**RESEARCH IN MANAGEMENT OF TECHNOLOGY AND BUSINESS**
e-ISSN: 2773-5044

**RMTB**

Vol. 5 No. 1 (2024) 812-825
https://publisher.uthm.edu.my/periodicals/index.php/rmtb

# The Relationship between Drivers of Artificial Intelligence and Willingness to Adopt Artificial Intelligence among Manufacturing Industries in Johor

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DOI: https://doi.org/10.30880/rmtb.2024.05.01.056

**Article Info**

Received: 31 March 2024
Accepted: 30 April 2024
Available online: 30 June 2024

**Keywords**

Drivers of artificial intelligence, willingness to adopt artificial intelligence

**Abstract**

Nowadays, the manufacturing industry's adoption of artificial intelligence is still delayed and difficult. Due to the need of deep learning and the difficulty in understanding it, thus many nations including Malaysia are still having trouble in adopting artificial intelligence. Encourage public-private sector cooperation to advance the use of AI in industry by offering awards, money, and regulatory assistance are just a few ways that governments may encourage the adoption of AI and it may foster knowledge sharing, speed up the transfer of technology, and reduce barriers to AI adoption. The purpose of this research was to determine the relationship between Drivers of AI and willingness to adopt artificial intelligence among manufacturing industries in Johor. The study focuses on a population of 500 manufacturing industries located in Johor. To ensure a representative sample, the researcher employed the Krejcie and Morgan table, determining that a sample size of 217. This study used a quantitative method to collect data using questionnaires via Google Form. The data was analyzed using Statistical Package for the Social Sciences (SPSS) software version 27. The findings showed all the drivers of AI include AI technology advantage (r=0.431), supply chain collaboration(r=0.431) and environmental uncertainty(r=0.262) have a significant relationship between willingness to adopt AI. This study aims to enhance awareness within the manufacturing industry regarding strategies for bolstering their competitive advantage through the adoption of Artificial Intelligence.

## 1. Introduction

The purpose of this section is to lead the reader from a general subject area to a particular field of research. It provides an overview of the relationship between Drivers of Artificial Intelligence and willingness to adopt Artificial Intelligence in the manufacturing sector in Johor. The discussion will begin with the research background, problem statement, research questions, research objectives, significance of research, and scope of research.

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## 1.1 Research Background

AI in manufacturing involves machines thinking like humans, autonomously responding to events, and predicting future occurrences (ErayEliaçk, 2022). Robots with AI can identify malfunctions and take corrective action when unexpected events occur, automating complex tasks and uncovering hidden patterns in workflows (ErayEliaç, 2022). Malaysia, through the "Transformasi Nasional 2050" or TN50 initiative, signals readiness for advanced technological development, emphasizing broader sectors and industries, focusing on economic growth through technological innovations like AI and robots (Transformasi Nasional, 2017).

The adoption of AI involves integrating this technology into commercial systems, providing businesses with various advantages, including a competitive edge and improved profitability. AI simplifies daily tasks, offers new opportunities for small firms, and enhances efficiency through process automation (Gu *et al.*, 2019). AI drivers, influencing the overall system, play a significant role in enabling businesses to leverage AI's potential for value creation (Schmidt *et al.*, 2020).

Efforts to enhance businesses' readiness for AI adoption and predict its positive impact on supply chain operations involve factors such as collaboration in the supply chain, AI technology, and environmental uncertainty. The readiness of organizations to adopt AI significantly influences the effectiveness of supply chain improvement techniques.

## 1.2 Problem Statement

The intricate nature of data, coupled with the demand for deep learning and the inherent challenges in comprehension, has resulted in many nations, including Malaysia, facing obstacles in the widespread adoption of Artificial Intelligence (AI). This assertion is reinforced by Ramaswamy (2019), who underscored the delayed and challenging integration of AI within the manufacturing industry.

The first issue is related to internal problems. Although there are many advantages to adopting artificial intelligence technology, there are also several drawbacks. After adoption, businesses must acquire more competitive hardware or data to retain a sustained competitive edge, which forces businesses and rivals to compete on hardware and data (Wang&Pan, 2022). Work assignments for corporate workers will also alter. Even while it is doubtful that artificial intelligence will totally replace human labor, more responsibilities will be delegated to it, and any corporate workers who are unable to advance with the technology will be let go.

The second issue is related to external problems. One significant problem lies in the complexity of adapting existing manufacturing processes to accommodate AI technologies. This involves addressing issues related to interoperability with legacy systems, potential disruptions during the implementation phase, and the need for upskilling the workforce to effectively harness AI capabilities. Additionally, concerns related to data privacy, security, and ethical considerations in AI applications within manufacturing add another layer of complexity to the external challenges faced by the industry (Kaplan, 2019). Ensuring seamless integration without disrupting ongoing operations is a complex task. Manufacturers may face difficulties in aligning AI applications with their existing infrastructure and ensuring compatibility with diverse machinery and software systems (Dirican, 2015). Therefore, it is important to conduct a study to understand whether AI can solve the specific problem as supply chain resilience and supply chain performance through empirical analysis.

Previous studies have consistently reported a limited level of AI adoption. For instance, according to Gnaneswaran (2019), only 26% of Malaysian enterprises have begun implementing AI. There will be a "AI gap" in the global economy as a result of the limited availability of artificial intelligence (AI) technology around the world, which will worsen inequality in the social, economic, and cultural sectors of the world. Since AI will also change the business model, businesses must be aware of it and prepared to implement it in their organizations in order to survive and maintain themselves (Lauterbach, 2016). In Malaysia, where AI use is still comparatively underdeveloped compared to Western or more developed nations, senior management and the government promote boosting AI use in manufacturing enterprises (Sulaiman, Cheung, & Messon, 2019).

Therefore, to achieve the research objectives the level of Artificial Intelligence willingness among manufacturing industries in Johor is determined. Furthermore, the relationship between artificial intelligence technology advantage and willingness to adopt AI among manufacturing industries in Johor also determined. Consequently, the relationship between supply chain collaboration and willingness to adopt AI among manufacturing industries in Johor is identified.

