

# The Impact of Technology Innovation and Innovative Work Practices on Employee Performance in the Manufacturing Industry

Mehela Subramaniam<sup>1\*</sup>

<sup>1</sup> Faculty of Business & Communication, Universiti Malaysia Perlis, UniCITI Campus, 02100 Padang Besar, Perlis, Malaysia

Received 19<sup>th</sup> May 2025, Revised 10<sup>th</sup> February 2026, Accepted 11<sup>th</sup> February 2026

---

## ABSTRACT

*In the modern industrial landscape, technology innovation plays a vital role in the manufacturing industry by enhancing employee performance and strengthening competitiveness in the global economy. Through technology innovation and Innovative Work Practices (IWPs), industries are able to generate more innovative ideas and practical knowledge that contribute to improve employee performance. The objective of this study is to examine the impact of technology innovation and IWPs on employee performance in the manufacturing industry. This research was carried out using a quantitative method by distributing 400 questionnaires. A convenient sampling method was used to collect the data. The findings were analysed using the Statistical Package for Social Science (SPSS). The findings indicate that technology innovation has the highest mean among the other variables, which is 37.12, and demonstrated a significant relationship with employee performance ( $R^2=0.746$ ,  $P\text{-value} < 0.05$ ). Hence, the hypothesis that technology innovation and IWPs have a significant relationship with employee performance is accepted. Through conducting this study, there are some limitations that occur when doing the research, such as limited data and resources, time constraints, and difficulty in accessing certain participants. In summary, technology innovation and IWPs enable industries to generate more innovative ideas and practical knowledge that improve employee performance.*

**Keywords:** Employee Performance, Innovation Satisfaction, Innovative Work Practices (IWPs), Technology Innovation

## 1. INTRODUCTION

According to Akbari et al. (2020), technology innovation is now a key component of obtaining a competitive edge in the rapidly evolving global economy, particularly in manufacturing. Malaysian manufacturing firms are progressively integrating new technologies like automation, robotics, artificial intelligence, and the Internet of Things (IoT) into their operations as industries adapt to the Fourth Industrial Revolution (Industry 4.0). These developments have a significant effect on labour dynamics and employee performance in addition to altering the way items are manufactured. In order to accommodate these innovations in technology, new work practices are being introduced at the same time, such as shared decision-making, team-based structures, continuous training programmes, and flexible work schedules (Zhang, 2024).

---

\*Corresponding Author: [mehelasubramaniam@gmail.com](mailto:mehelasubramaniam@gmail.com)

Employee engagement and productivity may increase as a result of these measures, which seek to promote flexibility, enhance skill development, and enhance job satisfaction. Understanding how technological innovation and innovative workplace practices impact employee performance is crucial to Malaysia's ambition to become a regional leader in high-tech manufacturing. Bell and Gluesing (2020) argued that, although digital tools and automation can increase productivity, how well people use these technologies will determine how successful they are. The purpose of this study is to examine the relationship between employee performance, technology innovation and IWPs in Malaysia's manufacturing industry. It aims to provide information on workforce development techniques that operate in an increasingly digital industrial sector.

Jayashree et al. (2021) mentioned that, Malaysia's economy depends significantly on the manufacturing sector, which employs a substantial percentage of the labour force and accounts for more than 20% of the country's GDP. This sector, which encompasses a number of industries like electronics, automotive, food processing, and machinery, is crucial to the expansion of the industry. By means of programmes like the Industry4WRD National Policy, the Malaysian government has recently concentrated on reforming the industrial sector. In order to increase productivity, creativity, and worldwide competitiveness, this strategy encourages the adoption of Industry 4.0 technology. According to Hanif et al. (2021), smart manufacturing methods have become more popular throughout the industry as a result of the integration of technological innovations like automation, robotics, artificial intelligence (AI), and the Internet of Things (IoT). Supply chains, operational procedures, and quality control techniques are all being altered by these developments. However, the workforce's capacity to accept and utilise new technologies efficiently is a major factor in their successful application. IWPs, such as team-based problem resolution, flexible work schedules, participative leadership, and ongoing upskilling, have gained importance in this setting. These procedures are designed to help staff members accomplish company objectives, enhance their performance, and adapt to the quick changes in technology. Nevertheless, despite the possible advantages, a lot of Malaysian manufacturing companies deal with issues like employee inability to change, a lack of digital skills, and a lack of preparedness for change (Cannavacciuolo et al., 2023). This emphasises the necessity of investigating the relationship between employee performance in the industry, IWPs, and technology innovation. To build a strong, future-ready manufacturing workforce, legislators, human resources professionals, and industry executives must have a deeper knowledge of this relationship. By determining the elements that support or undermine worker performance in tech-driven settings, businesses can better prepare to remain competitive in a rapidly evolving industrial context (Yang & Chen, 2019).

