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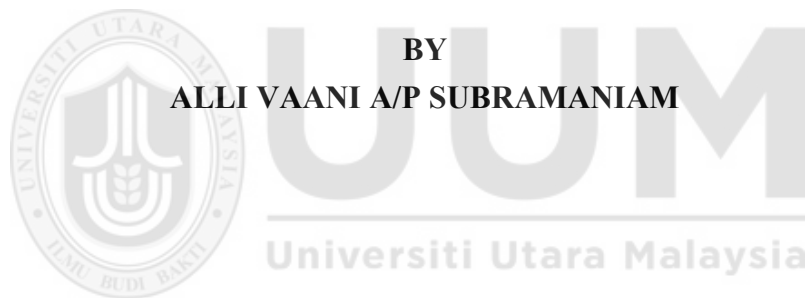
**THE EFFECT OF ARTIFICIAL INTELLIGENT - ENABLED HUMAN RESOURCE  
MANAGEMENT PRACTICES ON EMPLOYEE ENGAGEMENT IN MANUFACTURING  
SECTOR**

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**MASTER OF HUMAN RESOURCE MANAGEMENT  
UNIVERSITI UTARA MALAYSIA  
FEBRUARY 2026**

**THE EFFECT OF ARTIFICIAL INTELLIGENT - ENABLED HUMAN RESOURCE  
MANAGEMENT PRACTICES ON EMPLOYEE ENGAGEMENT IN MANUFACTURING  
SECTOR**



**Thesis Submitted to  
College of Business,  
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in Fulfilment of the Requirement for the Master of Human Resource Management**



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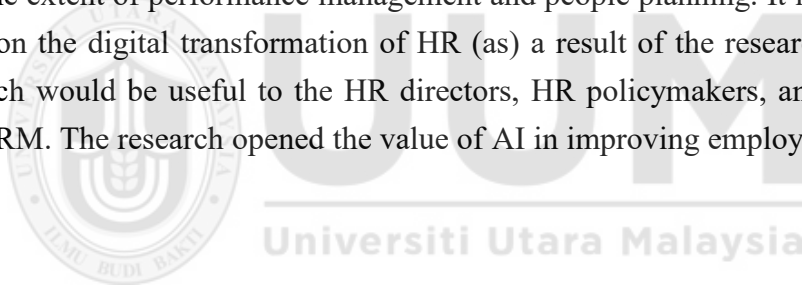


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## ABSTRACT

The increasing influence of Artificial Intelligence Technology on Human Resource Management (HRM) particularly on people planning, recruitment and selection, training, compensation and benefits and performance management is undeniable. Although the emergence of AI-enabled HRM strives to improve efficiency in HR functions and aid in the decision-making process in value-based management, the influence of AI on employee engagement in the industrial sector in Malaysia is still not fully explored. Hence, the study seeks to explore the effects of AI-enabled HRM practices, namely, Human Resource Planning, Recruitment and Selection, Training and Development, Compensation and Benefits, and Performance Management, on employee engagement in the manufacturing sector in Kulim, Kedah. As part of the study, a quantitative research methodology is operationalized by administering a structured questionnaire to employees in a sample of selected factories. Data analysis suggests that performance management and people planning are the constituents of employee engagement. This suggests that employee engagement in an organization is a function of the extent of performance management and people planning. It is expected that there will be a theory on the digital transformation of HR (as) a result of the research, and the practical use of the research would be useful to the HR directors, HR policymakers, and organizations that integrate AI in HRM. The research opened the value of AI in improving employee engagement.



## ABSTRAK

Perkembangan pesat Kecerdasan Buatan (AI) telah memberi kesan yang ketara terhadap Pengurusan Sumber Manusia (HRM), khususnya dalam perancangan tenaga kerja, pengambilan dan pemilihan, latihan, pampasan dan faedah, serta pengurusan prestasi. Walaupun Pengurusan Sumber Manusia berasaskan Kecerdasan Buatan dibangunkan untuk meningkatkan kecekapan dan membuat keputusan berasaskan data, kesannya terhadap penglibatan pekerja masih belum diketahui sepenuhnya, terutamanya dalam sektor perindustrian di Malaysia. Oleh itu, kajian ini bertujuan untuk meneliti kesan amalan Pengurusan Sumber Manusia berasaskan Kecerdasan Buatan, iaitu Perancangan Sumber Manusia, Pengambilan dan Pemilihan, Latihan dan Pembangunan, Pampasan dan Faedah, serta Pengurusan Prestasi terhadap penglibatan pekerja dalam sektor pembuatan di Kulim, Kedah. Kajian ini menggunakan pendekatan kuantitatif melalui edaran soal selidik berstruktur kepada pekerja di kilang-kilang terpilih. Analisis data menunjukkan elemen perancangan tenaga kerja dan pengurusan prestasi mempunyai hubungan positif dengan penglibatan pekerja. Ini bermaksud, semakin baik elemen perancangan tenaga kerja dan pengurusan prestasi di dalam organisasi, semakin tinggi penglibatan pekerja. Dapatan kajian dijangka menyumbang kepada pengayaan teori dalam transformasi HR digital serta menyediakan implikasi praktikal kepada pengarah HR, penggubal dasar, dan organisasi yang melaksanakan Kecerdasan Buatan dalam Pengurusan sumber manusia. Secara keseluruhannya, kajian ini menunjukkan kepentingan AI dalam meningkatkan penglibatan pekerja.

Universiti Utara Malaysia

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# CHAPTER 1

## INTRODUCTION

### 1.1 Background of Study

The manufacturing sector in Malaysia is a vital one for the country's economy, contributing significantly to Gross Domestic Product (GDP), exports, and employment. In 2023, Malaysia's GDP from the services industry was the largest among all sectors, totaling over 928 billion Malaysian ringgit, which includes utilities, retail and trade, and the food industry.

The manufacturing sector was the second largest, accounting for more than 366 billion Malaysian ringgit in GDP in 2023 (Statistic Research Department, 2024). During the stage of post-pandemic economic growth, which saw Malaysia's manufacturing sector investment rise in 2021, the sector had recovered in 2022 with increased job creation and greater participation from domestic investors, accounting for approximately 22-25 percent of Malaysia's GDP.

Now, the manufacturing sector is gradually integrating modern technologies, especially artificial intelligence (AI), to boost production, efficiency, and productivity. AI is one of the latest technologies in Malaysia's manufacturing industry. Robotics, machine learning, automation systems, and sophisticated analytics for prediction are among the technologies utilized in production (Javaid et al., 2022).

AI is a set of techniques that allows computers to complete tasks that do not require the reasoning skills that human intelligence brings (Grzonka et al., 2018). It operates in many different forms, such as robots, bots, or software (Madakam et al., 2019) to support different applications. The concept of innovative manufacturing in Malaysia centers around AI. According to the McKinsey Global Survey (2017), the implementation of AI in business organizations continues to increase by approximately 25% annually, particularly in export-oriented industries such as electronics, machinery, and chemicals.

Realistically, the path to economic recovery following the global COVID-19 epidemic increases demand for digitization among industries and businesses. (Kabalisa and Altmann, 2021). AI is at the center of current digital transformation efforts because of its advantageous potential.

(Rettas et al., 2019; Hajishirzi & Costa.,2021).

Robots and artificially intelligent (AI) systems automate processes, increasing productivity while minimizing error (Soori et al., 2024). However, in addition to the previously mentioned benefits, these systems are also capable of performing predictive maintenance by assessing potential problems before they occur. This can reduce downtime and the overall cost of maintenance by analyzing information from Internet of Things (IoT) sensors.

Moreover, AI solutions can be used for real-time production problem solving and process optimization. State of the art analytics can aid in the identification of bottlenecks in production, where additional effort or resources could improve throughput or reduce the total time in the process, or where insufficient effort is put in to achieve the desired level of output in an acceptable time frame.

Additionally, AI enhances the quality of business forecasts, positively impacting organizational decision and strategy development. Therefore, from an economic development and productivity and innovation potential perspective, for the Asean region, including Malaysia, AI applications will be of greatest importance in the early stages of Industry 4.0.

A report by the International Data Corporation expects a 24.5% compound annual growth rate in AI investment worldwide, rising from \$85.3 billion in 2021 to \$204

billion or more by 2025. Essentially, the implementation of AI in corporate operations is widely applied in human resource management (HRM).

Hallberg et al. (2006), Paul et al. (2006) and Senyucel (2009) describes Human Resource Management (HRM) as a combination of human-focused methods of leadership that recognizes employees as valued assets, not just resources. The incorporation of AI technologies into Human Resource Management (HRM) is changing the manner in which companies engage with their human capital Management.

The HR field can be modified with the assistance of AI, which incorporates machine learning, natural language processing, and data analytics ( Kaushal, N., et al. (2023)). AI tools increase productivity and precision and can help automate standard, traditional functions in an HR department, including candidate screening, evaluation, and resume filtering .(Singh & Sahoo, 2023)(Bhardwaj et al., 2020).

The recent development of technology, specifically the adoption of artificial intelligence within the human resources field, addresses the growing changes in the processes and functions of human resources. Businesses are continually progressing towards the digitization of their human resources functions. It becomes vital to comprehend the influence of artificial intelligence on numerous sectors of human

resources including the processing of payrolls, employee productivity, employee health and safety, employee relaxation, and immediate feedback (Urba, Set al.,2022).

Understanding the impact of these HR functions on organizational network analysis and design will provide further understanding of how organizations can leverage AI to improve their efficiency and effectiveness.

HRM strategies emphasize employee development and well-being in order to cultivate an internal culture of commitment and engagement. The success of AI in HRM stems from the flexible, data-driven, and personalized employee experience needs of today's competitive global market. In the fast-growing field of Artificial Intelligence, the enhancement of human resource management through streamlining and automating tedious processes is evident. Time and administrative activities are saved, and time can be reallocated to more value-added activities such as organizational strategic planning, employee engagement, and organizational development. The implementation of AI enabled HRM is drastically influencing employee engagement.

The participation of workers is an essential factor for enhancing efficiency and sustaining a competitive advantage. Engagement is often defined as a work-related and positive state of mind characterized by focus and presence, as well as a

combination of tenacity, dedication to the task, energy, participation, enthusiasm, and awareness (Schaufeli et al., 2002).

Employees who are more involved deliver better business results, regardless of industry, firm size, or nationality (Gallup, 2022). In certain situations, employee engagement term used to describe the mental and emotional dedication of workers in the context of their passion, dedication, and interest. Technologically, HR 4.0 is a game-changer in the human resources dimension, which has been embraced by many global companies, such as Google and IBM.

