reducing routine tasks and supporting decision-making (Brynjolfsson et al., 2023; Noy and Zhang, 2023), other studies suggest that productivity gains are not always realised because AI may automate tasks that contribute little to actual work performance, resulting in "efficient inefficiency" (Mills and Spencer, 2025). In addition, poor implementation of AI may increase complexity, uncertainty, and technostress, reducing employee engagement, job satisfaction, and overall well-being (Chuang et al., 2025). These contrasting findings suggest that AI alone does not automatically improve productivity, but that its impact depends on how employees perceive, adopt, and utilise the technology within their work environment. Although AI adoption continues to expand across Malaysian organisations, there is limited literature on AI adoption, particularly at the individual level. National statistics indicate that AI is extensively used among the workforce, empirical evidence detailing its impact on productivity within specific work environments remains limited (Department of Statistics Malaysia, 2024; TalentCorp, 2024). Existing literature primarily addresses the organizational readiness or specific sectoral application of AI. Therefore limited attention has been given to understanding the individual-level mechanisms through which employees perceive, adopt, and utilise AI to improve their productivity (Roszelan and Shahrom, 2025; Yusnilzahri et al., 2025). These mixed findings indicate the necessity for a theoretical framework that accounts for the mechanisms and the conditions how AI affects productivity. Without such a framework, the AI-productivity relationship may be overgeneralized, limiting both the academic insight and practical application. Correspondingly, this study adopts Rogers's DOI theory to explain how employees' perceptions of its five innovation characteristics influence AI adoption and usage, which subsequently affect employee productivity.

Theoretical positioning: Diffusion of Innovation (DOI)

This study will elaborate on how Rogers DOI theory can help us provide better insights into AI adoption and its effects with employee productivity in organizations. According to DOI theory, new technologies get adopted inside a social system. The impact afterward from adoption of technology depends heavily on how users perceive certain characteristics of the innovation. Five determinants influence a person's adoption of an innovation, relative advantage, compatibility, complexity, trialability and observability, according to the theory. Earlier studies used DOI theory to assess technology adoption within organizations including AI (Assidi et al., 2025). The findings of the studies show that acceptance of technology is affected by the characteristics of innovation. Historically, DOI has been utilized to evaluate the intent to adopt or frequency of usage, creating a gap between early acceptance and measurable productivity gains (Mills and Spencer, 2025). Most of the past literature treats DOI dimensions as precondition of behavioral acceptance. However, they rarely look at how these dimensions turn into performance results post-adoption. Thus, the relationship

between innovativeness attributes and productivity of employees is unexplored. Moreover, previous studies often explore selective dimensions of DOI in isolation. This segmented approach restricts DOI from providing insight into how individual behavior and performance outcomes are shaped by multiple factors depending on the context of the work environment.

The current research proposes to extend DOI theory by dedicating the five characteristics of innovation to initial perception which in turn influences employees' usage and adoption of AI. This, in turn, affects the productivity of the individual, which is seen by the framework as a process that is formed by perception rather than just a technological output. As demonstrated in this paper, any productivity gains depend, specifically, on how employees evaluate AI's relative advantage, compatibility, complexity, trialability, and observable impact on their work. In framing DOI as a conceptual link through which AI uptake is related to productivity outcomes, this study extends innovation theory beyond behavioral acceptance and performance demonstration. This matters because innovation characteristics do not always translate directly into performance outcomes. The framework therefore offers a clearer way to examine that relationship. Ultimately, this framework is set to provide a basis in understanding how AI can be used to achieve SDG 8 in terms of productivity and organizational efficiency especially amidst rising digitalization such as that of Malaysia.