Subramaniam et al. (2023) stated that, with the adoption of national policies like Industry4WRD to modernise traditional manufacturing into high-tech, knowledge-based manufacturing, respectively, the Malaysian manufacturing industry has reached a turning point. Automation, robotics, and intelligent systems are examples of the technologies that businesses are using constantly to boost productivity and operational efficiency. However, for these technologies to provide better results, the valuable contributions of the employees are equally important. However, it might be difficult for many organisations to find a method to align innovations in technology with what employees can do and expect to achieve. Moreover, there is often inconsistent or undervalued implementation of IWPs, such as team-based approaches, participation in decision-making, and continuous training. If these practices are not strategically integrated, employees may find it difficult to adapt to new technologies, which could lead to resistance to change, reduced productivity, and job discontent. Hermina and Yosepha (2019) mentioned that despite large investments in technology and workforce development initiatives, there is still little empirical data on the combined effects of technological innovation and IWPs on worker performance in Malaysia's manufacturing industry. This discrepancy poses a significant challenge for companies trying to maintain their competitiveness in a global market that

is changing quickly. Thus, this study aims to explore the ways in which technological innovation and IWPs impact employee performance in Malaysia's manufacturing sector, as well as the extent to which these factors interact to enhance or impair worker productivity and adaptability in a digitally changing environment (Arneguy et al., 2022).

In recent years, many studies have examined how organisational practices and technological innovation affect performance outcomes across a range of industries. Much of this study has focused on the technical benefits of Industry 4.0 technologies (such as automation, IoT, and AI) or standard human resource processes that impact employee engagement and productivity (Vuong & Nguyen, 2022). However, not much research has been done to examine how employee performance is impacted simultaneously by technology innovation and IWPs, particularly in Malaysia's manufacturing industry. The effectiveness of these technologies in increasing employee performance is still unclear, despite the fact that their adoption in Malaysian manufacturing is increasing due to national initiatives like the Industry4WRD policy. Research frequently focuses on organisational performance or operational efficiency, but it frequently ignores how employees actually react to or are impacted by new technologies. Furthermore, technological innovation and IWPs are frequently presented as separate fields of study in the current literature. According to Bekhet and Latif (2023), the possible interdependence of technological tools and human-centred practices in influencing performance outcomes is overlooked by this fragmented approach. For instance, even though automation can boost productivity, workers may feel weakened and perform poorly if training, teamwork, and participatory work environments are not provided (Meyer & Okoli, 2023). Furthermore, the majority of empirical research focuses on high-income or Western economies, offering little contextual understanding of emerging markets like Malaysia, where workforce preparedness and the rate of digital transformation differ greatly between businesses, particularly between large corporations and SMEs. As a result, there is a clear research gap in understanding how the combination of technological innovation and IWPs affects employee performance in the particular setting of Malaysia's manufacturing sector. Addressing this gap is important for creating workable frameworks that promote the development of human capital and technological advancement in Malaysian industries (Halawa et al., 2023). Below are the research objectives for this current study:

RO1: To examine the relationship between technology innovation and employee performance in the manufacturing industry.

RO2: To examine the relationship between innovative work practices and employee performance in the manufacturing industry.

## **2. LITERATURE REVIEW**

### **2.1 Employee Performance**

According to Triansyah et al. (2023), one of the most important elements in accomplishing organisational objectives is employee performance. Employees who are productive and efficient can help businesses generate more goods and services of higher quality, attract more clients, and enhance their company's reputation. The ability of an employee to carry out their tasks and obligations correctly and successfully is measured by their performance (Darvishmotevali & Ali, 2020). An employee's job results; efficiency, quality, initiative, and attitude can all be used to gauge their performance. While poor employee performance can result in losses for the business, good employee performance can assist organisations in more successfully accomplishing their goals (Sitopu et al.,

2021). In the age of globalisation and intensifying rivalry, the significance of employee performance is becoming more apparent. To create additional value and accomplish organisational objectives, businesses must maximise the potential of their workforce. In order to boost employee productivity and efficiency, it is crucial for businesses to create efficient performance management plans (Yong et al., 2019). In the age of digitisation, technology can make it easier and more accurate for businesses to keep an eye on employee performance. However, performance management is more than just monitoring workers; it also involves giving them constructive criticism and helping them grow their skills and abilities through training and development. For businesses to succeed in the long run, it is crucial to constantly assess and enhance staff performance (Vahdat, 2021). In summary, based on authors' review, a company's success depends on its employees doing well, which affects morale, productivity, and profitability. Fulfilling duties, achieving objectives, producing both high-quality and high-volume work, efficiency, job behaviour, and other factors are all important components of employee performance. Workers must effectively complete the tasks assigned to them and adhere to deadlines. Performance is evaluated in relation to particular goals and targets that the organisation has established. Accuracy, thoroughness, and output are components of both quantity and quality of work. Workers should be able to complete tasks efficiently while considering available resources. Employee performance is essentially a complex idea that reflects how well a worker performs their duties and contributes to the organisation's overall success.

## **2.2 Technology Innovation**

As stated by Davoudi et al. (2019), in order to support corporate, industrial, economic, and social change for businesses' and nations' competitive advantage and to advance human progress generally, technological innovation is crucial to society in meeting needs, accomplishing objectives, and resolving adopters' issues. Technology, which can be defined as a complex system made up of multiple entities or subsystems and the relationship that exists between each entity and at least one other entity in the system for accomplishing particular goals, is the foundation of technological innovation (Chen et al., 2022). According to Coccia (2020), technological innovation can be classified into various typologies based on the growing scale of change and socioeconomic impact, including incremental innovations, radical innovations, technological systems, technological revolutions, and others. As stated by the author, the process of bringing new or enhanced technologies that provide value by meeting particular demands or improving existing solutions is referred to as 'technology innovation'. Technology innovation is essential for economic growth, raising living standards, and increasing efficiency. In contrast, innovation is a major force behind economic expansion, resulting in new industries, higher productivity, and job creation. Better services, more effective shipping, and easier access to information and communication are possible outcomes of technological developments. Innovation can save expenses, increase the quality of goods and services, and streamline procedures. In summary, technological innovation is a vital and dynamic force that propels advancement and shapes the future.