## 1.3 Scope of Research

The scope of this current research study is focused on manufacturing industries in Johor. Johor is moving towards a smart city. Johor is reportedly the second-most populous state in Malaysia, according to Info Malaysia IMM (2022). This is credited to the state's original residents as well as the numerous migrants who were drawn to the nation because of its development as Malaysia's industrial hub. Johor is committed to strengthening the city's economic and industrial ecology to gain international prominence. The industrial ecosystem's attempts to expand the city are concentrated on luring capital to the new field of artificial intelligence (AI). The principal

locations of Malaysia's largest cities are in the state of Johor (Choon *et al.*, 2011). Therefore, the manufacturing industries in Johor have been chosen as the population and the eligible respondents were asked to fill out the questionnaire set pertaining to the study.

## 1.4 Significance of Research

This study's findings are regarding the correlation between drivers of Artificial Intelligence and willingness to adopt artificial intelligence among manufacturing in Johor. The study's findings aim to catalyze the digitization of traditional manufacturing sectors. Furthermore, it seeks to raise awareness within the manufacturing industry about enhancing competitive advantages through the adoption of Artificial Intelligence. This research is poised to introduce new paradigms, fostering future discussions and enabling more in-depth analyses.

This study provides manufacturing industry top management with new perspectives on the importance of leveraging artificial intelligence (AI). AI algorithms and technology enable faster and more intelligent product design and optimization, potentially leading to increased revenues and greater investment in new technologies. Manufacturers can enhance production efficiency and resource utilization, consequently reducing costs, by automating repetitive tasks such as quality control, data analysis, and production action planning using AI.

The research facilitates the mining and analysis of substantial production data, offering data-driven decision support. Executives can utilize AI-generated insights for more accurate, data-driven decisions that enhance productivity, reduce risk, and optimize resource allocation.The findings of this study serve as a foundation for future research, offering a basis for further studies and serving as relevant literature for researchers in the field.

# 2. Literature Review

The literature review of the investigations that have been carried out by earlier researchers is covered in this section. Thus, the model employed, previous studies analyzed, the creation of the hypothesis, and the conceptual framework of the investigation are all included in this section. This section goes into further detail on the connection between artificial intelligence's motivators and the manufacturing industry in Johor's desire to use it. As a result, the literature review is crucial because it may be used in a variety of ways as a roadmap and point of reference for finishing this research.

## 2.1 The Implementation of Artificial Intelligence among Manufacturing Industry

AI is a subfield of computer science, performs tasks requiring human intellect and is undergoing significant advancements globally, particularly in AI, machine learning, and deep learning, driven by the expansion of data and computational power (Panch, Szolovits, & Atun, 2018). AI, viewed as an engine for economic growth, is transforming various industries, including manufacturing and the environment (Kumar, Dwivedi, & Anand, 2021).

In the industrial sector, AI applications are becoming prominent, with adoption depending on organizations' current procedures and future technology planning capacities (Chatterjee, Kar, and Gupta, 2018). AI technology, utilizing machine learning and data analytics, enhances manufacturing efficiency, reduces downtime, ensures safety, anticipates needs, and accelerates production cycles (Chen *et al.*, 2016). The integration of AI in industry 4.0 technology is transforming the industrial sector in emerging nations (Benzidia, Makaoui, & Bentahar, 2021).

Despite the potential benefits, implementing AI and machine learning in the industrial industry requires significant financial investment and skilled human resources for collaborative working models. Predictions indicate that by 2030, over 70% of organizations will integrate AI into their operations (Buggins, Catlin, Hirt, and Willmott, 2018). According to Wladawsky-Berger (2018), AI has the potential to contribute nearly thirteen trillion dollars, or about sixteen percent, to global economic growth by 2030, representing an average annual productivity increase of about 1.2 percent from the present to 2030.

## 2.2 Definition of willingness to adopt Artificial Intelligence

Artificial intelligence (AI) adoption readiness is the state of being open and prepared with the willingness to embrace and incorporate AI technology into one's operations, procedures, or decision-making. It covers the attitudes, convictions, plans, and actions pertaining to the acceptance and application of AI in numerous fields. Firms' preparedness to embrace AI has also been examined in a number of scenarios along with AI adoptions (Halpern, Mwesiumo, Suau-Sanchez, Budd, & Brthen, 2021; Mather & Cummings, 2019). Johnk *et al.* (2021) conceptualized AI readiness and separated it from AI adoption. Instead of exploring the start, adoption decision, and implementation of AI, the pre-adoption stage of AI preparation focuses on the evaluation of organizations' needs, commitment, and available resources.

### 2.2.1 Theories related to adoption of Artificial Intelligence

Previous studies identified five theories related to the adoption of artificial intelligence: Technology Acceptance Model (TAM), Innovation Diffusion Theory (IDT), Unified Theory of Acceptance and Use of Technology (UTAUT), Theory of Planned Behaviour (TPB), and Diffusion of Innovations (DOI). TAM, proposed by Davis (1989), emphasizes the significance of ease and perceived value in technology acceptance. Rogers' (1962) IDT focuses on relative advantage, compatibility, complexity, trialability, and observability to explain innovation dissemination. UTAUT, developed by Venkatesh *et al.* (2003), integrates various determinants like performance expectations, effort expectations, social impact, and enabling circumstances. TPB, by Ajzen (1991), explores attitudes, subjective norms, and perceived behavioral control in influencing behavioral intentions towards AI acceptance. DOI theory, by Rogers (1962), categorizes adopters based on the speed of innovation acceptance. In this study, the Technological-Organizational-Environmental (TOE) framework will be employed to determine AI adoption drivers. Further details about the TOE framework will be explained in the next sub-section.