Also, majority of Malaysia's neighbouring countries are in the process of bridging the gap between HR 3.0 and 4.0 via execution of artificial intelligence (Jayashree et al., 2020). AI improves HR efficiency by automating boring operations, allowing employees to focus on more difficult and valuable activities.

This transition can result in increased job satisfaction as workers participate in more meaningful and intellectually interesting work. AI enabled HRM also helps to improve worker safety by automating harmful tasks and monitoring work settings for possible risks. Predictive maintenance of machinery, for example, helps to prevent accidents and creates a safer work environment.

## 1.2 Statement of the Problem

Malaysia's global technological readiness has improved dramatically as a result of its recent strong commitment to expanding its digital infrastructure and capacity. Malaysia's rating in the Index of Government AI Readiness has increased from 29th in 2022 with 67.37 points to 23rd with 68.71 points in 2023 out of 181 countries, according to the Ministry of Science, Technology, and Innovation (2023).

This progress reflects the country's growing emphasis on artificial intelligence (AI) as a strategic enabler of organizational and economic development. The increasing adoption of AI across industries highlights its potential to transform organizational operations through intelligent automation, effective human-machine collaboration, and continuous process improvement (Budhwar et al., 2022; Vrontis et al., 2023). In line with this direction, Malaysia's National Fourth Industrial Revolution (4IR) Policy recognizes AI as a key technology to enhance productivity, innovation, competitiveness, and overall societal well-being (Ng et al., 2023).

The manufacturing sector, in particular, has emerged as a major beneficiary of AI adoption. Organizations within this sector have invested heavily in AI technologies such as robotics, supply chain optimization, predictive maintenance, quality control, and process optimization to improve operational efficiency and competitiveness

(Javaid et al., 2022; Soori et al., 2024). Parallel to these developments, AI has increasingly been integrated into Human Resource Management (HRM) functions, including workforce planning, recruitment and selection, training and development, performance management, and compensation administration (Votto et al., 2021; Kambur & Akar, 2022).

Despite these advancements, many organizations continue to rely on traditional HRM practices that are manual, slow, and susceptible to human error (Aswathappa, 2017; Kumar, 2012). Such practices often result in inconsistent recruitment outcomes, standardized training programs that fail to address individual employee needs, subjective performance appraisals, and reactive workforce planning. In addition, traditional compensation and benefits systems frequently lack transparency and perceived fairness, which can undermine employee trust and reduce motivation. These limitations have direct implications for employee engagement, which is widely recognized as a critical driver of productivity, innovation, and organizational sustainability (Kahn, 1990; Bailey et al., 2017; Markos & Sridevi, 2010).

Employee engagement refers to the extent to which employees are cognitively, emotionally, and behaviorally invested in their work roles (Kahn, 1990; Schaufeli & Bakker, 2004). Prior research emphasizes that meaningful work experiences, fairness,

development opportunities, and supportive work environments are essential antecedents of engagement (Albrecht, 2013; Glavas, 2012; Robertson-Smith & Markwick, 2009). However, traditional HRM systems often struggle to provide such conditions consistently, particularly in dynamic and technology-intensive environments such as manufacturing.

AI-enabled HRM practices have been increasingly proposed as a solution to these challenges. AI-supported HR planning enhances employee self-service, streamlines administrative tasks, and enables data-driven workforce forecasting to better align employee skills with organizational needs, thereby increasing job purpose and satisfaction (Budhwar et al., 2022; Kambur & Akar, 2022). AI-enabled recruitment and selection systems improve job-person fit, fairness, and transparency while facilitating seamless onboarding experiences that foster early employee engagement (Black & van Esch, 2020; Pessach et al., 2020). Similarly, AI-driven training and development systems support personalized learning pathways, real-time feedback, and continuous skill development, which are associated with higher engagement, loyalty, and retention (Behrend & Thompson, 2011; Maity, 2019). AI-enabled performance management and compensation systems further promote objective evaluation, perceived equity, and recognition of employee contributions, which are crucial determinants of engagement (Buck & Morrow, 2018; Abraham et al., 2019).

Nevertheless, a significant practical gap remains. While AI-enabled HRM is increasingly adopted to improve efficiency and decision-making, its impact on employee engagement remains uncertain and empirically inconclusive, particularly within the manufacturing sector. Existing studies tend to emphasize technological capability, system performance, or organizational outcomes, with limited focus on employees' lived experiences, perceptions of fairness, control, and acceptance of AI-based HR systems (Charlwood & Guenole, 2022; Hughes et al., 2019). In practice, organizations often prioritize cost reduction and productivity gains, potentially overlooking the human-centered implications of AI adoption in HRM.

This gap is especially critical in the manufacturing sector, which employs a diverse workforce across industries such as electronics, pharmaceuticals, and consumer products and relies heavily on AI-driven technologies (Javaid et al., 2022).

Employees are widely regarded as the “heart” of organizations, and their level of engagement directly influences productivity, innovation, and long-term organizational growth (Bailey et al., 2017; Schaufeli et al., 2006). Without a clear understanding of how AI-enabled HRM practices affect employee engagement, organizations risk underutilizing AI's potential or inadvertently creating disengagement.

Therefore, this study seeks to address this practical and empirical gap by examining the effect of AI-enabled Human Resource Management practices on employee engagement, with particular focus on the manufacturing sector. The findings aim to provide valuable insights for organizations seeking to implement AI in HRM in a manner that balances technological advancement with employee engagement and well-being.

### **1.3 Research Questions**

Following the problem statement, the primary research question is “what is the Effect of Artificial Intelligent -Enabled Human Resource Management on Employee Engagement?”. This research has the following sub- research questions:

1. What is the effect of artificial intelligent -enabled human resource planning on employee engagement?
2. Does artificial intelligent -enabled recruiting and selection positively related employee engagement?
3. What is the effect of artificial intelligent -enabled training and development on employee engagement?
4. Is there a relationship between artificial intelligent -enabled compensation and benefits and employee engagement?

5. What is the effect of artificial intelligent -enabled performance management on employee engagement?

#### **1.4 Research Objectives**

The research purpose appears to be to better understand the the effect of artificial intelligent -enabled human resource management practices on employee engagement, which include Human Resource Planning, Recruiting and Selection, Training and Development, Compensation and Benefits and Performance Management. This research aims to meet the following research objectives.

1. To examine the the effect of artificial intelligent -enabled human resource planning on employee engagement.
2. To examine the the effect of artificial intelligent -enabled recruiting and selection on employee engagement.
3. To determine the effect of artificial intelligent -enabled training and development on employee engagement.
4. To assess the effect of artificial intelligent -enabled compensation and benefits on employee engagement.
5. To evaluate effect of artificial intelligent -enabled performance management on employee engagement.

### **1.5. Significance of the Study**

The contributions of this research are both theoretical and practical within the scope of Human Resource Management (HRM). From a theoretical perspective, the research broadened the understanding of the impact of AI-enabled HRM Systems on employee engagement along the dimensions of AI-enabled Human Resource Planning (HRP), AI-enabled Recruitment and Selection (RS), AI-enabled Training and Development (T&D), AI-enabled Compensation and Benefits (C&B), and AI-enabled Performance Management (PM). Using Kahn's theory of employee engagement and Social Exchange theory, the research illustrated that the digitization of functions within HRM affected employees' emotional engagement, motivation, and participation in work.

AI-enabled HRP improved the accuracy of forecasting workforce requirements, matched the adequacy of available employees, supported planning with AI, and helped employees understand and appreciate the value and support of the work they do. AI-enabled Recruitment and Selection improved the hiring process and its outcomes, while AI-supporting robots and automation gave applicants real-time responses and instructions to facilitate early contact and improve their knowledge of the organization. AI-enabled Training and Development provided individualized simulation and other programs to improve employees' knowledge, skills, and

abilities (KSA) and facilitate motivation and workplace advancement. AI-enabled Compensation and Benefits improved the data transparency and equity in reward and recognition decisions, improving employee satisfaction and trust. AI-enabled Performance Management provided real-time uninterrupted tracking of work, evaluation and instant feedback to employees, and motivational alignment with organizational goals. The research was able to capture the multifaceted impact of AI on HR practices and employee perceptions, attitudes, and behaviors to improve employee engagement.

On a practical level, the research was incredibly valuable for HR professionals, business leaders, and policy-makers, since AI-supported HRM helped organizations effectively and humanely handle a large influx of applications and employee data.

For instance, AI-supported recruitment and selection hastened the hiring process, AI-assisted T&D offered customized learning, AI-informed C&B systems made equitable reward distribution possible, and AI-supported PM systems offered continuous performance evaluation. The research findings showed that to achieve high employee engagement levels, organizations should employ clear communication, ethical AI, and take active measures to alleviate employee fears related to losing their jobs, or their role in the organization being changed. Furthermore, the research was of immense value to policy makers and industry

regulators in shaping guidelines regarding the ethical and equitable integration of AI in HRM systems to complement, rather than substitute, human work. To sum up, the findings of the research proved that the application of AI in at least one of the five HRM functions - HRP, Recruitment and Selection, T&D, C&B, or Performance Management - can lead to a High Performance Workplace where employee engagement levels are high, operational performance is improved, and business continuity is strengthened. If AI is implemented in HRM systems, organizations can adapt to the realities of the digital economy and maintain sustainable productivity without sacrificing workforce engagement or employee competence, thus creating a workforce that is poised to take on future challenges.

In conclusion, the findings indicate that the application of AI-Enabled HR Management on all five facets of HRP, R&S, T&D, C&B, and Performance Management, can function as a strategic means of enhancing employee engagement, streamlining operations, and achieving sustainable organizational success. If such organizations utilize AI with prudence, they will be able to create a workforce that is engaged, skilled, flexible, able to learn and sustain productivity in a digitally transformed work environment.

## 1.6. Scope of the Study

The Effect of Artificial Intelligent -Enabled Human Resource Management practices on Employee Engagement was thoroughly examined in this research. This research chooses industries located in Kulim Hi-Tech Park (KHTP), Kedah which is recognize by Malaysia Industrial Society . Kedah is particularly well-suited for this research.

Focusing on this region allows the research to offer insights that are appropriate and helpful within a particular industrial environment. Furthermore, narrowing the focus to a particular area enables a more focused investigation of the organizational procedures and workforce dynamics there.

In order to gather wide-ranging results, the research employed a quantitative approach. To gather the necessary information, the researchers used questionnaires distributed through Google Forms. This method makes it able to gather information from a huge sample size an efficient manner (Solomon & Draine, 2010).