## **2.3 The Impact of Technology Innovation on Employee Performance**

According to Osman et al. (2024), implementing entirely new technologies, combining existing technologies, or gaining new knowledge are all examples of technological innovation related to goods, services, and production. Through the absorption of external technological knowledge, technological innovation helps organisations learn and explore new ideas. It has been discovered that technological innovation significantly influences the acquisition and dissemination of information (Tsou & Chen, 2021). The basic principles of technological innovation indicate that since technology has changed the way employees work, tools and machines must be more adaptable, human-friendly, and capable of streamlining tasks (Mardumyan & Sabadie, 2023). As a result, employee performance

and technological innovation are significantly interconnected. A critical review of the literature suggests that innovation in technology has a significant impact on employee performance, typically resulting in higher output, greater job satisfaction, and better work-life balance. However, the nature of the technology itself, organisational support, and staff adaptation are all important considerations for the successful incorporation of innovative technologies. Employee productivity can be increased by using technology to automate repetitive jobs, optimise workflows, and provide access to information. This allows workers to concentrate on more intricate and strategic work. Greater job satisfaction and a sense of success can result from technology, which can reduce monotonous activities and equip workers with new information and abilities. Technology-enabled flexible work schedules and remote collaboration tools can enhance work-life balance and prevent burnout. To summarise, technological innovation has the potential to significantly boost employee performance, but its effective use necessitates thorough preparation, staff involvement, and a positive business culture.

#### **2.4 Innovative Work Practices (IWPs)**

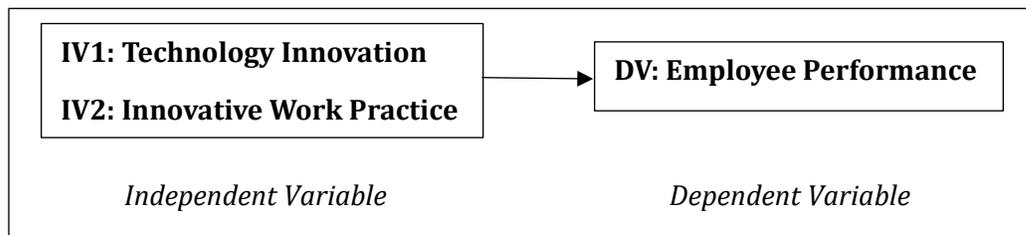
High-commitment management, high-involvement systems, transformed workplaces, flexible production systems, and high-performance work systems are some of the terms used to characterise workplaces that employ innovative practices in human resource management (Wood, 2020). The ability of workers to solve problems at the point of production and the flexibility that new work practices offer to solve problems across traditional job categories and time may lead to improved product or service quality. Innovative work practices within an organisation may also be linked to increased productivity. Alternative work organisation structures encourage flexibility in deployment so that labour can be used more efficiently, and new work practices generally lessen the need for supervision (Guan & Frenkel, 2019). Additionally, innovative work practices may boost employee morale, which could lead to better performance through fewer complaints and increased effort and diligence. Both the costs of moving away from a more traditional command-and-control culture and the higher wages needed to draw and keep employees with the necessary abilities to function in a high-involvement system are potential drawbacks of IWPs (Lawler & Benson, 2020). Based on previous studies, researchers suggest that the IWPs are novel approaches and techniques used by businesses to increase output, effectiveness, and overall success. These methods frequently entail adopting new technologies, reevaluating current procedures, and encouraging a culture of innovation and constant development. IWPs provide several advantages, such as improved problem-solving, increased productivity, and enhanced employee engagement. Increased output and quicker turnaround times might result from more efficient and streamlined procedures. Employees are more likely to be engaged and motivated when they feel appreciated and empowered, which boosts output and lowers attrition. Complex problems can be solved more creatively and successfully through cooperation and a diversity of viewpoints. Organisations can achieve better success in the today's rapidly changing business climate by adopting innovative procedures that make the workplace more dynamic, productive, and engaging.

#### **2.5 The Impact of Innovative Work Practices (IWPs) on Employee Performance**

In various contexts, employee performance is positively correlated with Innovative Work Practices (IWPs), according to empirical research. Businesses that implemented high-performance human resource management practices saw notable increases in productivity, decreased employee turnover, and improved financial outcomes (Huselid, 2021). Ichniowski et al. (2020) conducted a study on steel production lines and concluded that, in contrast to conventional management techniques, innovative practices such as flexible job assignments, problem-solving groups, and team-based work significantly increased productivity. In their significant study of the steel, clothing, and