Justification for the diffusion of innovation theory

The Technology-Organization-Environment (TOE) framework has been widely Applied to study AI's readiness and Adoption in Malaysian organisations. According to Roszelan and Shahrom (2025), the three contexts technological, organisational and environmental are useful to understand the readiness of an organisation to implement new technologies. Nevertheless, it mainly looks at the organization as its primary unit of analysis. This present study seeks to examine employee perceptions of AI technologies and how these perceptions impact employee productivity. Therefore, the DOI theory provides a more relevant theoretical perspective. Similarly, the Job Demands-Resources (JD-R) model has been extensively used to understand employee responses to AI implementations, including issues concerning technostress, workload, job satisfaction and well-being (Chuang et al., 2025). While the model is useful for understanding the psychological impact of AI, it does not explicitly explain how innovation attributes inform employees' adoption and use decisions. Thus, the JD-R model serves to enhance, rather than replace, the present study's focus on innovation adoption. Accordingly, this study adopts Rogers' Diffusion of Innovation (DOI) theory because it explains how employees evaluate an innovation through five characteristics, namely relative advantage, compatibility, complexity, trialability, and observability, before deciding to adopt and use the technology (Rogers, 2003). Earlier studies have applied DOI to study technology adoption and behavioural acceptance mostly (Assidi et al., 2025). This study extends the application of the theory with a proposition that AI adoption and usage are not the end event of the adoption of innovation. Instead, AI adoption and usage serve as the mechanism that enhance employee productivity through employee perception of the five innovation characteristics.

Conceptual framework and prepositions

Conceptual framework

A conceptual framework according to Diffusion of Innovation theory is proposed in this study regarding employee perceptions of AI characteristics and productivity in organizations. DOI mainly focuses on technology adoption, but the present study extends DOI application further by linking innovation characteristics to productivity results at the individual worker level. The framework proposes that an employee's reaction towards AI presence depends on how useful the employee thinks it is, how well it fits in with their current job, complexity and observable benefits. The nature of these perceptions determines how much and how effectively they are using AI in their everyday work and ultimately their productivity. In this framework, the five dimensions of DOI are the main independent variables and employee productivity is the principal dependent variable. The mediating mechanism (AI adoption and usage) clarifies how employee perceptions actively translate into performance outcomes.

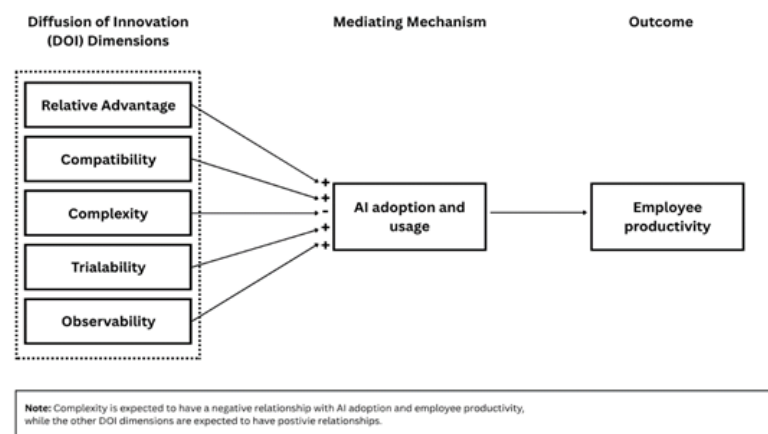


Figure 1. A framework displaying the relationship between the innovation characteristics, employee productivity and AI adoption and usage.

Development of propositions

Relative advantage and AI adoption and usage

Relative advantage refers to the degree to which AI is perceived as better than whatever it is expected to supersede (Rogers, 1962). Employees use AI in their work when they see it speeding up execution, improving decision making and lessening their workload. According to existing studies, AI technology can help in enhancing the efficiency of operation while minimizing human errors contributing to better work. (Assidi et al., 2025; Akter et al., 2024). Thus, the following is proposed based on these.

P1: The relative advantage of AI is positively associated with AI adoption and usage.