## 2.3 TOE Framework

The Technology-Organization-Environment (TOE) framework is used in this study to analyze how AI adoption in manufacturing works. The Technology Organization Environment (TOE) framework (Tornatzky and Fleischer 1990) organizes on understanding of the aspects that affect how quickly the new technologies embrace. The framework examines how organizations adopt and utilize technological breakthroughs by combining organizational, technological, and environmental variables. In order to understand how organizations embrace new technologies, TOE has been in-depth theoretically and empirically researched and then implemented in sectors including IT, manufacturing, and financial services (Aboelmaged *et al.*, 2014). The TOE (Technological-Organizational-Environmental) framework, as delineated by Wang *et al.* (2010), encompasses not only technological and organizational components but also extends to incorporate external elements such as social and environmental aspects. In the context of this study, the technological aspect pertains specifically to the advantage derived from AI technology. The organizational facet is elucidated as supply chain collaboration, while the environmental dimension is construed as Environmental uncertainty. Detailed explanations for each of these drivers are provided in the subsequent sub-section.

### 2.3.1 Technology (AI technology advantage)

The technological component examines essential technology tools, practices, and methods both internally and externally within the firm. Technology infrastructure plays a crucial role in facilitating technology adoption by reducing associated costs, given the pre-existing hardware, software, and networking technologies (Bhattacherjee & Hikmet, 2008). The application of embedded AI technology has transformed operational and manufacturing processes, resulting in significant innovation in manufacturing systems (Jabbour *et al.*, 2018; Sung, 2018; Li, 2018). Organizations leverage technologies enabling deep learning, machine learning, and natural language processing to gain a competitive edge (Curran and Pureel, 2017). The integration of AI technologies in manufacturing contributes to the development of smart, adaptable, and eco-friendly production environments (Metallo *et al.*, 2018), creating a socioenvironmental component for competitive advantage (Makridakis, 2017).

### 2.3.2 Organization (Supply chain collaboration)

With an emphasis on company size, structure, communication channels, and decision-making, the organizational component describes the organization and its possessions (Aboelmaged, 2014). Decision-makers who can foster an innovative environment are needed for top management support (Chaubey & Sahoo, 2021; Premkumar & Roberts, 1999). The size of an organization closely relates to how well innovation is received. Due to their ability to absorb the associated risks and expenses, larger businesses can adopt technology more quickly (Duan, Deng, & Corbitt, 2010; Sharma & Rai, 2003). Supply chain cooperation is described as two or more separate businesses cooperating to plan and carry out supply chain activities by Simatupang and Sridharan (2002). Collaboration is desirable because it encourages relational control over contractual governance (Nyaga *et al.*, 2010).

### 2.3.3 Environment (Environmental uncertainty)

According to Oliviera and Martins (2011), the environmental dimension in business encompasses external factors such as competitors, suppliers, consumers, and regulatory authorities. Competitive pressures often drive technology adoption, with business partners and government initiatives exerting significant influence. Governments may employ tailored incentives to encourage technology adoption, although regulations can potentially impede or delay innovation (OECD, 2018). Globalization and new technology have led to more specialized customer demands, contributing to a more unpredictable external environment (Belderbos *et al.*,

2019). Uncertainty arises when there is a lack of fundamental understanding about a topic or event, and it represents a risk that cannot be assessed (Knight, 1921). Tan and Litsschert (1994) attribute uncertainty to difficulties in comprehending and obtaining external information, while Jaworski and Kohli (1993) identify market, competitive, and technical uncertainties as components of environmental uncertainty, distinct from technical and market uncertainty as defined by others (Ma, 2018).

## 2.4 Past Studies related to Drivers of Artificial Intelligence and Willingness to adopt Artificial Intelligence.

### 2.4.1 Past studies on the relationship between AI technology advantage (Technology) and willingness to adopt Artificial Intelligence

Artificial intelligence (AI) is categorized into super intelligence (Artificial Super Intelligence or ASI), strong intelligence (Artificial General Intelligence or AGI), and artificial narrow intelligence (ANI). Super intelligence surpasses human capabilities in various domains (Baum, 2017). The TOE hypothesis emphasizes technical factors related to emerging technologies, including their foundational aspects, technical prowess, comparative advantages, and compatibility with existing systems. Despite the promise of AI technologies, businesses may delay or reject adoption if they are incompatible or pose deployment challenges (Baker, 2012). In conclusion, the advancement of AI technology itself is a catalyst for its business adoption. Wang and Pan's (2022) study reveal a positive relationship between AI technology advantage and willingness to adopt AI.

Hypothesis 1: There is a positive relationship between the artificial intelligence technology advantage and willingness to adopt artificial intelligence technology.

### 2.4.2Past studies on the relationship between supply chain collaboration(organization) and willingness to adopt Artificial Intelligence

Supply chain collaboration, as outlined by Soosay (2015), involves businesses forming partnerships to pool knowledge, assets, and risks, maximizing collaboration value beyond autonomous operations. Coordination between upstream and downstream supply chain enterprises becomes essential for normal functioning during sudden changes in the supply-demand relationship, requiring cooperation and integration of information and resources. Artificial intelligence technology plays a vital role in managing supply chain risks by alleviating information and cognitive overload from significant data volumes (Baryannis, 2019). The study by Wang and Pan (2022) suggests a positive relationship between supply chain collaboration and the willingness to adopt artificial intelligence, indicating that companies may be more inclined to apply AI technology to enhance collaboration.

Hypothesis 2: There is a positive relationship between supply chain collaboration (organization) and a firm's adoption of artificial intelligence technology.

### 2.4.3 Past studies on the relationship between environmental uncertainty (Environment) and willingness to adopt Artificial Intelligence

Environmental factors are defined by the TOE theory as external pressure and support that influence an enterprise's adoption of new technologies. This definition primarily refers to external environmental factors that influence an organization's adoption of new technologies and have a favourable effect on the organization's willingness to adopt technologies (Ghaleb, 2021). Companies think that adopting innovative technologies sooner than rivals would help them maintain a competitive edge in the face of growing environmental uncertainties and have a significant impact on supply chain integration and operational performance (Wong, 2021). Therefore, it is reasonable to assume that environmental uncertainty will favorably affect the uptake of artificial intelligence technologies. Hence, based on the findings on the study conducted by Wang and Pan (2022) there is a positive relationship between environmental uncertainty and willingness to adopt artificial intelligence. Based on the findings on the study conducted by Yulia (2022) also shows that there is a positive relationship between environmental uncertainty and willingness to adopt artificial intelligence.