medical industries, Appelbaum et al. (2019) observed that IWPs increased employee morale and job satisfaction in addition to organisational efficiency. This supports the notion that creative methods benefit both the business and its employees. Research continuously demonstrates that IWPs can greatly enhance worker performance by developing a more capable, driven, and engaged workforce. Implementing IWPs successfully depends on a number of factors, including workforce flexibility, leadership support, and organisational collaboration (Marchington & Grugulis, 2020). From the point of view of the researcher, IWPs encourage creativity, problem-solving, and adaptability, which greatly improve employee performance. These procedures, which include promoting experimentation, idea generation, and information exchange, foster an atmosphere at work where staff members are inspired to offer fresh ideas and enhancements. Higher productivity, higher-quality work, and a bigger competitive advantage for the organisation result from this. Employees are encouraged to think creatively and unconventionally by IWPs, which lead to more original solutions to workplace problems. Employees who are given the freedom to innovate improve their ability to recognise issues and create workable solutions. Employees in an innovative workplace are better equipped to adjust to shifting conditions and take on new tasks, which increases the organisation's resilience. Employees are more likely to be engaged and motivated at work when they believe their opinions are respected and that they can help bring about positive change. Streamlining procedures and implementing creative solutions into practice can boost an organisation's output and efficiency. In the end, employees' combined creative efforts enhance the organisation's overall performance and success, including its capacity to complete successfully (Krasniqi & Sonnenschein, 2025).

## 2.6 Research Framework



**Figure 1.** Conceptual Framework of Research

Figure 1 shows the conceptual research framework of the research; it gives a clear indication that technology innovation and IWPs have a significant relationship toward employee performance. The framework and variables of this study are derived from previous research studies. There are many previous research studies that have conducted research separately on the impact of technology innovation and IWPs on employee performance. From the research titled 'Does innovation contribute to the employee performance?' by Osman et al. (2020), it was stated that there are several methods to enhance employee performance, and one of them is through technological innovation. Technology innovation enables the businesses to acquire and search for new ideas through the receptivity of external technological knowledge and was found to have a significant impact on employee performance. The results of that study show that technology innovation has the highest impact on employee performance. Moreover, the research titled 'Innovative work behaviour: to what extent and how can employee practices contribute to higher levels of innovation within SMEs?' by Bucker and Van Der Horst (2019) stated that, IWPs today are important for employees to remain competitive. IWPs are able to develop processes and ideas that can generate the innovation satisfaction among employees. The innovativeness of the employees is a main source for developing the effectiveness of employee performance. This study stated that IWPs should be maintained, developed, and enhanced to increase the innovative potential of employee as a means of improving

employee's performance. From the literature review, it is concluded that technology innovation and IWPs have an impact on employee performance.

### **3. RESEARCH METHODOLOGY**

#### **3.1 Research Design**

According to Akhtar (2020), research design is the arrangement of data collection and analysis in a way that aligns with the research purpose. Research design is a plan, structure, and strategy for obtaining answers to research questions and controlling variance. There are two categories of research design, which are qualitative and quantitative. Quantitative research involves numerical data gathered through questionnaire and is used to generate statistical outputs such as graphs and statistical analysis (Akhtar, 2020). Thus, this research was conducted by using a quantitative approach because the researcher identified the impact of technology innovation and IWPs on employee performance in the manufacturing industry in Malaysia.

#### **3.2 Population and Sample size**

The population of interest in this research is employees who work in the manufacturing industry in Malaysia. According to data from the Department of Statistics Malaysia (DOSM, 2024), there are 2,280,951 people employed in Malaysia in the manufacturing industry. From the total population of 2,280,951 employees working in the manufacturing industry in Malaysia, 384 respondents were randomly selected to answer the distributed questionnaire. The sample size was determined using the Krejcie and Morgan (1970) Table (Bukhari, 2021). Although the required sample size was 384 respondents, this research distributed 400 questionnaires to increase the likelihood of achieving the targeted sample size and to obtain sufficient information.

#### **3.3 Sampling Techniques**

In this research, the non-probability sampling method was used to select the respondents. This is because non-probability sampling provides the opportunity to select participants purposively. In this study, the researcher chose to use convenience sampling. This is because this sampling is fast, inexpensive, and easily accessible for data collection (Taherdoost, 2021). Convenience sampling involves selecting participants who are readily available from the target population. Therefore, convenience sampling was considered suitable for meeting the research objectives. This sampling is also the most useful technique for pilot testing. Due to limited time and budget constraints, convenience sampling was employed by selecting participants who were readily available and willing to participate. This method was deemed suitable for this exploratory study, where the primary objective was to gain initial insights into employee performance rather than to make statistically generalisable claims. Through this approach, data were collected from employees working in the manufacturing industry.

#### **3.4 Data Collection**

Taherdoost (2021) stated that the data collection process is needed to know how to distribute the questionnaire to the respondents, the duration that was needed to distribute the questionnaire to the respondent, and the duration that the respondents needed to complete it. Besides that, the data collection process also involves collecting the data from the respondents. The duration needed for the data collection was estimated to be four weeks or one month to collect the data for 400 sets of questionnaires. The researcher sent the Google Form to all the employees working in the

manufacturing industry to collect data on the impact of technology innovation and IWPs on employee performance in the manufacturing industry in Malaysia.