Compatibility and AI adoption and usage

The compatibility of AI is the degree to which it fits into the values, experiences and normal working methods of employees (Rogers, 1962). People are likely to adopt and utilize the technology that fits seamlessly into existing systems. Conversely, poor alignment can create resistance and hinder implementation. Research on AI implementation in Malaysian context demonstrates that for AI to be successfully

introduced in the workplace, it must be organizationally ready and strategically aligned (Roszelan and Shahrom, 2025). In accordance with this study:

P2: There is a positive relationship between AI compatibility and its adoption and use.

Complexity and AI adoption and usage

Complexity is how hard it is thought to be to operate AI. Increased complexity will act as a deterrent to adoption and increase the mental load of the employee, possibly causing technostress and reducing job satisfaction (Chuang et al., 2025). When workers perceive AI systems to be difficult to use, then productivity benefits are unlikely to arise. Aspects of performance may sometimes decrease. The study proposes that:

P3: A negative relationship exists between AI adoption and usage and its complexity.

Trialability and AI adoption and usage

Trialability means whether or not the AI can be tried out by the organization before it is rolled out at scale. When employees use AI tools in low-risk settings, it builds confidence and competency, eliminates uncertainty and identifies maximization tasks application (Rogers, 1962). Studies reveal that organizations that configure to experiment with novel AI tools facilitate the transition from exploration to operation (Mikalef et al., 2023). This practical exposure helps employees to recognize the usefulness of AI and integrate it more effectively into their work. Following claims that were made in previous studies, this paper proposes the following:

P4: Trialability of AI is positively associated with AI adoption and usage.

Observability and AI adoption and usage

Observability refers to the observable effects of AI deployment on other people in the organization. According to Assidi et al. (2025), the positive perception of employees will get maximized with organizations showcasing visible improvements, such as better decisions, fewer mistakes, or seamless workflows. This will lead to more encouragement and sustainable adoption. Visible success stories also create social validation and mutual learning which spread usage effectively across teams. This visibility also helps mitigate the 'efficient inefficiency' phenomenon, whereby AI algorithms allow tasks to be completed faster without resulting in any value added to the outcome. The assurance of visible outcomes for value-added applications rather than speed per se (Mills and Spencer, 2025). Consequently, this research recommends:

P5: There is a positive relationship between observability of AI with adoption and usage of AI.

AI adoption and usage and employee productivity

In light of previous assertions, it stands to reason that the degree to which workers consistently and effectively embed AI tools into their daily workflows will likely be the main way worker perceptions turn into actual performance outcomes. Active integration

of AI into core workflows yields tangible productivity gains, whereas superficial or passive usage often fails to deliver comparable benefits (Brynjolfsson et al., 2023; Noy and Zhang, 2023). Regular and effective use of AI can help reduce errors, speed up decision-making, and ease mental workload. Collectively, all of this helps improve quality and efficacy at an individual level. Given these observations, it is proposed that the following:

P6: There is a positive relationship between AI adoption and usage with employee productivity.

The impact of AI adoption and usage on DOI dimensions in mediating employee productivity

The central mediating proposition synthesizes the whole conceptual framework built upon P1 through P6. A review of past research in information systems and technology adoption reveals quite an interesting lesson: Technological features and user perceptions do not guarantee better performance. Instead, these factors influence productivity via the actual usage and depth of integration (DeLone and McLean, 2003; Goodhue and Thompson, 1995). When it comes to AI, the assessments of the characteristics of innovations must first be transformed into sustained and task-embedded usage before any measurable productivity effects can be observed. Thus, the adoption and use of AI is the main behavioral link transferring employee perceptions to actual organization outcomes. In light of these findings, the following proposition is developed.

P7: AI adoption and usage acts as a mediator between the five perceived characteristics of AI (relative advantage, compatibility, complexity, trialability, and observability) and employee productivity.