Hypothesis3: There is a positive relationship between environmental uncertainty (Environment) and a firm's adoption of artificial intelligence technology.

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## 2.5 Conceptual Framework

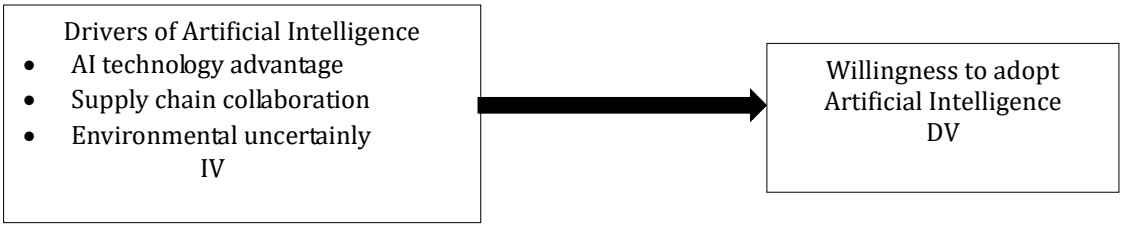


**Fig. 1** *Conceptual framework*

Based on the Theory of TOE and hypotheses discuss in previous sub-section, it derives to this study conceptual framework shown in Fig. 1, the independent variables are the drivers of artificial intelligence including AI technology advantage, supply chain collaboration and environmental uncertainty. The dependent variable is willingness to adopt artificial intelligence.

## 3. Methodology

The approach used to analyze and understand the data was covered in this chapter. A quantitative tool is the use of questionnaires. The research flow chart and methods utilized to conduct this study in order to meet the research aim were presented first in this chapter. The quantitative research design, study population and sampling, research tools, pilot study, study reliability and validity, data collecting, and data analysis are all included in this investigation.

## 3.1 Research Process

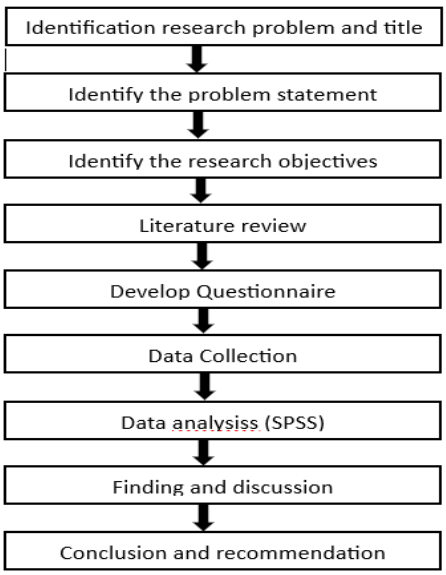


**Fig. 2** *Research process*

Fig. 2 shown the research process flow chart of this study. The research started with the identification of problems and a title was chosen based on it. Then, identify the problem statement and research objectives based on the research questions. Literature review about the artificial technology advantage, supply chain collaboration and environmental uncertainty were explained. The research used secondary data which included printed material (books, articles, journals, reports, newspaper) and electronic media (Internet, journals and past research paper). Besides that, it was also used primary data through questionnaires survey. After that, the data collected was analyzed by using SPSS software. Next, discussion and conclusion related to the objectives of the research was explained. Lastly, limitations of the study and recommendations for future research were made.

## 3.2 Research Design

According to Creswell and Plano Clark (2007, p. 58), research design is the "procedures for collecting, analyzing, interpreting, and reporting data in research studies." It is the general strategy for linking theoretical research

issues to relevant (and doable) actual research. In other words, the study design determines how the data will be collected, how it will be analyzed, and how it will be used to answer the research question (Grey, 2014).
The research design for this study is a quantitative method. Descriptive analysis- analyze the respondent profile and to answer RO 1. While correlation analysis was conducted to examine the relationship between the AI drivers and willingness to adopt AI. The design of this study can be further narrowed down to a non-experimental correlational study where we will be conducting a study on the relationship between drivers of AI and willingness to adopt Ai among manufacturing industry in Johor. The sample size for respondents is 217 manufacturing. The data collected is through survey forms which will be distributed to our targeted manufacturing industries through Google Forms. Once that is done, we proceed to utilize the Statistical Package for Social Sciences (SPSS) to analyze the data obtained.

## 3.3 Population and Sampling

The population, defined by Shukla (2020), includes all units relevant to the research topic. The target population for this study is Johor's manufacturing industry, comprising 500 industries (Federation of Malaysian Manufacturers, 2023). Using the Krejcie and Morgan (1970) method, the sample size is determined as 217 respondents.

For sampling, probability sampling, specifically random sampling, is chosen to generalize findings. Despite potential cost and time implications, random sampling ensures an unbiased and representative sample (Kendra Cherry, 2021). This study employs a random sampling method, providing equal opportunities for all manufacturing industries in Johor to be selected as respondents.

## 3.4 Research Instrument

### 3.4.1 Survey Design

**Table 1** *Survey design*

| Section | Interpretation | Scale |
|---|---|---|
| A | Demographic respondents | Nominal scale |
| B | Drivers of artificial intelligence<br>- AI technology advantage<br>- supply chain collaboration<br>- environmental uncertainty | Five-point Likert scale:<br>- Strongly disagree<br>- Disagree<br>- Neutral<br>- Agree<br>- Strongly agree |
| C | Willingness to adopt artificial intelligence | |

Table 1 presents the questionnaire design for this study, utilizing a Likert scale with five response options: "Strongly Disagree," "Disagree," "Neutral," "Agree," and "Strongly Agree." The questionnaire, the primary data collection instrument, was crafted to survey manufacturing industries in Johor, focusing on understanding the drivers of artificial intelligence and willingness to adopt it. The questionnaire consists of three sections: Section A covers respondent demographics, Section B explores the drivers of artificial intelligence, and Section C delves into willingness to adopt artificial intelligence. This format aids in capturing the perspectives of respondents and assessing their agreement with the presented questions.