### 3.5 Instrument and Measurement

According to Katz (2020), a questionnaire is the main means of collecting data for analysis. This research used the questionnaire to collect data from the respondents to know more about their opinions and ideas regarding technology innovation and IWPs. A questionnaire is one of the methods that is easy to use and develop when there is a large population of respondents. In addition, a questionnaire is low cost compared to other techniques and is able to reduce the time to collect back the data from the respondent. Besides that, this questionnaire has been designed in the English language which is easier to communicate with the respondents. This questionnaire has been distributed to the respective respondents through email and Google Forms. In this research, the questionnaire has two parts. The first part is the demographic part which collects the personal information of the respondent. The second part focuses on the impact of technology innovation and IWPs toward employee performance in the manufacturing industry. In this research, technology innovation and IWPs are the independent variables that impact employee performance. The questionnaire has been designed based on the five-point Likert Scale as follows: 1 is Strongly Disagree, 2 is Disagree, 3 is Neutral, 4 is Agree and 5 is Strongly Agree.

### 3.6 Pilot Test

In this study, a pilot test was performed by distributing the questionnaire to a group of respondents. During the research, the pilot test is important because it can show any errors that occur in the questionnaire before it is fully distributed to the respondents. In this pilot test, 35 responses were collected and tested for the reliability of all the questions that were included in the questionnaire. According to Karamurugan et al. (2022), the data from the pilot test were analysed using the Statistical Package for Social Science (SPSS) to obtain the result. In the pilot test, Cronbach's alpha was tested. According to George and Mallery (2019), reliability is the degree to which measures are free of error and thus produce reliable results.

According to Renuse (2024), one of the most significant and prevalent statistics in research is Cronbach's alpha. The author stated that the result of Cronbach's alpha can be divided into a few categories, which are excellent, good, acceptable, and questionable. For excellent reliability, the Cronbach's alpha result is more than 0.9. For good reliability, it is more than 0.8, and for acceptable reliability is more than 0.7.

**Table 1** The Reliability Statistics on Pilot Test

Variable	No. of Item	Cronbach's Alpha
Employee Performance	5	0.788
Technology Innovation	10	0.822
Innovative Work Practices	5	0.739

Table 1 shows the result of Cronbach's alpha, where employee performance (dependent variable) is 0.788, which is considered acceptable reliability. Technology innovation (independent variable) has a Cronbach alpha of 0.822, which indicates good reliability, and IWPs (independent variable) have a

Cronbach alpha of 0.739, which indicates acceptable reliability. Cronbach's alpha is used to measure and examine the internal consistency and reliability of instruments.

### 3.7 Data Analysis Procedure

The plan for data analysis is a necessary step to interpret the data after the questionnaire results have been received. The data were analysed using the Statistical Package for Social Sciences (SPSS). Five analyses were conducted, namely frequency analysis, descriptive analysis, reliability analysis, Pearson correlation analysis, and multiple regression analysis.

## 4. RESULTS AND DISCUSSION

To analyse the results, this study used the Statistical Package for Social Sciences (SPSS) student version. In addition, five analyses, namely frequency analysis, descriptive analysis, reliability analysis, Pearson correlation analysis, and multiple regression analysis, have been performed.

### 4.1 Frequency Analysis

The study of frequencies examined the number of respondents and the percentages by gender, age, highest academic attainment, position, and sub-sectors of manufacturing.

### 4.2 Reliability Analysis

**Table 2 Reliability Analysis**

Variable	Number of Item	Cronbach's Alpha
Employee Performance	5	0.881
Technology Innovation	10	0.799
Innovative Work Practices	5	0.904

Table 2 shows the Cronbach's alpha value for the three variables, comprising the independent and dependent variables. The findings show that the reliability of all three constructs ranges from acceptable to excellent. With a Cronbach's Alpha of 0.881, the five-item Employee Performance scale demonstrated strong internal consistency. The Technology Innovation scale, consisting of ten items, had a Cronbach's Alpha of 0.799, which falls within the acceptable range.

Although this value is acceptable, it raises the possibility of improving the scale's internal consistency. With a Cronbach's Alpha of 0.904 for all five items, the IWPs scale showed the highest reliability and excellent internal consistency. These findings demonstrate that the study's instruments are reliable and suitable for further analysis.

### 4.3 Descriptive Analysis

**Table 3 Descriptive Statistics**

Variable	N	Mean	Standard Deviation
Employee Performance	389	16.0113	3.40377
Technology Innovation	389	37.1784	4.75586
Innovative Work Practices	389	16.5352	3.40502

Table 3 illustrates the descriptive statistics for the variables, which are employee performance (DV), technology innovation (IV1) and IWPs (IV2). It illustrates the mean and standard deviation for employee performance, technology innovation and IWPs. A mean employee performance score of 16.01 with a standard deviation of 3.40 was observed. This demonstrates a moderate level of variation among employees. With the highest score of 37.18, technology innovation indicates that the organisation places a high priority on it. However, the standard deviation of 4.76, indicates a wider range of variation in respondents' perceptions. The mean score of 16.54 for IWPs is comparable to that of employee performance, with a comparable standard deviation of 3.41. This suggests that employee performance and IWPs are closely correlated in terms of average scores and response consistency, even though technology innovation received the highest rating.