Results and Discussion

Synthesis of the framework

This paper proposes a DOI-based framework that translates employee perceptions of AI characteristics into the adoption and usage to productivity benefits. Placing the adoption and usage of AI as a mediating mechanism makes an improvement in the connection between adoption intention and performance realization (Mills and Spencer, 2025). Propositions P1 through P6 asserted that efficiency gains are not a case of technological output by itself. Instead, it illustrates the process of how employees screen the technology which then influences their actions. Essentially, the framework supplements existing literature by situating the necessary bridge between innovation attributes and the performance realization.

Practical implications

The framework can assist organisations in Malaysia to enhance employee productivity through AI adoption. Small and medium enterprises (SMEs) often face resource constraints and uncertainty during digital transformation. For such organisations, the framework shows that successful AI implementation depends not only on investment in new technology but also on employees' perceptions of AI. Accordingly, managers should allow employees to experiment with AI applications,

show its observable benefits, and ensure the AI tools are compatible within existing work processes. These practices can reduce resistance to change, while strengthening workforce readiness and organisational productivity. (Roszelan and Shahrom, 2025; TalentCorp, 2024). Based on the proposed framework, organisations should consider the following: (1) Provide pilot testing to showcase the relative advantages of AI before organisation-wide implementation.; (2) Encourage end-users participation in determining how AI will be used to ensure compatibility with existing work processes.; (3) Deliver training in phases with sufficient support to reduce complexity.; (4) Utilizing sandbox environments for employees to test AI before full deployment; and (5) Sharing successful stories and performance metrics to enhance observability of AI benefits.

The suggested framework provides useful practical insights for public sector agencies responsible for implementing the National AI Roadmap and MADANI Economy agenda. Organisations should ensure equal focus on workforce readiness, digital literacy, change management and technology infrastructure for sustainable AI implementation. A human-centred and human-friendly approach would be in line with TalentCorp's recommendations on workforce reskilling and upskilling. This will also support Malaysia's aspiration to adopt AI responsibly for greater productivity and competitiveness. In the end, the framework supports Sustainable Development Goal 8 (SDG 8) as far as AI should enhance rather than replace human capabilities. Organisations that implement AI based on employees' perceptions of innovation characteristics are more likely to improve productivity without compromising workforce well-being, thereby supporting sustainable economic growth.

Limitations and future research directions

As a conceptual paper, our study does not provide data. Therefore, we recommend testing all of seven propositions rigorously using quantitative, qualitative, or mixed methods. Future study should consider the following: (1) Prioritize longitudinal, multiple waves, or surveys with repeated cross-sections to evaluate the process and the productivity effect of AI adoption and usage in organizations; (2) Assess the framework relevancy by running comparative studies across industries beyond the Malaysian context given that technology adoption influence is dissimilar (Dwivedi et al., 2021); (3) Analyze if the relationships found in this study might be moderated with either organizational factors (leadership support, data governance, and readiness for change) or personal traits (digital self-efficacy and learning agility) (Dwivedi et al., 2021; Venkatesh et.al, 2016); (4) Developed measurement tools of the proposed mediating construct i.e. AI adoption and usage by following standard scale development steps to guarantee the validity and reliability (DeVellis, 2016).

Theoretical implications

As presented the framework stretches DOI theory beyond confined technology adoption to performance outcomes, in doing so enhancing existing literature. Where existing literature has focused on the early acceptance of innovations, this paper explores how certain innovation characteristics affect productivity in individual-level. As a result, the link between perceived characteristics of innovation and actual workforce efficiency will be further clarified.

Conclusion

This paper developed a DOI-based conceptual framework linking employees' perception of AI characteristics to their productivity through behavioral pathway (AI adoption and usage) as mediator. An extension of DOI from adoption to performance results provides us a way to understand AI that is both theory-grounded and practically useful. This helps us understand how it can contribute to productive employment in Malaysia. The propositions offer a straightforward guideline for empirical testing and can serve as a springboard for future studies which are located at the intersection of innovation, human resource management and digital transformation.

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Conflict of interest

The authors confirm that there is no conflict related to this study.

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