The surveys aim to collect quantitative data on a range of subjects, including workforce dynamics, hence utilizing Google Forms makes it simple to distribute and monitor responses, guaranteeing prompt and well-organized data gathering.

Convenience sampling was employed in this research's sampling, taking into consideration the researcher's accessibility to possible respondents. Choosing respondents for this research means selecting individuals who are willing and able to participate. As per Speak et al. (2018) and Mweshi and Sakyi (2020), convenience sampling provides the researcher with the benefit of effective respondent selection, enabling the researcher to promptly collect data from easily accessible respondents, consequently speeding up the research process.

To ensure representation across a range of industries and organizational sizes, from small-scale businesses to multinational corporations, the researcher will focus on a Manufacturing industry in Kulim Hi-Tech Park (KHTP). The research will also target respondents from different tiers of the chosen organisations, which also include executives, senior management, and Human Resource (HR) professionals. To guarantee demographic diversity among participants, the researcher will consider various factors, including age, gender, tenure, and educational background.

### **1.7. Definition of Key Terms**

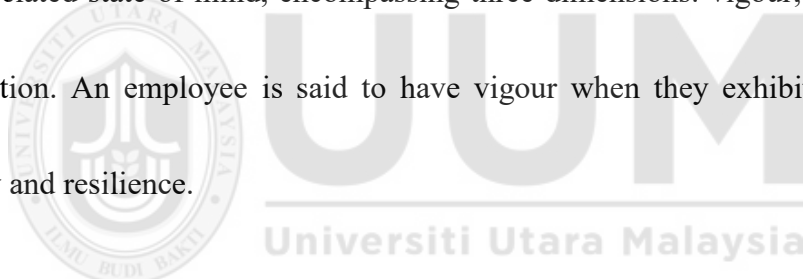
This section will explain some of the major terms used throughout the research.

### **1.7.1 Artificial Intelligence (AI)**

Artificial Intelligence (AI) is the tangible real-world capability of non-human machines or artificial entities to perform, task solve, communicate, interact, and act logically as it occurs with biological humans (de Zúñiga, Goyanes & Durotoye, 2023).

### **1.7.2. Employee Engagement (EE)**

Schaufeli et al. (2002) defined employee engagement as a positive, fulfilling, and work related state of mind, encompassing three dimensions: vigour, dedication, and absorption. An employee is said to have vigour when they exhibit high levels of energy and resilience.



### **1.7.3. Human Resource Management (HRM)**

According to Aswathappa (2017), an Indian academic, defines that simply says HRM is the application of management principles to the management of an organization's employees. HRM is a management function that assists managers in planning, recruiting, selecting, training, developing, compensating, and maintaining personnel in an organization.

#### **1.7.4. AI - Enabled Training and development (AI-enabled T&D)**

Employee training and development is a conceptual process of guiding employees toward the attainment of relevant knowledge, changing their mindsets, and building the necessary competencies to perform their roles and help the organization meet its goals (M.A. Camilleri, 2021).

Training and development with the aid of AI allows employees to engage with simulation-based training exercises that replicate real-world working situations, and provide a safe, controlled space to practice and learn to make and execute workplace relevant decisions (Bell et al., 2008).

#### **1.7.5 AI - Enabled Compensation and Benefits (AI-Enabled C&B)**

According to Eubanks (2018), C&B systems more accurately support bias-free pay equity and fairer payroll decisions (both in the positive and negative directions) and bias-related issues in compensation and payroll decisions on the basis of gender, age, and experience. AI systems enhance employee compensation payment transparency and trust through compensation-related employee access, inquiry submission, and responses attained more quickly via technology to compensation systems ( Vrontis et al., 2021).

### **1.7.6 AI - Enabled Performance Management (AI-enabled PM)**

AI-enabled performance management (AI-enabled PM) refers the application of artificial intelligence to analyze performance data, identify performance gaps, and recommend appropriate interventions, such as just-in-time training, upskilling availability, or advanced capability training (Manoharan et al., 2011; Hughes et al., 2019).

### **1.7.7 AI - Enabled Human Resource Planning (AI-enabled HRP)**

AI-enabled HRP is the system that fosters employees' effective functioning of the system by the optimal matching of the organizational manpower needs and the employees' individual potentialities and longitudinal development (Budhwar et al., 2022).

### **1.7.8 AI - Enabled Recruitment and Selection (AI-enabled R&S)**

AI-enabled Recruitment and Selection (R&S) refers to the use of artificial intelligence technologies to improve recruitment process productivity and effectiveness. With AI in RS, recruiters can be more precise in the screening, evaluation, and selection of prospective candidates, and HR managers can handle large volumes of applications with greater ease (Kumar, 2012).

## **1.8 Organizational of the Study**

The research paper will be organized into five chapters.

Chapter One providing a brief introduction of the research by presenting a comprehensive outline to establish the groundwork for the subsequent sections of this thesis. It provides a brief summary of the research's context, followed by the problem statement, research questions, and research objectives. It proceeds with the importance of the research, the scope of the research, the definitions of key terms, and the structure of the thesis.

In Chapter Two, the relevant literature's are looked at in order to find the gaps in the literature that this research is meant to fill. The research looked at five main ideas: employee engagement, Artificial Intelligent -Enabled Human Resource Planning on Employee Engagement, Artificial Intelligent -Enabled Recruiting and Selection on Employee Engagement, Artificial Intelligent -Enabled Training and Development on Employee Engagement, Artificial Intelligent -Enabled Compensation and Benefits on Employee Engagement and Artificial Intelligent -Enabled Performance Management on Employee Engagement, were examined by analyzing the concepts, reviewing pertinent models, and evaluating the existing empirical evidence relating to the research's scope.

Chapter three describes the research's theoretical background and how the theories were formed. It also talks about the theory that connects the research's variables, the research paradigm, and the research plan that made up the research's base. Finally, it talks about the data analysis methods that were used in the research.

In Chapter Four, the results and analysis of the facts are shown. This chapter also goes into great depth about how the data was gathered and screened. After that, the results of the data analysis and testing of theories were shown.

Chapter Five concludes the investigation by summarizing its whole, analyzing the data outcomes, and elucidating the theoretical and practical implications. It also delineates the limitations of this research and proposes recommendations for further investigations. The conclusion section provides a summary and essential information on the research.

## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter presents the past literature related to key variables of the research namely employee engagement as the dependent variable, followed by the independent variables: AI-Enabled Human Resource Management, AI-Enabled Human Resource Planning, AI-Enabled Recruitment and Selection, AI - Enabled Training and Development, AI - Enabled Compensation and Benefits and AI-Enabled Performance Management. This chapter also discuss the underpinning theory of the study and the research gap.

#### **2.2. Employee Engagement**

##### **2.2.1. Concept and Definition of Employee Engagement**

According to Kahn (1990), employee engagement denotes a psychological and motivational phenomenon that highlights how deeply employees have mentally, emotionally, and physically connected themselves to their work and organization. It also describes a positive and constructive relationship employees have with their jobs, coworkers, and organization that incents additional effort and continuous

engagement. According to Kahn (1990), employee engagement denotes a psychological and motivational phenomenon that highlights how deeply employees have mentally, emotionally, and physically connected themselves to their work and organization.

It also describes a positive and constructive relationship employees have with their jobs, coworkers, and organization that incites additional effort and continuous engagement. According to Kahn (1990), employee engagement denotes a psychological and motivational phenomenon that highlights how deeply employees have mentally, emotionally, and physically connected themselves to their work and organization.

It also describes a positive and constructive relationship employees have with their jobs, coworkers, and organization that incites additional effort and continuous engagement. First defined by Kahn in 1990, the concept of employee engagement is, in Kahn's terms, the harnessing of employee's selves to the roles of the employee's work.

To Kahn, the engaged employees do all three, physically, psychically and emotionally do their roles in the work they do, however the disengaged employees, During their work, they obtain a psychological distance and withdraw. This perspective demonstrates engagement as a significant and multi structural concept.

Following this, Schaufeli et al. (2002) defined employee engagement as a positive, fulfilling, and work related state of mind, encompassing three dimensions: vigour, dedication, and absorption. An employee is said to have vigour when they exhibit high levels of energy and resilience.

Dedication is described as enthusiasm, inspiration, and pride, while absorption is being fully concentration and engrossed in work-related activities. This definition of employee engagement shifts the focus to a sustained motivational state, as opposed to a momentary emotional reaction.

Even though employee engagement has become a rather common term over the last several years, it still lacks a common definition that is universally accepted. Markos and Sridevi (2010) explained that the term has been the subject of numerous discussions because it is intertwined with other similar constructs, like job satisfaction, organizational commitment, and work involvement.

Still, it appears that most academics are in agreement that employee engagement is not the same as satisfaction, as it is more focused on employees' willingness to give additional effort and to work towards the attainment of organizational goals in a purposeful manner.

Albrecht's (2013) description of employee engagement appears very contemporary and definitional; however, it is a positive psychological state pertaining to work, having both rational and emotional attachments, and a willingness to work towards achievement of organizational objectives. In this definition, earlier definitions are captured and additional emphasis is placed on the psycho-motivational and behavioral facets of engagement.

To summarize, employee engagement includes a set of dimensions, such as employee motivation, emotion, psychology, physical being, and positive attachment that eventually result in enhanced work performance and contribution in efforts toward attaining the goals of the organization, toward team and work processes as well as the whole organization.

### **2.2.2. Previous Research Finding of Employee Engagement**

Previous empirical work illustrates that the most important influence on employee engagement is not top down from management but rather is the individual employee's work experiences and the characteristics of the organization itself. It is theorized that engagement is a function of employee psychological states associated with their work environments which include a sense of work role meaning and emotional attachments, efficacy perceptions, and ability to manage work demands (Schaufeli & Bakker, 2004).

The presence of leadership and managerial employee support has been shown to be some of the top predictors of employee engagement, as employees' perceptions of supportive supervision and effective managerial communication and employee relationships prompt the employees' willingness to exert their discretionary effort to their work (Harter et al, 2002, Robertson-Smith & Markwick, 2009).

Organizational advocacy of a healthy work-life balance employee policy and supportive work culture environments has been shown to provide a significant boost to employee engagement levels (Susi & Jawaharrani, 2011). Effective communication even within the organization is of great importance, as employees who perceive that communication is timely and transparent feel a greater sense of belonging and that their presence in the organization is of importance (Shashi, 2011).

Engagement studies in the particular industry also demonstrate that there are a number of construction industry engagement predictors and include job characteristics, recognition, and support from the organization.

## **2.3. AI-Enabled Human Resource Management**

### **2.3.1 Concept and Definition of AI-Enabled Human Resource Management**

There is currently no set definition for AI-enabled HRM. Initial research into AI suggests that even non-expert HRM practitioners can have their decisions made with AI more quickly and with greater accuracy (Hooper et al., 1998).