#### 4.4 Pearson Correlation Analysis

**Table 4** Correlations of Technology Innovation, Innovative Work Practices and Employee Performance

	Variable	EP	TI	IWP
EP	Pearson correlation	1	0.288**	0.746**
	Sig. (2-tailed)		0.000	0.000
	N	389	389	389
TI	Pearson correlation	0.288**	1	0.246
	Sig. (2-tailed)	0.000		0.000
	N	389	389	389
IWP	Pearson correlation	0.746**	0.246	1
	Sig. (2-tailed)	0.000	0.000	
	N	389	389	389

\*\*Correlation is significant at the 0.01 level (2-tailed)

According to Table 4, the results show the correlation relationships between technology innovation, IWPs and employee performance. The results show that there is a positive relationship between all the variables. The findings indicate that employee performance and technology innovation had a moderately positive correlation ( $r = 0.288, p < 0.001$ ). This suggests that employee performance tends to increase as technological innovation increases. Employee performance and IWP had a strong positive correlation ( $r=0.746, p < 0.001$ ). This indicates a strong correlation between more creative work practices and improved employee performance. Furthermore, TI and IWP showed a weak to moderately positive correlation ( $r=0.246, p < 0.001$ ). This implies a weak but statistically significant correlation between IWPs and technological innovation. All correlations were statistically significant at the two-tailed 0.01 level.

#### 4.5 Multiple Regression Analysis

**Table 5** Impact of Technology Innovation and Innovative Work Practices on Employee Performance

Dependent Variable	Independent Variable	Std. Beta	Sig.
Employee Performance	Technology Innovation	0.111	0.001**
	Innovative Work Practices	0.719	0.000**
R2		0.569	
Adjusted R <sup>2</sup>		0.567	

Dependent Variable	Independent Variable	Std. Beta	Sig.
F Change		254.540	

P < 0.01\*\*, P < 0.05\*

The impact of technological innovation and IWPs on employee performance was examined using a multiple regression analysis. Table 5 displays the findings; with an adjusted  $R^2$  of 0.567, the model accounts for roughly 56.9% of the variation in employee performance ( $R^2 = 0.569$ ). Overall, this indicates an excellent relationship. The model is statistically significant overall, as indicated by the significant F-statistic ( $F = 254.540$ ,  $p < 0.01$ ). Employee performance is significantly improved by both IWPs ( $\beta = 0.719$ ,  $p = 0.000$ ) and technology innovation ( $\beta = 0.111$ ,  $p = 0.001$ ). According to the standardised beta coefficients, IWPs, compared to technology innovation, are a much stronger predictor of performance. Therefore, the result of the hypothesis testing summary is presented in Table 6.

**Table 6** Hypothesis Result

Hypothesis	Statement	Remarks
H <sub>1</sub>	Technology innovation has a significant impact on employee performance in the manufacturing industry.	Accepted
H <sub>2</sub>	Innovative work practice has a significant impact on employee performance in the manufacturing industry.	Accepted

## 5. CONCLUSION, IMPLICATION, LIMITATIONS AND RECOMMENDATIONS

In conclusion, employee performance in Malaysia's manufacturing sector is significantly enhanced by technological innovation and IWPs. Using contemporary technology improves communication, efficiency, and skill development. Employee productivity and job satisfaction are subsequently positively impacted by this. Additionally, IWPs like teamwork, continuous learning, and flexible scheduling foster an inspiring atmosphere that encourages innovation and involvement. Better overall organisational performance and competitiveness in the manufacturing sector are the results of all these factors. Through conducting this study, several limitations were encountered, such as limited data and resources, time constraints, and difficulty accessing certain participants. The accuracy of the analysis may have been impacted by the scarcity of up-to-date and comprehensive industry data. Additionally, the study was limited in time, which restricted the ability to conduct more extensive surveys or interviews. However, some key participants, specifically upper management or employees in specialised roles, were hard to reach, which may have limited the variety of perspectives. To build on the results of this study, future researchers are encouraged to increase the sample size and scope by incorporating a larger and more diverse sample from various manufacturing sectors and regions to enhance the accuracy of the results. Next, conducting longitudinal research would provide a deeper understanding of how technological innovation and work practices influence performance over time. Additionally, to improve the data and provide a more thorough understanding, future studies may adopt mixed-method approaches, which combine quantitative surveys with qualitative techniques (such as focus groups and interviews). Additionally, future research may examine specific technologies. Studies could focus on how specific advancements, such as automation, artificial intelligence, or the Internet of Things, impact employees' roles and performance outcomes. Finally, future research may explore the role of leadership and

organisational culture in influencing the adoption of innovative practices, as these contextual factors may significantly shape employee performance outcomes.