### 3.4.2 Measurement of Item

**Table 2** *Measuring development table of variable*

| Section | Variable | Measurement | Scale | Reference |
|---|---|---|---|---|
| B | AI Technology Advantage | 1. Using artificial intelligence technology can enhance an organization's capacity for risk management.<br>2. The application of artificial intelligence technologies will lower overall business running costs.<br>3. The ability of businesses to provide technical IT support will increase with the usage of artificial intelligence technologies.<br>4. The input-output ratio of businesses to IT will be improved by the deployment of | | (Wang&Pan 2022) |

| | | | | |
|---|---|---|---|---|
| | | artificial intelligence technologies.<br>5. The business can use artificial intelligence technology to its comparative advantage. | | |
| B | Supply Chain Collaboration | 1. The business has access to other supply chain organizations' information systems.<br>2. Cooperation between businesses in the supply chain to enhance production techniques.<br>3. Collaboration amongst supply chain companies to get supplies cheaply.<br>4. Product co-pricing between enterprises in the supply chain. | Five-point Likert scale:<br>- Strongly disagree<br>- Disagree<br>- Neutral<br>- Agree<br>- Strongly agree | (Wang&Pan 2022) |
| B | Environmental Uncertainty | 1. There are numerous prospects for transformation in the global corporate landscape.<br>2. Customer demand changes dramatically over time.<br>3. The company's product mix undergoes frequent and significant modifications.<br>4. The supply needs fluctuate every week.<br>5. The company's products require significant technical modification. | | (Wang&Pan 2022) |
| C | Willingness to Adopt Artificial Intelligence | 1. The business has the capacity to resume the material flow promptly.<br>2. The business intends to quickly implement artificial intelligence technologies.<br>3. Artificial intelligence technology has been incorporated by business.<br>4. Future adoption of artificial intelligence technologies by the company is anticipated. | | (Wang&Pan 2022) |

Tables 2 show the measurement development of the questionnaire for this study. In this study, the source of measurement is divided into two focused sections, such as drivers of artificial intelligence and willingness to adopt artificial intelligence. The measurement for drivers of artificial intelligence includes AI technology, supply chain collaboration and environmental uncertainty while the next variable is the willingness to adopt artificial intelligence. Additionally, references are to the same article and same author. The instrument was designed in Likert scale style, with a five-scale range.

## 3.5 Pilot Study

In this research, the researcher conducted a pilot study, and he was responsible for administering the questionnaire to ensure that the survey could accurately answer researcher's research questions. Although there is a large gap between the number of respondents to the pilot study and the real number of respondents to the survey, it can still be ensured which was helpful to measure the questionnaire. The purpose of conducting the pilot test is to identify any problems before sending them the targeted respondents for data collection. The pilot test of this study was conducted among 30 manufacturing industries in the area of Johor Bahru.

## 3.6 Data Analysis

The quantitative statistical software programs will be utilized to address the research objectives which include descriptive analysis, reliability analysis, normality analysis and correlation analysis. Descriptive analysis is used to present the data in a more descriptive and manageable form. The purpose of reliability test is conducted for pilot study and actual study to measure consistency. There are two well-known tests for normality which are the Kolmogorov-Smirnov Test and Shapiro-Wilk Test. Correlation analysis is used to determine there is a link between two variables or datasets and the potential strength of that association.

## 4. Introduction

This chapter delves into the analysis of data obtained from distributed questionnaires in Johor, utilizing the Statistical Package for Social Science (SPSS) software. It encompasses demographic, reliability, descriptive, normality, and correlation analyses for the collected data.

## 4.1 Demographic Analysis

**Table 3** *Demographic Information of Respondents*

| Demographic | Detail | Frequency | Percentage (%) |
|---|---|---|---|
| Gender | Male | 130 | 59.9 |
| | Female | 87 | 40.1 |
| Age | 21-30 | 54 | 24.9 |
| | 31-40 | 103 | 47.5 |
| | 41-50 | 47 | 21.7 |
| | 51 and above | 13 | 6 |
| Ethnicity | Malay | 62 | 28.6 |
| | Chinese | 100 | 46.1 |
| | Indian | 55 | 25.3 |
| Education Level | SPM/O-Level | 17 | 7.8 |
| | Diploma/STPM | 33 | 15.2 |
| | Degree | 137 | 63.1 |
| | Master | 25 | 11.5 |
| | PhD | 5 | 2.3 |
| Department | Human Resource | 40 | 18.4 |
| | Production | 66 | 30.4 |
| | Operation | 62 | 28.6 |
| | Marketing | 49 | 22.6 |
| Job Tenure | Less than 4 years | 35 | 16.1 |
| | 5 to 10 years | 114 | 52.5 |
| | More than 10 years | 68 | 31.3 |

Table 3 displays demographic details for the 217 respondents. The number of male respondents is 130 (59.9%), exceeding female respondents at 87 (40.1%). The majority of respondents fall within the 31 to 40 years age range, constituting 103 individuals (47.5%), while the lowest age group, 51 years and above, has 13 respondents (6%). Among the ethnic groups, 100 respondents are Chinese, and 55 are Indian. Degree holders represent the majority, comprising 137 individuals (63.1%), while respondents with a PhD level education are the lowest at 2.3% (5 respondents). The production department has the highest representation with 66 respondents (30.4%), whereas the human resource department has the least with 40 respondents (18.4%). In terms of work experience, 52.5% (114 persons) have 5 to 10 years, 31.3% (68 respondents) have more than 10 years, and the lowest is 16.1% (35 persons) with less than 4 years of experience.

## 4.2 Reliability Analysis

Reliability analysis was used to determine the internal consistency which the same data can be obtained in the same statement more than one time (Mohajan, 2017). Cronbach's alpha (α) is the most common measurement for reliability analysis.

### 4.2.1 Pilot Study

A total of 30 questionnaires have been used which were randomly distributed from the sample size of the research conduct this pilot test. Cronbach's Alpha of willingness to adopt Artificial Intelligence (Dependent Variable) is 0.787 which is strong. Then, AI technology advantage (0.665) and environmental uncertainty (0.605) are considered moderate due to the Cronbach's Alpha are between 0.6 to 0.7. Cronbach's Alpha of supply chain collaboration is 0.577 which is considered poor.