The application of AI within HRM demonstrates the ability of this technology to quickly make decisions, process large amounts of data, and mitigate the risk of employee turnover (Wang et al., 2017). The installation of AI into HRM systems replaces those currently being utilized by personnel with systems that are capable of achieving and sustaining the highest standards of service quality.

Organizations are attempting to reduce their labor expenditures by integrating Artificial Intelligence in their Human Resources Management (Kambur and Akar, 2021). Thus, for the purposes of this research, AI-enabled HRM refers to the implementation of technology that streamlines the HRM processes for the purpose of operationalizing the tactical assimilation of workers and ecological viability. AI, as reflected in the literature, has found utility in a number of aspects of HRM which include (but are not limited to) Human Resource Planning (HRP), Training and Development (T&D), Recruitment and Selection (R&S), Performance Management

(PM), Compensation and Benefits (C&B), Employee Satisfaction (ES), Employee Engagement (EE) and Job Performance (JP), Employment Termination (ET), Performance Appraisal (PA), Talent Management (TM), Reward Management (RM), and Job Design (JD) (Qamar et al., 2021; Kambur and Akar, 2021; Priksat et al., 2021; Vrontis et al., 2021; Votto et al., 2021; Budhwar et al., 2022).

The subsequent paragraph elaborates the inclusion of Artificial Intelligence with specific HRM functions as found in the literature. Karatop et al. (2015) report that AI in HR facilitates employee job allocation. Moreover, AI predicts employee requirements and makes optimal recruitment decisions. In recruitment and selection, AI enhances the discernment and dissemination of vacant positions and the corresponding qualifications needed for the roles within the industry (van Esch et al., 2020).

AI in training and development monitors talent gaps and designs training curricula (Karatop et al., 2015). In performance management, AI shows different levels of employee performance (Manoharan et al., 2011). AI in compensation and benefits eventually streamlines the payroll and other important tasks for all employees (Pessach et al., 2020).

### **2.3.2. Previous Research Finding of AI -Enabled Human Resource Management**

Drawing on the relevant findings about the role of AI in improving HRM practices, we start this discussion with the role of AI in improving decision-making in HRM. Given the positive decision-making (AI system), but no training or expertise (Hooper et al., 1998), this seems to be the first case in which someone's AI system facilitates almost all decision-making within HR structures.

Thus, the potentially positive influence AI may have on the decision-making of HRM functions is evident. Several challenges are always associated with the functions of the HRM system. Drawing on additional research, AI speeds HRM functions while retaining and processing excess data.

This helps organizations determine which employee risks (i.e., employee turnover, employee performance) to mitigate (Wang et al. 2017). AI in HRM improves the interface of services provided to clients by streamlining traditional HR systems. This is why organizations are willing to implement AI-enabled HRM to decrease their costs and improve their services (Kambur & Akar, 2021). There is breadth and depth to the research around the role of AI across the HRM functions.

As noted by Qamar et al. (2021), Kambur and Akar (2021), Prikshat et al. (2021), Vrontis et al. (2021), Votto et al. (2021), and Budhwar et al (2022), the application of

AI to HRM covers human resource planning, recruitment and selection, training and development, performance management, compensation and benefits, talent management, performance appraisal, employee satisfaction, employee engagement, job performance, employee turnover, reward management, job design and employee management.

The generalization of these studies points to the conclusion that the application of Artificial Intelligence to the management of human resources is crucial in evolving the traditional management of human resources to a managerial function that is more strategic and driven by data. In particular, there is evidence that AI in Human Resource Planning (HRP) improves the matching of jobs to candidates, has the ability to assist organizations in predicting workforce gaps, and makes hiring smarter (Karatop et al., 2015).

AI in recruitment and selection is characterized by enhanced identification of applicants, automated communication with candidates, and the provision of relevant job information to candidates in a timely manner (van Esch et al., 2020). AI is also useful in the design of training programmes by failing to address gaps in the skill set of an organization (Karatop et al., 2015).

Moreover, AI-based systems have been shown to provide ongoing, impartial assessments of employees' performance at all levels, which helps more equitable and

developmental decisions to be made (Manoharan et al, 2011). As for compensation and benefits, AI enhances efficiency in payroll processing and management of employees' rewards and benefits, which increases productivity and satisfaction of employees (Pessach et al, 2020).

However, the same literature indicates that the AI technology should be implemented in an ethical manner in organizations to achieve the desired sustainable employees' engagement and long-term organizational performance.

## **2.4. AI-Enabled Human Resource Planning**

### **2.4.1 Concept and Definition of AI-Enabled Human Resource Planning**

AI-enabled Human Resource Planning (HRP) is the strategic use of AI technologies in workforce planning to make sure that a company has a sufficient number of workers with the right capabilities at the right time. AI-enabled HRP is different from traditional HRP since it doesn't just look at historical trends, human assumptions, and static forecasting models.

Instead, it uses advanced data analytic, machine learning, and predictive techniques to provide you real-time insights and the ability to make predictions that change continuously (Karatop et al., 2015).

These tools can look at huge and complicated datasets, like employee performance records, market trends, turnover patterns, and industry demands, to find new skill shortages, guess what the workforce will need in the future, and help make hiring decisions based on facts. For example, AI systems can find patterns that suggest a possible rise in demand for certain talents or responsibilities and then suggest whether to hire new people, train current employees, or move internal talent around.

This enables HR professionals go from staffing that is reactive to staffing that is proactive and deliberate. AI in HRP not only helps with planning for the future, but it also makes employees more engaged and changes their behaviour for the better. According to research, AI-driven HRP makes career development paths more focused and relevant, which encourages aspiring employees and workers to focus on learning skills that are useful for their current jobs and for the future (Huang & Rust, 2018).

This targeted planning gives employees more power, motivation, and purpose, which leads to more employee engagement (EE). Budhwar et al. (2022) also say that employees are more likely to stay productive and dedicated to the organization if they think that HR systems are fair, forward-looking, and adapted to their needs.

AI in HRP focuses on improving the optimization of recruiting and the enhancement of employee development. However, the good functioning of AI HRP is contingent

upon the quality of data, ethical AI, and human oversight. Over-reliance on automated decision-making without enough context can result in bias and trust issues and detrimental employees off. HR decision-making AI should be a supplement instead of a replacement of human skills.

#### **2.4.2. Previous Research Finding of AI -Enabled Human Resource Planning**

Recent studies have expanded the scope of Artificial Intelligence (AI) applications in Human Resource Planning (HRP) focusing on forecasting, recruitment, and the integration of human resources with organizational goals (Qamar et al, 2021; Vrontis et al, 2021; Budhwar et al, 2022). The pioneering work of Karatop et al (2015) demonstrated the superiority of AI systems over traditional HR systems in forecasting staffing needs, using advanced algorithms that examined employee turnover, recruitment activities, and workforce datasets. With this, AI systems that predicted skill needs and shortages, offered solutions to develop talent internally or recruit externally, enhanced HR systems to a new level.

Organizations are able to analyze and plan for different scenarios by utilizing artificial intelligence for analytical and simulation capabilities in workforce planning (Qamar et al., 2021). At the same time, Huang and Rust (2018) illustrated that the adoption of AI in human resource planning positively impacts the development of

employees, particularly by motivating them to obtain relevant and transferable skills, which are useful in multiple job roles.

Such improvement not only enhances the fit of the employee to the job but also improves employee career development and aspiration to higher job roles in the future. This impacts positively by providing employees the greater sense of satisfaction that their skills and abilities are well utilized to serve the future goals of the organization.

Further developing these statements, Budhwar et al. (2022) indicated that employee engagement (EE) could be affected directly by the predicting abilities of AI. According to the study, employees show higher commitment to their self-development and success when AI is used to anticipate the needs of the workforce and align the predictive career development programs to future job positions.

This strategic alignment nurtures and sustains the employee engagement and retention important attributes continuous commitment, motivation, and trust. Moreover, this predictive planning facilitates the forecasting of career paths and the transparency of HR decisions, positively impacting the culture of the organization.

Moreover, Vrontis et al. (2021) and Prikshat et al. (2021) show the extent to which AI could be used to increase the flexibility and efficiency of HR departments. To

illustrate workforce planning flexibility, AI-based tools can provide HR managers with real-time analytical data that can be used to change course when there is a shift in the organization or the environment, such as a technological crisis, changes in legislation, or a recession.

This research, however, indicates that the impact that Artificial Intelligence has on Human Resource Planning (HRP) is only as good as the data input, the methods designed, and the involvement of HR professionals who need to review the AI-derived suggestions. Without these safeguards the organisation may suffer ‘ill conceived planning processes that can erode employee trust and equity’ (Pessach et al, 2020). This is among the reasons that the balance of the influence of the Human on the Artificial Intelligence is fundamental.

In all other respects, past research shows that HRP positively influences employee planning outcomes. Such outcomes include, to name a few, the anticipation and building of total workforce requirements, improved placement of the right skills, planning and overall balance of employee’s active participation. But the outcome can only be achieved when the integration of AI is done ethically, with transparency, and with a good balance between the Human component and the Technology.

## **2.5. AI-Enabled Recruitment and Selection**

### **2.5.1 Concept and Definition of AI-Enabled Recruitment and Selection**

The use of artificial intelligence in recruitment and selection (RS) is a recent phenomenon in the field of human resource management (HRM). It encompasses the use of artificial intelligence (AI) tools to streamline and improve the automation and efficiency of the recruitment, selection, and staffing processes. Recruitment, in the past, was a tedious and time-consuming process that relied solely on human decision-making, often resulting in disagreements, bias issues, and inefficiencies when dealing with numerous candidates.

However, recruitment has advanced as a result of new technologies such as predictive analytic and machine learning, especially in the field of natural language processing (NLP). The systems help recruiters identify and assess the fit of candidates, verify the requirements, and process thousands of applications within minutes (Kumar, 2012; Votto et al., 2021).

These technologies improve the precision of the recruitment process as well as the overall quality of recruitment by reducing the recruitment time. AI-based recruitment tools assess candidates on a number of dimensions, including cognitive ability, behavioral style, and technical skills, and AI has the ability to do this in a meaningful

and in-depth way. AI-based tools are also able to screen candidates and rank them on a tailored set of requirements.

Also, AI's ability to improve candidate experiences is especially important for employee engagement and employer branding. Virtual recruitment assistants and AI chatbots, which are ubiquitous in large corporations, can communicate with candidates in real time and instantly respond to any questions about the company's values, recruitment policies, or job descriptions (Votto et al., 2021). Such interactions enable candidates to build trust and familiarity with the organization and to know what is expected and plan accordingly.