## REFERENCES

- Akbari, M., Rezvani, A., Shahriari, E., Zuniga, M. Á., & Pouladian, H. (2020). Acceptance of 5G Technology: Mediation Role of Trust and Concentration. *Journal of Engineering and Technology Management, 57*, 101585. <https://doi.org/10.1016/j.jengtecman.2020.101585>
- Akhtar, M. I. (2020). Research in Social Science: Interdisciplinary Perspectives. In *Research in Social Science: Interdisciplinary Perspectives*.
- Appelbaum, N. P., Lockeman, K. S., Orr, S., Huff, T. A., Hogan, C. J., Queen, B. A., & Dow, A. W. (2019). Perceived Influence of Power Distance, Psychological Safety, and Team Cohesion on Team Effectiveness. *Journal of Interprofessional Care, 34*(1), 20–26. <https://doi.org/10.1080/13561820.2019.1633290>
- Arneguy, E., Ohana, M., & Stinglhamber, F. (2022). Organisational Justice and Readiness for change: A Concomitant Examination of the Mediating Role of Perceived Organisational Support and Identification. *Frontiers in Psychology, 9*, 1172. <https://doi.org/10.3389/fpsyg.2018.01172>
- Bekhet, H. A., & Latif, N. W. A. (2023). The impact of Technological Innovation and Governance Institution Quality on Malaysia's Sustainable Growth: Evidence from a Dynamic Relationship. *Technology in Society, 54*, 27–40. <https://doi.org/10.1016/j.techsoc.2018.01.014>
- Bell, D. L., & Gluesing, J. C. (2020). The Vision for the Future of Mobility. *Journal of Business Anthropology, 9*(2), 225–250. <https://doi.org/10.22439/jba.v9i2.6123>
- Bucker, J., & Van Der Horst, E. (2019). Innovative Work Behaviour: To What Extent and How Can HRM Practices Contribute to Higher Levels of Innovation within SMEs? In *InTech eBooks*. <https://doi.org/10.5772/intechopen.68433>
- Cannavacciuolo, L., Ferraro, G., Ponsiglione, C., Primario, S., & Quinto, I. (2023). Technological Innovation-Enabling Industry 4.0 Paradigm: A Systematic Literature Review. *Technovation, 124*, 102733. <https://doi.org/10.1016/j.technovation.2023.102733>
- Chen, L., Qi, J., Su, X., & Wang, R. (2022). REMR: A Reliability Evaluation Method for Dynamic Edge Computing Network Under Time Constraint. *IEEE Internet of Things Journal, 10*(5), 4281–4291. <https://doi.org/10.1109/ijot.2022.3216056>
- Coccia, M. (2020). Fishbone Diagram for Technological Analysis and Foresight. *International Journal of Foresight and Innovation Policy, 14*(2/3/4), 225. <https://doi.org/10.1504/ijfip.2020.111221>
- Darvishmotevali, M., & Ali, F. (2020). Job Insecurity, Subjective Well-Being and Job Performance: The Moderating Role of Psychological Capital. *International Journal of Hospitality Management, 87*, 102462. <https://doi.org/10.1016/j.ijhm.2020.102462>
- Davoudi, S. M. M., Fartash, K., Baklashova, T. A., Svechnikova, N. V., Nikolaeva, Y. V., Grimalskaya, S. A., & Beloborodova, A. V. (2019). The Impact of Technology Acquisition & Exploitation on Organisational Innovation and Organisational Performance in Knowledge-Intensive Organisations. *Eurasia Journal of Mathematics Science and Technology Education, 14*(4). <https://doi.org/10.29333/ejmste/84835>
- DOSM. (2024). *Department of Statistics Malaysia*. Retrieved March 10, 2025, from <https://www.dosm.gov.my/>
- George, D., & Mallery, P. (2019). *IBM SPSS Statistics 26 Step by Step*. <https://doi.org/10.4324/9780429056765>
- Guan, X., & Frenkel, S. (2019). How HR Practice, Work Engagement and Job Crafting Influence Employee Performance. *Chinese Management Studies, 12*(3), 591–607. <https://doi.org/10.1108/cms-11-2017-0328>
- Halawa, F., Sridadi, A. R., Hardiana, Y., Sundari, A., Zain, I. a. S., & Ramadhan, M. N. (2023). The Importance of Innovative Work Behaviour in Era Industrial Revolution 4.0. *Jurnal Maksipreneur*