### 4.2.2 Actual Study

Cronbach's Alpha Reliability Test of the Independent variables and Dependent variable results. The result shows that most of the variables are moderate and poor. Cronbach's Alpha of willingness to adopt Artificial Intelligence (Dependent Variable) is 0.687 which is moderate. However, AI technology advantage supply chain collaboration and environmental uncertainty are poor due to the Cronbach's Alpha are less than 0.600.

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## 4.3 Descriptive Analysis for Willingness to Adopt Artificial Intelligence (Dependent Variable) and Drivers of Artificial Intelligence (Independent Variables)

The results show that the level of meaning of Independent Variables and Dependent Variable are in the category of high interpretation. For Willingness to Adopt Artificial Intelligence (Dependent Variables), the overall mean is 4.0518. However, in Independent Variables which are AI-technology advantage, supply chain collaboration and environmental uncertainty, the overall mean for these variables is 4.0488, 4.0760 and 4.0811.

## 4.4 Normality Test

**Table 4** *Demographic information of respondents*

| Tests of Normality | | | | | | |
|---|---|---|---|---|---|---|
| | Kolmogorov-Smirnov | | | Shapiro-Wilk | | |
| | Statistic | df | Sig. | Statistic | df | Sig. |
| Overall Mean Willingness to Adopt Artificial Intelligence | .141 | 217 | <.001 | .936 | 217 | <0.01 |

The Kolmogorov-Smirnov and Shapiro-Wilk tests will be applied to determine normal or non-normal distribution, particularly in studies with a sample size of 217 (Ghasemi & Zahediasl, 2012). The data distribution is not normal as Kolmogorov-Smirnov and Shapiro-Wilk normality tests show a p-value < 0.001.

## 4.5 Correlation Analysis

The purpose of a correlation analysis is to determine how two or more variables are related to one another. Data gathered from respondents was used in the assessment. Statistics aid in determining how strongly two or more variables are related (Kumar, 2016). In this study, data from respondents were used. Nonparametric correlation analysis was chosen due to the non-normal distribution of the data. The correlation between AI-technology advantage (independent variable) and willingness to adopt artificial intelligence (dependent variable) is moderate and positive ($r = 0.431$, $p < 0.01$). Similarly, supply chain collaboration shows a moderate and positive correlation with willingness to adopt AI ($r = 0.431$, $p < 0.01$). Environmental uncertainty also exhibits a weak and positive correlation with willingness to adopt AI ($r = 0.262$, $p < 0.01$).

## 4.6 Conclusion

As conclusion, the findings and results of our research show that in the demographic section, the male respondents are higher than the female respondents and the respondents are mostly in the ages in between 31 to 40 years old. Then, in the reliability test for our research and findings, most of the variables are in moderate and poor strength. Besides, in descriptive analysis, the overall mean for dependent variable and independent variables are in high interpretation. Next, for the normality test, the data distribution is not normal due to the p-value < 0.01 and Spearman correlation analysis is used. Finally, the result of correlation analysis shows that there is correlation between Independent Variables and Dependent Variable.

# 5. Introduction

This chapter is to summarize and discuss the findings of the research objectives. The aim is to conclude the research then some limitations and recommendations to improve future related research will be included in this chapter.

## 5.1 Overview of Study

**Table 5** *Demographic information of respondents*

| | Research Question | Research Objective | Results |
|---|---|---|---|
| Research Objective 1 | What is the level of wiliness to Artificial Intelligence among manufacturing industries in Johor? | To examine the level of willingness to artificial intelligence among manufacturing industries in Johor. | Therefore, Artificial Intelligence includes expert systems, natural language processing, speech recognition and machine vision. The finding shows that have a high level of willingness to adopt the artificial intelligence among manufacturing industries in Johor. |

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|---|---|---|---|
| Research Objective 2 | What is the relationship between artificial intelligence technology advantage and willingness to adopt AI among manufacturing industries in Johor? | To identify the relationship between artificial intelligence technology advantage and willingness to adopt artificial intelligence among manufacturing industries in Johor. | The findings show a moderate relationship between independent variable (AI-technology advantage) and dependent variable (willingness to adopt artificial intelligence). |
| Research Objective 3 | What is the relationship between supply chain collaboration and willingness to adopt AI among manufacturing industries in Johor? | To study the relationship between supply chain collaboration and willingness to adopt artificial intelligence among manufacturing industries in Johor. | The findings show a moderate relationship between independent variable (Supply chain collaboration) and dependent variable (willingness to adopt artificial intelligence). |
| Research Objective 4 | What is the relationship between environmental uncertainty and willingness to adopt AI among manufacturing industries in Johor? | To determine the relationship between environmental uncertainty and willingness to adopt artificial intelligence among manufacturing industries in Johor. | The findings show a poor relationship between independent variable (Environmental uncertainty) and dependent variable (willingness to adopt artificial intelligence). |

## 5.2 Findings Based on Objectives

This research is aimed to examine the level of artificial intelligence willingness among manufacturing industry in Johor. Besides that, the researcher also aimed to identify the relationship between drivers of artificial intelligence and willingness to adopt artificial intelligence among manufacturing industries in Johor. 217 respondents from manufacturing industries in Johor were randomly chosen, and 217 surveys were successfully collected over the internet. The Spearman test and correlation analysis were used to examine all the objectives.

### 5.2.1 To Examine the Level of Willingness to Artificial Intelligence Among Manufacturing Industries in Johor

Based on the descriptives analysis, the mean of level is 4.0518. It shows that the Level of AI willingness among manufacturing industries in Johor is high interpretation. According to Pizzi *et al.* (2020), despite the sluggish adoption of AI into practice, humanitarian organizations are exhibiting a high level of interest in using AI to improve their decision-making capacities. Another significant component of AI is its ability to boost productivity (Alexopoulos & Cohen, 2019; Mayer, Strich, & Fiedler, 2020). AI can improve planning accuracy and operational optimization on multiple fronts, especially when resources are limited due to the scale of the business (Nascimento, Melo, Queiroz, Brashear-Alejandro, & de Souza Meirelles, 2021).