Budhwar et al. (2022) report that candidates leave their first interaction with the organization more knowledgeable and more construction. Such positive interactions and experiences are associated with higher employee engagement and employee retention.

Also, such early engagement can set the foundation for the right level of job-related Knowledge, Skills and Abilities (KSA) to be built for the role. The AI in R&S improves operational efficiency and engagement and also offers important data for strategic workforce planning in terms of recruitment. AI in R&S enhances operational efficiency, engagement, and provides important data for strategic

workforce planning in terms of recruitment trends, what candidates are seeking, and internal skill gaps.

These perceptions assist HR managers in making strategic, long-term, talent acquisition decisions that align with business goals, increasing the bond between the organization's success and the recruitment activities. Nonetheless, the literature addresses the ethical aspects and concerns of AI use in R&S.

To ensure responsibility, adoption, and equity, concerns like algorithmic discrimination, data protection, lack of transparency, and the hiring process being dismissed as unimportant need to be addressed (Pessach et al., 2020). AI, therefore, must be treated as a complement, and not a substitute, to human recruiters, and augment the human part of the decision-making process.

To sum up, AI-supported R&S gives a contemporary organization a competitive edge, whereby hiring decisions are made promptly and accurately, candidate experience and employee engagement is enhanced, and HR functions are overall more effective.

### **2.5.2. Previous Research Finding of AI -Enabled Recruitment and Selection**

The use of AI as a technique to assist people in recruitment and selection (R&S) processes has attracted much attention to the different ways AI is changing the work

of people in different disciplines (Kumar, 2012; Votto et al., 2021). AI has made recruitment processes faster and improved the speed and quality of the recruitment processes.

The more traditional recruitment processes that relied mainly on human selection were often slow, lacked enough attention, and were plagued with bias. The applications that give the organization the ability to assist in the automated selection of candidates, predict job fit, and assess the qualifications of the candidates also give the organization a more powerful tool to improve recruitment.

Evaluations of candidates based on cognitive, emotional, and social, as well as the skills that candidates possess, give a more comprehensive view of the candidates and enhance recruitment decisions. More high-quality (informed) recruitment decisions lead to improved job specifications and more qualified candidates, while broadening the gap in traditional recruitment practices.

Beyond efficiency gains, AI-enabled recruitment systems also dramatically enhance candidate experience and satisfaction. Votto et al. (2021) and Budhwar et al. (2022) demonstrate that AI-powered virtual assistants and chat-bots stimulate candidate engagement. Such systems encourage initial trust and transparency by providing automated responses to queries concerning the organization's values, available positions, and the hiring processes.

As a result, candidates join the organization with significantly higher levels of knowledge and self-assured motivation, which elevates employee engagement and retention. Such initial contact with the organization's procedures facilitates the acquisition of essential job knowledge, skills, and abilities (KSA) that allow new hires to assimilate, contribute, and perform satisfactorily without delay.

Moreover, the use of recruitment predictive analytics tools has been shown to assist with the strategic workforce planning function of the Human Resource Management (HRM) function by providing information that can assist with understanding recruitment trends, candidate preferences, and internal talent deficiencies.

This allows HR managers to make evidence-based alignment decisions that sustain the strategic direction of the organization. However, former studies have noted the range of ethical issues associated with the use of AI in recruitment. Algorithmic bias, opacity, data protection issues, and the potential offshoring of recruitment activities have underpin the concerns in the field (Pessach et al., 2020).

Consequently, the literature has advocated for a tempered stick approach which allows for the use of AI to assist recruitment processes, rather than supplanting the recruitment function with machine learning. This enables hiring decisions to be made with fairness, transparency and humanity. The literature has articulated the ways that AI-enabled RS provides a competitive advantage to the organization via the

optimization of operational processes, the candidate journey and the quality of the workforce, while also addressing the need for ethical AI to be a core focus of the HR function.

## **2.6. AI-Enabled Training and Development**

### **2.6.1 Concept and Definition of AI-Enabled Training and Development**

AI-enabled Training and Development (T&D) is the use of AI technologies like machine learning, the processing of natural languages (NLP), data mining, and intelligent automation in employee training systems to improve how learning is designed, delivered, personalized, and maintained.

This is a more advanced way of learning that not only turns information into digital form but also makes it more interactive, responsive, and adaptable to the demands and performance of each employee (Soltani et al., 2020; Vrontis et al., 2021).

In the past, T&D was a static procedure that focused on improving general abilities and was the same for everyone. But with AI, learning is dynamic, personalized, and smart. AI systems may look at a person's progress, preferred ways of learning, and gaps in their knowledge in real time and then create personalized learning courses for them. These systems also give rapid feedback, suggest relevant modules, and can

even guess what skills will be needed in the future based on how well people are doing and job trends.

Maity (2019) says that AI-powered learning solutions help employees learn new skills faster and better by delivering content that changes in real time. This personalized method makes learning more effective, cuts down on repetition, and helps workers remember what they've learn better.

Kashive et al. (2020) also say that AI-based T&D helps people learn new skills faster, which helps companies construct flexible workforce's that can adapt to changing job positions and market demands. AI in T&D not only helps people learn faster and better, but it also makes them more motivated and emotionally involved. Paesano (2021) and Chowdhury et al. (2023) have cited intelligent systems that offer individualized assistance to employees and help them feel appreciated and acknowledged.

This results in an increase in happiness and motivation and fosters a sense dedication that translates to sustained employee engagement. This dedication to learning mentally and emotionally translates to enhanced performance in one's duties and the generation of ideas (Wijayati et al., 2022).

The ability of employees to move from passive information reception to active information engagement is crucial not only to the employees as individuals but also to the organization as a whole. From a strategic point of view, AI in T&D lets HR and management teams keep an eye on how well training is working, find skill shortages in the organization, and use data to make decisions about how much to spend on learning. .

### **2.6.2 Previous Research Finding of AI -Enabled Training and Development**

Prior research has documented the ways in which AI-integrated Training and Development (T&D) reshapes systems of learning in organizations from the personalization, adaptability, and efficiency of learning systems. Inquiries using AI, especially machine learning, natural language processing, and data mining, suggest that training systems have the potential to adjust training content to individual needs, as training systems can automatically adjust to individual training needs and automatically adjust to individual training needs (Soltani et al. 2020; Vrontis et al. 2021).

These results confirm that AI-integrated T&D training systems go beyond traditional static training content and more towards the realm of intelligent, responsive learning. Furthermore, there is evidence that AI-enabled T&D has significant advantages in learning efficiency and acquisition of skills. Maity (2019) determined

that learning systems powered by AI accelerated the learning of an employee by adapting content to the individual's mastery and to the overall content of the system, which improved retention of the knowledge and reduced unnecessary repetition.

Likewise, Kashive et al (2020) reported that T&D powered by AI is contributing to faster upskilling and reskilling in organizations, which leads to the creation of a workforce that is flexible and responds to rapid changes in job requirements and the market. Along with efficiency in learning, several studies emphasize the influence on employee motivation and engagement through AI enabled T&D. Paesano (2021) and Chowdhury et al. (2023) note that the individualized instructional assistance rendered by adaptive intelligent training systems augments employees' learning recognition and value which, in turn, results in a higher degree of learning satisfaction, motivation, and emotional engagement.

Such emotional engagement has been shown to result in higher performance and innovative job-related behaviors, as employees become cognitively and emotionally liable to the learning for their acquisition (Wijayati et al., 2022). Organizational perspective research findings also underline the core importance of AI enabled T&D. AI based learning analytics provide a means for HR managers to assess training efficacy, discern organizational skill gaps, and facilitate evidence based learning

resource allocation and workforce development strategy decisions (Soltani et al., 2020).

Such features foster training design iterative refinements and improve the symmetry between employee value proposition and the organizational strategy. The preceding studies substantiate the claim that AI-powered T&D leads to better learning outcomes, greater workforce flexibility, increased employee engagement, and enhanced strategic decisions. Yet, the authors point out that the benefits of the system are substantial only when AI is employed ethically, openly, and with human interfaces to maintain fairness and trust in AI-enhanced learning (Vrontis et al., 2021; Chowdhury et al., 2023).

## **2.7. AI -Enabled Compensation and Benefits**

### **2.7.1. Concept and Definition of AI-Enabled Compensation and Benefits.**

AI-enabled Compensation and Benefits (C&B) is characterized by the use of artificial intelligence technology to formulate, manage and refine the compensation and benefit plans, as well as incentive programs offered to employees in a transparent, fair and empirical way (Budhwar et al., 2022). Such a paradigm employs compensation in a fair and just way, utilizing the most advanced algorithms, predictive analysis, and sophisticated automation.

In the analysis of Budhwar et al., (2022), AI systems improve the transparency and consistency of the pay systems, as they reduce the discretionary power of the managers and standardize the processes in the compensation systems. Predictive analysis tools enable organizations to analyze large sets of employee and performance data to uphold internal and external equity, as well as alignment with the prevailing organizational and regulatory frameworks.

Eubanks (2018) cites the explanation of the systems to promote fair pay as an example of the systems that he cites to illustrate the efforts of AI in wages systems to reduce the age, gender, and experience biases attributed to funds. The use of AI systems in C&B enhances the perception of fairness and trust as well as the level of engagement in the organization.

Furthermore, Vrontis et al (2021) explain that staff members can find accurate and current information about pay, settle pay-related issues, and learned compensation reward programs, thanks to this technology. With these benefits, Vrontis et al (2021) explain that AI technology improves employees' self-awareness and self-education.

Also, AI boosted C&B increases employees' interest and incentive. Vrontis et al (2021) maintain that AI technology improves employees' self-awareness and self-education. These programs can analyze employee performance and changes in the

market in real time, thus allowing human resources to build reward systems that are equitable and meet the needs of employees.

Lastly, Vrontis et al (2021) argue that the system of AI boosted C&B; is only an administrative function of the organizations. Vrontis et al (2021) emphasizes that the system of C&B should be equitable driven and transparent to employees as this promotes employee productivity.

### **2.7.2. Previous Research Finding of AI- Enabled Compensation and Benefits**

Prior studies indicate the transformative impact of AI-enabled Compensation and Benefits (C&B) systems on the equity, visibility, and efficiency of organizational reward management systems, where Budhwar et al. (2022) estimates the degree of automation of managerial bias and subjectivity in the compensation systems through the standardization of pay processes, thanks to the integrations of artificial intelligence.