- Manajemen Koperasi Dan Entrepreneurship*, 13(1), 38.  
<https://doi.org/10.30588/jmp.v13i1.1493>
- Hanif, A., Hussain, I., & Hameed, F. (2021). Innovation and Employee Performance: Mediating Role of Psychological Well-Being. *Journal of Business and Social Review in Emerging Economies*, 7(3), 699–710. <https://doi.org/10.26710/jbsee.v7i3.1896>
- Hermi, U. N., & Yosepha, S. Y. (2019). The Model of Employee Performance. *International Review of Management and Marketing*, 9(3), 69–73. <https://doi.org/10.32479/irmm.8025>
- Huselid, M. A. (2021). The Impact of Human Resource Management Practices on Turnover, Productivity, and Corporate Financial Performance. *Academy of Management Journal*, 38(3), 635–672. <https://doi.org/10.5465/256741>
- Ichniowski, C., Shaw, K., & Prennushi, G. (2020). The Effects of Human Resource Management Practices on Productivity. *NBER Working Paper Series*. <https://doi.org/10.3386/w5333>
- Jayashree, S., Reza, M. N. H., Malarvizhi, C. a. N., & Mohiuddin, M. (2021). Industry 4.0 Implementation and Triple Bottom Line Sustainability: An Empirical Study on Small and Medium Manufacturing Firms. *Heliyon*, 7(8), e07753. <https://doi.org/10.1016/j.heliyon.2021.e07753>
- Karamurugan, S., & Govindarajan, B. (2022). Statistical Package for the Social Science. *International Journal of Business and Economics Research (IJBER)*, 8(4) 616–621
- Katz, I. R. (2020). Instrumentation and Measurement in Educational Assessment. *IEEE Instrumentation & Measurement Magazine*, 12(5), 18–19. <https://doi.org/10.1109/mim.2009.5270523>
- Krasniqi, B., & Sonnenschein, S. (2025). Technology Access and Financial Stress: Post-COVID-19 Academic Outcomes for First-Generation and Continuing-Generation College Students. *Education Sciences*, 15(7), 881. <https://doi.org/10.3390/educsci15070881>
- Lawler, E. E., & Benson, G. S. (2020). The Practitioner-Academic Gap: A View from the Middle. *Human Resource Management Review*, 32(1), 100748. <https://doi.org/10.1016/j.hrmmr.2020.100748>
- Marchington, M., & Grugulis, I. (2020). “Best Practice” Human Resource Management: Perfect Opportunity or Dangerous Illusion? *The International Journal of Human Resource Management*, 11(6), 1104–1124. <https://doi.org/10.1080/09585190050177184>
- Mardumyan, A., & Sabadie, W. (2023). When a Third Party is A Third Chance: The Impact of Mediation on Relationship Quality with the Firm in the Post-Recovery Stage. *Recherche Et Applications En Marketing (English Edition)*, 39(1), 36–58. <https://doi.org/10.1177/20515707231175390>
- Meyer, D., & Okoli, T. T. (2023). Financial Technology Development: Implications for Traditional Banks in Africa. *Investment Management and Financial Innovations*, 20(3), 166–176. [https://doi.org/10.21511/imfi.20\(3\).2023.14](https://doi.org/10.21511/imfi.20(3).2023.14)
- Osman, S., Shariff, S. H., & Lajin, M. N. A. (2020). Does Innovation Contribute to Employee Performance? *Procedia - Social and Behavioural Sciences*, 219, 571–579. <https://doi.org/10.1016/j.sbspro.2016.05.036>
- Osman, Z., Alwi, N. H., Jodi, K. H. M., Khan, B. N. A., & Ismail, M. N., Yusoff, Y., (2024). Optimising Artificial Intelligence Usage among Academicians in Higher Education Institutions. *International Journal of Academic Research in Accounting, Finance & Management Sciences*, 14(2). <http://dx.doi.org/10.6007/IJARAFMS/v14-i2/20935>
- Renuse, Y. S. (2024). Understanding the Significance of Pilot Testing in Research and Development. *International Journal of Multidisciplinary Research & Reviews*, 3(4), 8–13. <https://doi.org/10.56815/ijmrr.v3i4.2024/8-13>
- Sitopu, Y. B., Sitingjak, K. A., & Marpaung, F. K. (2021). The Influence of Motivation, Work Discipline, and Compensation on Employee Performance. *Golden Ratio of Human Resource Management*, 1(2), 72–83. <https://doi.org/10.52970/grhrm.v1i2.79>
- Subramaniam, M., Salleh, S. S. M. M., Suanda, J., Fareed, M., & Ahmad, A. (2023). Can Technology Innovation Enrich Employee Performance? Evidence from Malaysian Manufacturing Industry. *AIP Conference Proceedings*, 2753, 050046. <https://doi.org/10.1063/5.0117269>

- Taherdoost, H. (2021). Data Collection Methods and Tools for Research; A Step-By-Step Guide to Choose Data Collection Technique for Academic and Business Research Projects. In *International Journal of Academic Research in Management*, 10(1), 10–38. Helvetic Editions LTD. <https://elvedit.com/journals/IJARM/wp-content/uploads/Data-Collection-Methods-and-Tools-for-Research.pdf>
- Triansyah, F. A., Hejin, W., & Stefania, S. (2023). Factors Affecting Employee Performance: A Systematic Review. *Journal Markcount Finance*, 1(2), 118–127. <https://doi.org/10.55849/jmf.v1i2.102>
- Tsou, H., & Chen, J. (2021). How does Digital Technology Usage Benefit Firm Performance? Digital Transformation Strategy and Organisational Innovation as Mediators. *Technology Analysis and Strategic Management*, 35(9), 1114–1127. <https://doi.org/10.1080/09537325.2021.1991575>
- Vahdat, S. (2021). The Role of IT-Based Technologies on the Management of Human Resources in the COVID-19 Era. *Kybernetes*, 51(6), 2065–2088. <https://doi.org/10.1108/k-04-2021-0333>
- Vuong, T. D. N., & Nguyen, L. T. (2022). The Key Strategies for Measuring Employee Performance in Companies: A Systematic Review. *Sustainability*, 14(21), 14017. <https://doi.org/10.3390/su142114017>
- Wood, S. (2020). Human Resource Management–Performance Research: Is Everyone Really on the Same Page on Employee Involvement? *International Journal of Management Reviews*, 22(4), 408–426. <https://doi.org/10.1111/ijmr.12235>
- Yang, S. C., & Chen, Y. (2020). Technology-Enhanced Language Learning: A Case Study. *Computers in Human Behaviour*, 23(1), 860–879. <https://doi.org/10.1016/j.chb.2006.02.015>
- Yong, J. Y., Yusliza, M., Ramayah, T., Jabbour, C. J. C., Sehnem, S., & Mani, V. (2019). Pathways Towards Sustainability in Manufacturing Organisations: Empirical Evidence on the Role of Green Human Resource Management. *Business Strategy and the Environment*, 29(1), 212–228. <https://doi.org/10.1002/bse.2359>
- Zhang, Q. (2024). The Impact of Digitalisation on the Upgrading of China's Manufacturing Sector's Global Value Chains. *Journal of the Knowledge Economy*, 15(4), 15577–15600. <https://doi.org/10.1007/s13132-023-01698-8>