The survey, based on Wang *et al.* (2022), employed Likert scales with five-point intervals ranging from "strongly disagree" to "strongly agree." Despite the modest sample size, the results in Chapter Four provide meaningful insights applicable to general practice. Descriptive analysis indicates a high willingness to adopt AI among respondents, as reflected in the overall mean of 4.0518, categorizing it as high willingness.

### 5.2.2 To Identify the Relationship between Artificial Intelligence Technology Advantage and Willingness to Adopt Artificial Intelligence Among Manufacturing Industries in Johor

This Spearman Correlation result that tested the relationship between artificial intelligence technology advantage and willingness to adopt artificial intelligence shows a value of 0.431, indicating there is a moderate correlation between these two variables. Three levels of artificial intelligence (AI) exist: weak intelligence, limited to specific tasks; strong intelligence, comparable to human cognitive abilities, capable of governance tasks, thinking, planning, and problem-solving; and super intelligence, surpassing human capabilities in scientific research, overall cognition, and social skills (Baum *et al.*, 2017). The successful adoption of AI in enterprises depends on its compatibility with existing operating systems and the ease of implementation. Consequently, substantial evidence supports the conclusion that there is a significant relationship between the

advantage offered by artificial intelligence technology and the willingness to adopt artificial intelligence among manufacturing industries.

### 5.2.3 To Study the Relationship between Supply Chain Collaboration and Willingness to Adopt Artificial Intelligence Among Manufacturing Industries in Johor

This Spearman Correlation result that tested the relationship between supply chain collaboration and willingness to adopt artificial intelligence shows a value of 0.431, indicating there is a moderate and positive correlation between these two variables. Supply chain collaboration involves enterprises forming partnerships to share information, resources, and risks, aiming to maximize the value of their cooperation and generate more benefits than individual actions (Soosay *et al.*, 2015). During sudden changes in supply and demand dynamics, supply chain enterprises must collaborate to coordinate activities. Artificial intelligence (AI) is crucial in alleviating information overload from vast data, transforming it into usable information for effective supply chain risk management (Baryannis *et al.*, 2019). Therefore, there is sufficient reason to conclude that there is a significant relationship between Supply chain collaboration and willingness to adopt artificial intelligence.

### 5.2.4 To Determine the Relationship between Environmental Uncertainty and Willingness to Adopt Artificial Intelligence Among Manufacturing Industries in Johor

This Spearman Correlation result that tested the relationship between environmental uncertainty and willingness to adopt artificial intelligence shows a value of 0.262, indicating there is a weak and positive correlation between these two variables. According to the TOE theory, environmental factors encompass external pressures and support that influence the technology adoption of enterprises. Environmental uncertainty results from external changes, and amid increased uncertainty, companies view rapid adoption of new technologies as essential for competitive advantage. It is reasonable to expect that environmental uncertainty will positively influence the adoption of artificial intelligence technology. Therefore, there is sufficient reason to conclude that there is a significant relationship between environmental uncertainty and willingness to adopt artificial intelligence.

## 5.3 Limitation of Study

There are some challenges and limitations to complete this research. Small sample size for the study. The sample size only represents one specific geographical area. It does not accurately reflect the whole Malaysia manufacturing industries population. Time consideration had limited the number of respondents. The data collection period for this research is only about three months.

## 5.4 Recommendations

The research achieved its objectives, but future improvements are recommended. Future researchers are advised to increase their sample size to enhance the generalizability of findings and ensure more precise estimations of research objectives. Additionally, incorporating mixed methods, including qualitative approaches, can broaden the scope of research by extracting information from various sources and gaining diverse perspectives through interviews, leading to more nuanced and comprehensive conclusions.

## 5.5 Conclusion

This study reveals a strong correlation between key drivers of artificial intelligence and the willingness of manufacturing industries to adopt it. The favorable influence of AI technology on boosting manufacturing adoption is clear, since it provides competitive advantages and addresses difficulties such as "out of stock." Integrating AI into supply chain collaboration is beneficial for processing large datasets, overcoming information overload difficulties, and translating data into meaningful insights. In the face of increased environmental uncertainty, manufacturing industries are more likely to employ AI for strategic development. The study suggests that proactive AI deployment delivers significant benefits to manufacturing businesses, which is consistent with previous findings.

## Acknowledgement

The authors would like to thank the Faculty of Technology Management and Business, Universiti Tun Hussein Onn Malaysia for its support.

## Conflict of Interest

Authors declare that there is no conflict of interests regarding the publication of the paper.

## Author Contribution

*The authors confirm contribution to the paper as follows:* ***study conception and design:*** *H.M.Y., and N.K.K.;* ***data collection:*** *H.M.Y.,* ***analysis and interpretation of results:*** *H.M.Y., and N.K.K.;* ***draft manuscript preparation:*** *H.M.Y., and N.K.K. All authors reviewed the results and approved the final version of the manuscript.*

## References

Baker, J. The Technology–Organization–Environment Framework. Inf. Syst. Theory 2012, 28, 231–245.

Baum, S.; Barrett, A.; Yampolskiy, R.V. Modeling and Interpreting Expert Disagreement About Artificial Superintelligence; Social Science Research Network: Rochester, NY, USA, 2017.

Baryannis, G.; Validi, S.; Dani, S.; Antoniou, G. Supply Chain Risk Management and Artificial Intelligence: State of the Art and Future Research Directions. Int. J. Prod. Res. 2019, 57, 2179–2202.

Chatterjee, S., Rana, N. P., Khorana, S., Mikalef, P., & Sharma, A. (2021). Assessing Organizational Users' Intentions and Behavior to AI Integrated CRM Systems: A Meta-UTAUT Approach. Information Systems Frontiers. https://doi.org/10.1007/s10796-021-10181-1

Chen, Y., & Hu, S. (2021). Research on the Impact of Artificial Intelligence on the High-quality Development of the Logistics Industry-Based on the Perspective of Total Factor Productivity.

Dirican, C. The Impacts of Robotics, Artificial Intelligence on Business and Economics. Procedia Soc. Behav. Sci. 2015, 195, 564–573.