Using credit algorithms and predictive analytics, systems help organizations assess large datasets on employee performance and market performance to achieve internal equity, external pay competitiveness, and regulatory compliance. Multiple studies affirm the role of AI-enabled C&B systems in alleviating compensation-related bias.

Eubanks (2018) concludes that the automation of payroll and reward systems effectively mitigates the gender, age, and tenure pay gaps. AI supports the perception of organizational justice and procedural fairness through algorithmically driven, consistent rule applications across employee segments. Such perception of fairness has a positive correlation with employee trust, job satisfaction, and employee engagement.

Furthermore, Vrontis et al. (2021) explores the ways in which artificial intelligence improves flexibility and transparency in compensation and the systems associated with it, as well as results in the empowerment of employees. Vrontis et al. (2021) indicates that employees that utilize artificial intelligent systems that focus on compensation are able to resolve pay equity issues, access appropriate compensation and other related documents, and understand reward and incentive systems better.

This provision of information results in self- awareness and financial literacy, and an understanding of performance related rewards at the individual level. On the other side, other studies have motivated the inclusion of artificial intelligent systems which focus on compensation and reward systems. As Vrontis et al. (2021) and Budhwar et al. (2022) explain, ‘personalized, tailored, and flexible’ incentive systems to be designed in HR departments.

Artificial intelligent compensation and reward systems enable the HR departments to create personalized and adaptive incentive systems as the reward algorithms respond to an employees ongoing performance in relation to the market conditions, and other environmental variables. Such systems foster and strengthens the performance-reward link which in turn results in the employee's self motivation, productivity, and overall commitment to the organization.

In relation to research findings, AI-enabled Compensation and Benefits systems are not simply a matter of administrative efficiencies, but of being a strategic human resource management practice. AI-enabled C&B systems create greater equity, transparency, and performance-based reward distribution in a way that increases employee engagement and motivation.

However, scholars argue that the systems are effective AI-enabled C&B systems are based on ethics, transparency, and human oversight, in order to maintain employee trust and organizational legitimacy (Budhwar et al, 2022; Vrontis et al., 2021).

## **2.8 AI -Enabled Performance Management**

### **2.8.1. Concept and Definition of AI -Enabled Performance Management**

AI-Enabled Performance Management (PM) involves the integration of various technologies like predictive analytics, natural language processing, and intelligent

automation into the frameworks used to monitor and evaluate employee performance.

Unlike standard performance management systems, which focus primarily on performance review cycles, AI systems offer real-time evaluations and performance reviews, which greatly improve the effectiveness and accuracy of performance evaluations.

AI systems offer an in-depth analysis of employee data, including productivity, behaviors, outcomes of projects, and engagement data. Such data gives managers the ability to assess performance gaps and take action to address the gaps, including on-the-spot training, changes in talent and/or skill focus, advanced training, or retraining (Hughes et al, 2019; Manoharan et al, 2011).

AI systems enable organizations to move from a reactive management to proactive management ensuring organizations get optimal alignment in their Employee value proposition and their Business value proposition. Managerial AI adds enormous value in closing the alignment gaps. Machines with Artificial Intelligence also assist PM in automated feedback structures that help provide employees with constant and timely feedback that is constructive.

Unlike annual or bonus reviews, these systems provide ongoing performance insights which increase transparency, fairness, and clarity while aiding to continuous improvements. This feedback in real time gives employees a stronger engagement

(EE) with these systems because employees feel that their contributions are recognized and they understand the performance guidance to high levels that are expected to be maintained (Votto et al., 2021; Buck & Morrow, 2018). Moreover, Artificial Intelligence indeed provides employees with effective communication throughout the year which helps to improve their collaboration and knowledge sharing.

### **2.8.2. Previous Research Finding of AI -Enabled Performance Management**

The consequences of AI-enabled Performance Management Systems (PM) on effectiveness and employee outcomes have been discussed in previous work. The performance evaluation system is improved by AI tools such as predictive analytics, natural language processing (NLP), and intelligent automation in measuring performance (Manoharan et al., 2011; Hughes et al., 2019). In contrast to conventional performance evaluations, which employee central performance reviews and object, use of AI in PM enables and provides high-quality reviews to managers that high-recognition performers, developed, and who active gaps in performance, to be implemented.

Employees will be able to learn learn to use tools such as on-demand training, and talent development, as AI-driven PM Systems are proactive in encouraging training. (Manoharan et al., 2011; Hughes et al., 2019). AI-enabled evaluation provides

evaluation participants (employees) with consistent and constructive evaluation which ultimately culminates in a transparent, fair evaluation. The feeling and access to tools that allow employees to evolve in their careers leads to real-time evaluations that are evaluated, and that are the basis for encouraging (Votto et al., 2021; Buck & Morrow, 2018).

Additionally, studies argue that the use of AI in PM helps create and sustain high-performance organizational culture by fostering meritocracy and inclusiveness through fairness and impartiality. AI can identify early signals of disengagement and burnout, enabling managers to take preventative measures to address employee well-being and retention (Manoharan et al, 2011; Hughes et al, 2019). AI-powered PM has been attributed to enhanced inter-employee and managerial staff communication that facilitates ongoing collaboration and knowledge sharing throughout the year(Buck & Morrow, 2018).

In the AI era, the focus of the previous studies has been on the development of workplace culture and employee training that goes hand in hand with increased organizational productivity. Integration of AI in PM is identified as an important feature in fostering workplace high-performance culture in modern workplace characterized by digital complexity.

## **2.9 Underpinning Theory**

### **2.9.1 Kahn's Theory of Employment Engagement**

Employee Engagement (EE) is the cognitive, emotional, and behavioral effort which an employee exerts in their work role. It is an employee's psychological state which embodies the commitment, motivation, and participation of the employee in the organization's processes. EEs is defined in this paper as the employee bringing their whole self to work, as also characterized in the employee engagement literature (Kahn, 1990; Glavas, 2012).

Kahn's Employee Engagement theory is the foundational work which conceptualizes employee engagement. This theory defines engagement as the 'harnessing of the selves of organizational members to the work roles' (Kahn, 1990, p.694). According to Kahn, the conditions which need to be present in order for an employee to be engaged in their work role include, psychological meaningfulness, psychological safety and psychological availability.

Psychological meaningfulness is defined as the extent employees feel that their work and the outcome of their work is valued; this is further explained as psychological safety which is the construct of feeling safe to express one's self without consequence for negative outcomes, and psychological availability means that

employees have the requisite socio-emotional and cognitive bandwidth to be present and fully functional in the role and work tasks that have been assigned to them (Kahn, 1990).

In a similar light, Kahn (1990) further broadened the understanding of employee engagement, describing it as a multi-faceted phenomenon that includes cognitive, emotional, and physical dimensions. Employees demonstrate cognitive engagement through the attention, focus, and absorption they display in their jobs. In addition, employees are emotionally engaged through feelings of positive enthusiasm and affective connections to their jobs and the organization as a whole.

Employees demonstrate physical engagement by investing their energy, effort, and sustained attention to the tasks they are required to complete. This concept of engagement being multi-faceted has been substantiated by several empirical studies demonstrating the phenomenon's contextual and dynamic nature (Breevaart et al., 2012; Glavas, 2012).

Within the manufacturing industry, Artificial Intelligence (AI) powered Human Resource Management (HRM) practices offer a unique way of enhancing and, consequently, employee engagement.

AI-powered HRM systems such as AI-driven performance management, recruitment and selection, training and development, compensation and benefits and continuous feedback enhance the psychological attributes that render HRM practices as being meaningful (Buck and Morrow, 2018; Malik et al., 2022). Employees are more likely to find their roles engagement when they understand the contribution of their jobs to the overall organizational goals (Glavas, 2012).

In like manner, AI-supported HRM practices are able to provide psychological safety by adding transparency, fairness, and impartiality to HR decisions concerning employees. Evidence of bias and arbitrariness in evaluations is reduced by AI-supported assessments and standardized data, which allow employees to openly state, act, and participate to a fuller extent (Abraham et al., 2019; Charwood and Guenole, 2021). Without doubt, perceptions of fairness and control are primary predictors of employee engagement in digital workplaces (Hughes et al., 2019).

Psychological resources available to employees are increased as AI technologies take care of routine HR tasks, reallocate workloads in balanced ways, and provide real time information. AI-enabled HRM systems reduce administrative tasks and cognitive overload, which allow employees to concentrate on primary job tasks more intensely (Eubanks, 2018; Wilson and Daugherty, 2018). This availability of

resources also increase employee's effort and active involvement in the work, both physically and emotionally.

Taking into Kahn's (1990) Employee Engagement Theory, it is expected that AI-driven HRM practices will strengthen employee engagement further, owing to increased psychological meaningfulness, safety, and availability. When these psychological conditions are met, it is expected that there will be an increased cognitive, emotional, and physical engagement in their work. In manufacturing firms, such engagement is fundamental for the continued productivity, flexibility, and performance in the AI-driven operational climate (Buck and Morrow, 2018; Malik et al., 2022).

### **2.9.2 Social Exchange Theory**

Examining social behavior in organizations through the lens of Social Exchange Theory (SET) demonstrates that social behavior is the reciprocal stream of exchanges between individuals and the organization (Blau, 1964). In organizational contexts, employees assess the level of fairness, support, rewards, and opportunities from their employer and respond behaviorally due to an imbalance of what their employer has provided. Employees emotionally invest in their work and respond positively through enhanced attitudes, behavior, and performance when they feel their organization is valuing their contributions by prioritizing their welfare.

SET's focuses on social behavior in the work organizations and how the new strategies of HRM impact employees through the lens of SET in regard to modern human resource practices. In contrast, AI-enabled technologies, which when integrated in HR practices such as recruitment and selection, training and development, performance management, compensation and benefits, and human resource planning, have an impact on organizational support, fairness, and transparency

For instance, AI recruiting and selection systems mitigate bias and are perceived as fair and without prejudice, therefore employees regard the organization as a fair and just employer. A fair employer enhances the perceived quality of the exchange relationship, which reinforces employee trust and engagement.

The most recent research have provided a valid basis for the use of SET concerning AI in HR practices. Research published in the Journal of Information Systems Engineering and Management, the positive impact of AI-enhanced recruitment, training, pay, and team fitting on employee engagement and retention is due to the alignment of organizational practices to employee expectations and job needs, and this is commensurate with the emphasis with the SET on balanced relational exchanges.

Additionally, the systematic review of AI in HRM found that employees may perceive AI-enabled HR systems as a manifestation of organizational commitment which, in turn, through the perceived fulfillment of the reciprocity principle, strengthens trust and engagement.