International Journal of Production Economics, 250. https://doi.org/10.1016/j.ijpe.2022.108618

Ghaleb, E.A.A.; Dominic, P.D.D.; Fati, S.M.; Muneer, A.; Ali, R.F. The Assessment of Big Data Adoption Readiness with a Technology–Organization–Environment Framework: A Perspective towards Healthcare Employees. Sustainability 2021, 13, 8379.

Ghani, E. K., Ariffin, N., & Sukmadilaga, C. (2022). Factors Influencing Artificial Intelligence Adoption in Publicly Listed Manufacturing Companies: A Technology, Organisation, and Environment Approach. International Journal of Applied Economics, Finance and Accounting, 14(2), 108–117. https://doi.org/10.33094/ijaefa.v14i2.667\

Giuggioli, G., & Pellegrini, M. M. (2022). Artificial intelligence as an enabler for entrepreneurs: a systematic literature review and an agenda for future research. In International Journal of Entrepreneurial Behaviour and Research. Emerald Group Holdings Ltd. https://doi.org/10.1108/IJEBR-05-2021-0426

Gutierrez, A.; Boukrami, E.; Lumsden, R. Technological, Organisational and Environmental Factors Influencing Managers' Decision to Adopt Cloud Computing in the UK. J. Enterp. Inf. Manag. 2015, 28, 788–807.

Hangl, J., Behrens, V. J., & Krause, S. (2022). Barriers, Drivers, and Social Considerations for AI Adoption in Supply Chain Management: A Tertiary Study. Logistics, 6(3), 63. https://doi.org/10.3390/logistics6030063

Hradecky, D., Kennell, J., Cai, W., & Davidson, R. (2022). Organizational readiness to adopt artificial intelligence in the exhibition sector in Western Europe. International Journal of Information Management, 65. https://doi.org/10.1016/j.ijinfomgt.2022.102497

Kanti, P. S., Sadia, R., & Suchismita, D. (2022). Artificial intelligence adoption in supply chain risk management: Scale development and validation. HO CHI MINH CITY OPEN UNIVERSITY JOURNAL OF SCIENCE - ECONOMICS AND BUSINESS ADMINISTRATION, 12(2), 15–32. https://doi.org/10.46223/HCMCOUJS.econ.en.12.2.2142.2022

Kaplan, A.; Haenlein, M. Siri, Siri, in My Hand: Who's the Fairest in the Land? On the Interpretations, Illustrations, and Implications of Artificial Intelligence. Bus. Horiz. 2019, 62, 15–25.

Liu, K. S., & Lin, M. H. (2021). Performance assessment on the application of artificial intelligence to sustainable supply chain management in the construction material industry. Sustainability (Switzerland), 13(22). https://doi.org/10.3390/su132212767

Malik, N., Tripathi, S. N., Kar, A. K., & Gupta, S. (2022). Impact of artificial intelligence on employees working in industry 4.0 led organizations. International Journal of Manpower, 43(2), 334–354. https://doi.org/10.1108/IJM-03-2021-0173

Nascimento, A. M., De, F., & Meirelles, S. (n.d.). Association for Information Systems Association for Information Systems Factors Influencing the Adoption Intention of Artificial Intelligence Factors Influencing the Adoption Intention of Artificial Intelligence in Small Businesses in Small Businesses Factors Influencing the Adoption Intention of Artificial Intelligence in Small Businesses. https://aisel.aisnet.org/isla2022

Pandl, K. D., Teigeler, H., Lins, S., Thiebes, S., & Sunyaev, A. (2021). Drivers and inhibitors for organizations' intention to adopt artificial intelligence as a service. Proceedings of the Annual Hawaii International Conference on System Sciences, 2020-January, 1769–1778. https://doi.org/10.24251/hicss.2021.215

Perc, M., Ozer, M., & Hojnik, J. (2019). Social and juristic challenges of artificial intelligence. In Palgrave Communications (Vol. 5, Issue 1). Palgrave Macmillan Ltd. https://doi.org/10.1057/s41599-019-0278-x

Samsurijan, M. S., Ebekozien, A., Nor Azazi, N. A., Shaed, M. M., & Radin Badaruddin, R. F. (2023). Artificial intelligence in urban services in Malaysia: a review. PSU Research Review. https://doi.org/10.1108/PRR-07-2021-0034

Sharma, M., Luthra, S., Joshi, S., & Kumar, A. (2021). Implementing challenges of artificial intelligence: Evidence from public manufacturing sector of an emerging economy. Government Information Quarterly. https://doi.org/10.1016/j.giq.2021.101624

Soosay, C.A.; Hyland, P. A Decade of Supply Chain Collaboration and Directions for Future Research. Supply Chain Manag. 2015, 20, 613–630.

Wang, M., & Pan, X. (2022). Drivers of Artificial Intelligence and Their Effects on Supply Chain Resilience and Performance: An Empirical Analysis on an Emerging Market. Sustainability (Switzerland), 14(24). https://doi.org/10.3390/su142416836

Wei, R., & Pardo, C. (2022). Artificial intelligence and SMEs: How can B2B SMEs leverage AI platforms to integrate AI technologies? Industrial Marketing Management, 107, 466–483. https://doi.org/10.1016/j.indmarman.2022.10.008

Wong, C.Y.; Boon-itt, S.; Wong, C.W.Y. The Contingency Effects of Environmental Uncertainty on the Relationship between Supply Chain Integration and Operational Performance. J. Oper. Manag. 2011, 29, 604–615.

Wu, J., & Shang, S. (2020). Managing uncertainty in ai-enabled decision making and achieving sustainability. Sustainability (Switzerland), 12(21), 1–17. https://doi.org/10.3390/su12218758

Zahari, M. K., & W. Muhamad Radzi, W. N. (2021). THE IMPACT OF INDUSTRY REVOLUTION 4.0 TOWARDS THE READINESS OF EMPLOYEE IN MANUFACTURING SECTOR IN JOHOR BAHRU, MALAYSIA. Journal of Information System and Technology Management, 6(24), 27–33. https://doi.org/10.35631/jistm.624004