Particularly in the manufacturing domain where operational and skill demands are high, the potential of AI-enabled HRM to signal organizational investment in employee developmental, equitable, and supportive goals is promising. For example, AI-based performance management systems that continuously capture and objectively assess employee performance are supportive of professional growth and signal equitable treatment.

Also, AI-enabled individualized learning pathways bolster employees' perceived supportive concern for their career advancement. From an SET perspective, such favorable outcomes are among the organizational resources that employees will perceive as valuable and to which they will respond with greater engagement, commitment, and discretionary effort.

Nonetheless, SET shields us from some hazards: employees may simply view AI systems as processes that lack empathy, as tools that are unreliably discriminatory, or as processes that are evaluatively threatening, such as those involving AI that lacks clarity, those that replace human judgment, etc. Such views may result in the

psychological contract being breached, or dissatisfaction, trust erosion, or disengagement, etc., all of which are negative outcomes.

Thus, AI systems that are integrated into the workplace must protect and allow for the enhancement of social exchanges through more humane system designs, ethical designs, and transparent designs. In conclusion, we examine the implications of Social Exchange Theory for the case of employee engagement in AI-Enabled HRM practices. Because employees value processes that operate with fairness, transparency, and through supportive systems that allow for individualized and personalized employee development, employees are willing to increase their engagement and commitment to the organization. Indications are that positive employee engagement is possible through the employment of AI in HRM practices that facilitate social exchanges.

### **2.10 Gap in the literature**

The investigation of current literature indicates that, although extensive research has been undertaken on specific components of Human Resource Management (HRM) practices, such as training and development, recruitment and selection, compensation and benefits, and performance management; there exists a notable deficiency in comprehending the comprehensive influence of AI-enabled HRM functions on employee engagement, especially in the context of industrial sector.

Numerous investigations have investigated AI applications in HR operations, illustrating its capacity to improve operational efficiency, mitigate bias, deliver personalized feedback, and facilitate strategic decision-making. Nevertheless, these study (Kahn 1990) frequently analyse individual HR functions in isolation and lack a cohesive framework that links AI-enabled HR practices collectively to employee engagement outcomes.

Furthermore, past studies confined to western or global business contexts, providing limited understanding of the local dynamics, cultural norms, and industrial framework unique to Malaysian industries. Moreover, although employee engagement is often linked to psychological commitment, motivation, and performance, there is a lack of empirical evidence connecting AI-driven HRM strategies to the multifaceted dimensions of employee engagement, specifically cognitive, emotional, and physical engagement, as outlined in Kahn's (1990) theory.

Consequently, the present study attempts to fulfil the gaps in the literature by proposing a complete model to determine the impact of AI-enabled Human Resource Management (HRM) practices on employee engagement in the Malaysian manufacturing industry. Previous studies have failed to account the specific nature of manufacturing entities, including the heavy reliance on manual labour, routine and repetitive tasks, a diverse skill set of the employees, and the demand for the

application of advanced technologies to the workforce, which will affect the ways in which AI-enabled HRM practices influence employee engagement.

This study focuses on the specific segment of manufacturing to contribute to the HRM and behaviour in organizations literature by shedding light on the impact of AI-powered HRM on employee engagement. Consequently, the study makes a dual contribution to the theory and practice of understanding the AI-enabled HRM implementation and employee engagement interfaces in the manufacturing firms in the context of emerging economy.

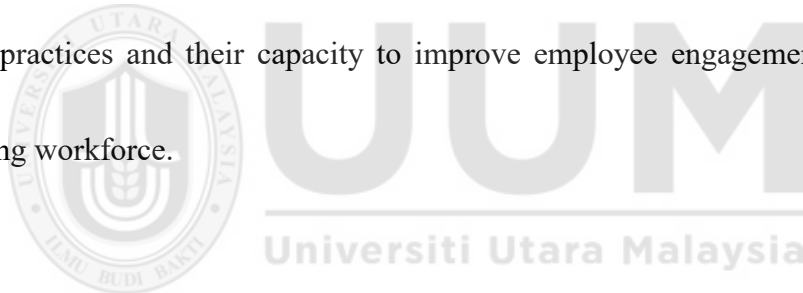
## **. 2.11 Summary of the Chapter**

The analysis of academic literature on Employee Engagement, AI-Enabled Human Resource Management (HRM), specifically Human Resource Planning, Recruitment, and Selection, Training and Development, Compensation and Benefits, and Performance Management has depth this study aims to achieve providing a historically thorough overview and pinpointing key areas of insufficient knowledge.

Previous studies have looked at the AI impact on specific HR function areas in isolation, such as recruitment, training, and performance review. However, there is little evidence regarding the cumulative impacts of AI enriched HRM on employee engagement, especially in developing market settings like Malaysia.

The majority of current research is either disconnected, focused on global or Western contexts, or fails to include AI applications across all essential HRM tasks. Moreover, while employee engagement has been thoroughly examined from psychological and behaviour viewpoints, there is a lack of research connecting .

This is particularly evident in manufacturing sectors, where the integration of AI in human resource management is on the rise, while empirical assessment is still constrained. This chapter establishes the intellectual basis for the research, elucidating the necessity to investigate how emerging AI technologies are affecting HRM practices and their capacity to improve employee engagement in a digitally evolving workforce.



## CHAPTER 3

### METHODOLOGY

#### 3.1. Introduction

The previous section has analyzed relevant literature and identified gaps in the field of research paper. This chapter will thoroughly describe the details of research's methods of the research paper and cover aspects related to research framework, hypothesis development, variable measurement, research population sampling, data collection and data analysis techniques.

#### 3.2. Discussion About framework

Employee engagement play a major role in an organization to the success. Employee engagement is a psychological condition that involves perceptions, emotions, and behaviors, that indicate energy and involvement at work. According to Schaufeli et al. (2004), engaged employees have a deep connection to their job and believe they can handle the challenges of the job at hand.

Employee engagement has evolved as one of the most important management ideas. According to Bailey et al. (2017), increasing employee engagement enhances both individual and organizational outcomes. Employee engagement was defined as a person's participation, satisfaction, and excitement for their job (Harter et al., 2002).

AI-enabled human resource management practices in areas related to AI-enabled human resource planning, AI-enabled recruitment and selection, AI-enabled training and development, AI-enabled compensation and benefits and AI-enabled performance management .They are plays an important role in employee engagement. Recognizing the impact of AI on employee engagement is important (Kumari et al., 2019).

This aids an organization in establishing work settings that put employee well being, safety, and exclusivity first, all of which contribute to the growth of positive workplace cultures.Evidently, the National Fourth Industrial Revolution (4IR) Policy document has recognized AI as one of the major technologies and promotes its application and utilization to transform Malaysia's economy towards broadening employment opportunities, encouraging competitiveness, innovation, and entrepreneurship, and improving people's well-being overall (Ng et al., 2023).

For instance, the manufacturing industry has made investments in AI technologies of robotics, supply chain optimization, quality control, predictive maintenance, and process optimization. Additional advancement leads to more productivity, lower costs, improved efficiency, and increased innovation and competitiveness in the market.

As stated in the Deloitte 2023 Manufacturing Industry Outlook, manufacturers will most likely start implementing smart manufacturing. Technologies of this type provide enhanced productivity, greater output, reduced inventory levels, and real-time process control to identify and alleviate production bottlenecks in the value chain.

The incorporation of Artificial Intelligence (AI) across multiple industries, including manufacturing, has implications that are yet to be clarified and are highly context-sensitive. As a result, the aim of this study is to understand the impact of AI-enabled human resource management systems on employee engagement.

Specifically, the purpose of the study is to assess the impact of AI-enabled human resource management systems (HR planning, training and development, compensation and benefits, recruitment and selection, and performance management) on employee engagement of employees of companies in Kulim Hi-Tech Park, thereby enriching the theoretical framework of Kahn's employee engagement model and social exchange theory.

This study will shed light on the psychological processes that impact employee attitudes, behaviors, and perceptions in technologically advanced workplaces by narrowing the focus on the impact of artificial intelligence on the transformation of the HRM functions. Ultimately, it provides a better understanding of the impact of

the digitalization of the workplace, and the role of artificial intelligence in particular, on the engagement dynamics of employees in the modern workforce.

### **3.2.1. Theoretical framework**

This theoretical framework built after a thorough review of the literature and identification of research variables. This research's theoretical framework was built by extensive literature studies and gap analysis of its variables, including employee engagement, artificial intelligence, human resource management, human resource planning, recruitment and selection, training and development, compensation and benefits and performance management.

Kahn's Theory of Employment Engagement', and Social Exchange Theory served as the underpinning theory for this research. According to the theory, employee engagement involves identifying an employee's personal characteristics while doing his tasks. He suggests that engaged employees present themselves physically, cognitively, and emotionally when carrying out their tasks, whereas disengaged employees withdraw or defend themselves mentally, emotionally and physically from their daily task.

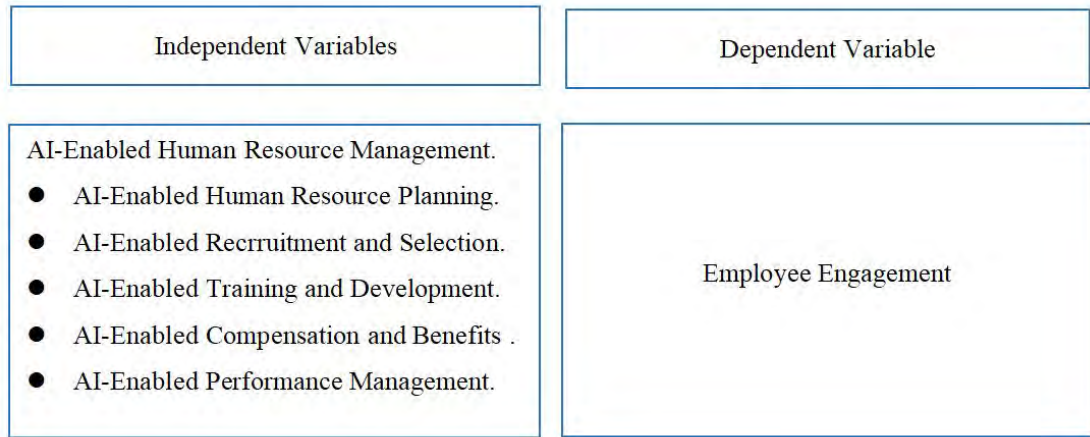
Albrecht (2013) emphasizes the connection between employee engagement and positive work-related cognitive circumstances, as well as an honest intention to

contribute to company objectives. In his research, the measure business-unit results in terms of profit, workers turnover, productivity, and customer satisfaction, summarizing that improving methods of leadership improves overall revenues and employee satisfaction. Employees are more productive when they work with interests.

A variety of things inspire us to approach our work with passion, excitement, vigour, and energy. The mental, emotional, and physical connections employees have between their work, teams, and organizations is known as employee engagement. Thus, after matching all the factors of our research with the Kahn's Theory of Employment Engagement' and social exchange theory, the researchers conclude employee engagement are how employee engagement refers to an employee's physical, mental, and emotional connection with their job and organization. When the engagement is strong, it will improve earnings, revenue growth, sales, customer happiness, and turnover rate.

Supported by the findings and the social exchange theory , the relationship between the research's variables can be explained by training and development, compensation and benefits, human resource planning, human resource management, recruiting and selection and performance management (see Figure 3.1). These elements would work

together to increase the potential that they continue with the company for long periods.



**Figure 3.1 Conceptual framework linking independent variables and dependent variable**

### 3.3 Hypothesis Development

This research's hypotheses were developed based on the literature review and theoretical arguments offered in the previous chapter and section. The following five hypotheses' statements were developed to research the connection that exist between AI-enabled human resource planning, AI-enabled recruitment and selection, AI-enabled training and development, AI-enabled compensation and benefits and AI-enabled performance management.

### **3.3.1 Artificial Intelligence (AI) - Enabled Human Resource Management (HRM) and Employee Engagement (EE)**

Kahn's (1990) Employee Engagement Theory forms the foundation of this research in order to establish the connection between Artificial Intelligence (AI) and Human Resource Management (HRM) and Engagement (EE). With the help of Kahn's theory, we can fully explain the impact of modern AI-augmented HRM practices on the employees' ability and willingness to devote their physical, mental, and emotional energies to their work.

The theory suggests that employee engagement takes place when there are three specific psychological conditions—meaningfulness, safety, and availability. To a great extent, AI-enabled HRM practices help to enhance the psychological sense of meaningfulness by ensuring that employees' competencies, job roles, and career advancement opportunities are congruent.

The use of AI in recruitment and selection improves fit by matching the skills and competencies of the candidate with the needs of the organization. Similarly, AI-enabled training and development systems help employees understand the actual value of their work by providing opportunities for ongoing skills development and real-time feedback.

Employees are likely to further engage with their work when they understand that the work they do provides them with developmental opportunities and that they are making a meaningful contribution.

AI-Enhanced HRM systems allow for psychological safety to be fostered through their transparent, consistent, and fair practices. AI Performance Management Systems and AI Compensation Management Systems apply the same criteria and lack any human bias when managing performance evaluation and allocation of compensation.

The uniformity of the performance evaluation, along with the feedback objectivity, and the compensation systems feedback, foster the trust and safety within the employees and the organization means that employees can freely position with no fear of inequitable treatment. Such employees are given the entire range of the role in a way that also allows for cognitive and emotional engagement.

AI-Enabled HRM also supports the employees' psychological availability by ensuring employees are ready to work, both physically and mentally. AI-Enabled human resource planning systems optimize the balance of work, staffing predictions and work flexibility to minimize resource depletion and stress.

AI powered feedback systems and employee assistance systems and AI-enabled support systems provide employees with strategies and resources to conserve the attention and energy they need in order to remain engaged.

AI-enabled Human Resource Management helps employees perceive their duties as more meaningful through motivational growth and psychological welfare. They have more discretion and flexibility in their schedules and dedicate more of themselves to their work.

AI does not only automate HR processes, but also reshapes the employee experience by personalizing, automating, and addressing employee needs in real-time. Therefore, the investment of HRM in AI technology has great significance in the engagement of employees which in turn affects the efficiency and sustainability of the organization.

### **3.3.2 Artificial Intelligence (AI) - Enabled Human Resource Planning (HRP) and Employee Engagement (EE)**

Studies have consistently proven that adding Artificial Intelligence (AI) to Human Resource Planning (HRP) makes HR decisions far more accurate and efficient. For example, Karatop et al. (2015) stressed that AI in HRP not only makes hiring better, but it also helps the company better predict and meet the demands of future employees by using workforce analytic and talent forecasting models.

AI-driven HRP systems employs techniques and predictive analytics to analyze workforce trends, identify skills shortages, and anticipate future workforce requirements. These tools assist HR units to make data-driven decisions to predict workforce requirements, and facilitate alignment of human capital planning with strategic objectives of the organization. This ensures optimal job fit, and helps employees to derive a sense of purpose and feel that they are attaining the objectives of the organization, which are among the key drivers of Employee Engagement (EE).

According to Huang and Rust (2018), AI-powered recruitment enables job seekers to concentrate on the learning the necessary competencies. These specific competencies not only assist individuals in performing the tasks in their current positions but also prepare them for analogous positions in different organizations, thereby increasing their employability and facilitating career advancement. From the employees' perspective, this paradigm and competencies development approach demonstrates the organization's commitment to the employees' success employer-sponsored personal and professional development.

Employers can use AI in Human Resource Planning to assist with individualized career trajectory planning via smart career pathing. Predictive analytics can assist with determining the optimal career path(s) for employees. This can create employee

feelings of job security and opportunities for career advancement, both of which are favorable to Employee Engagement (EE).

Budhwar et al. (2022) argued that the utilization of AI in HRP can foster the creation of a conducive and stimulating environment in the workplace, when employees are equipped with the right resources, kept in sync with the organizational alignment, and future-readiness. Employees are more likely to take initiative, job satisfaction, and organizational commitment when employers are perceived to be offering job security, employee's competencies will be utilized, and opportunities for organizational advancement are available.

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offering job security, employee's competencies will be utilized, and opportunities for organizational advancement are available.

AI-enabled HRP also allows for continuous feedback and the management of a flexible workforce. AI systems, for example, monitor workloads and predict burnout, then automatically redistribute tasks in an optimal fashion. Such predictive task management and workload balancing systems avoid employee burnout and promote engagement and well being.

Generally, AI-enhanced HRP is not limited to the anticipated improvement of the organizations.

The role of AI within human resource planning fosters continuous motivation and development of employees and subsequently leads to better employee engagement and retention, and is reflected in productivity gains, which are all essential to building and maintaining a competitive and strong workforce.

Hence, the following hypothesis is proposed:

**Hypothesis 1: AI-enabled Human Resource Planning positively related to Employee Engagement.**

### **3.3.3 Artificial Intelligence (AI) - Enabled Recruitment and Selection (RS) and Employee Engagement (EE)**

Through the use of Artificial Intelligence, the recruitment and selection (RS) processes have allowed HR practitioners to simplify and make the processes of candidate evaluation and on-boarding more efficient. With the help of AI, organizations can quickly evaluate numerous systems (applications), making recruitment easier. They can evaluate and choose candidates according to specific pre-determined criteria aligned with their organizational objectives (Kumar, 2012).

This capability speeds up the recruitment processes and improves the quality of candidates hired as organizations can more easily find candidates whose profiles match the desired job and organizational culture

Probably one of the most pivotal applications of AI in RS processes is the use of AI-powered chat-bots. They respond quickly to candidates' queries about the jobs, application stages, and interview processes. AI chat-bots facilitate 24/7 communication and informational candidates, providing them with a positive recruitment experience. Such support help candidates understand the organizational values, expectations, and processes more deeply, enhancing their knowledge, skills, and abilities (KSAs) related to the job and the organization (Votto et al., 2021).

The scope of employees' further engagement with their organizations and its processes expands even further with their introduction to AI-empowered RS and

organizational processes. Employees with clearly defined tasks and success pathways tend to develop job satisfaction and motivation. The emotional and cognitive attachment to the organizations is strengthened through this engagement.

Additionally, the trust and inclusiveness resulting from the AI feedback loop in candidate evaluations creates the perception of organizational justice, which increases the likelihood of participatory engagement. Employees are more invested in their tasks and demonstrate heightened passion and dedication when motivated by the knowledge that their recruitment was based on data and analytics, thus meritocracy is achieved (Votto et al., 2021). AI in RS enhances the efficiency of HR organizational processes, but it also creates an engaging and meaningful organizational experience from the onset of their employment. Based on the above discussion, the following hypothesis is proposed:

**Hypothesis 2: AI-enabled Recruitment and Selection can positively enhance Employee Engagement**

### **3.3.4 Artificial Intelligence (AI) - Enabled Training and Development and Employee Engagement (EE)**

The introduction of sophisticated, data-centric technologies that respond to changes within the organization have profoundly transformed AI's approach to T&D. Traditional training approaches usually follow a uniform approach which fails to take into consideration the varying degrees of learning, job functions, or career goals of each employee. AI enables a much more flexible and tailored approach. AI can design and refine personalized learning pathways that incorporate employee performance data, learning style, and job requirements, and balance it with progress and feedback (Soltani et al., 2020; Vrontis et al., 2021).

One of the main benefits of AI in talent development is the ability to monitor employee performance and provide automated feedback on a continuous basis. This feedback loop gives employees the opportunity to gain a better understanding of their strengths and weaknesses thus accelerating the learning and encouraging continuous improvement. AI systems often include training, scenarios, and micro learning that is more engaging and proven to be more effective in learning and skill acquisition (Maity, 2019; Kashive et al., 2020).

In addition, the use of artificial intelligence allows for the democratization of learning, as it provides endless availability of training materials in various forms—videos, audio, quizzes, and interactive resources—modified for the specific needs of

employees. This adaptability allows employees to take control of their learning, self-direct research, and schedule training in a manner that improves job satisfaction and responsibility. The psychological effects of such assistance are substantial. Employees who perceive that the organization is committed to their personal and professional development through effective and adaptive training systems generally exhibit increased motivation, confidence, and job satisfaction (Paesano, 2021; Chowdhury et al., 2023). These feelings are essential elements of affective engagement, one of the three aspects of employee engagement, which also includes cognitive and behavioral engagement.

Additionally, employees who receive more focused training and who pursue more training have the opportunity to establish and develop the sense of mastery and agency over their roles. Such mastery and agency allows for greater engagement in the outcomes of the organization and the attainment of those outcomes (Wijayati et al., 2022). This creates a positive feedback loop of AI supporting engagement, engagement supporting skills and creativity and skills supporting further learning. AI-supported systems for talent development go beyond the primary purpose of skills improvement and enabling systems for the continuous improvement of a learning organization. AI in talent development creates a supportive, stimulating, and

appreciative learning environment that fosters lifelong engagement of employees and performance of the organization. Hence, the below hypothesis is proposed:

**Hypothesis 3: AI-enabled Training and Development positively related with Employee Engagement.**

### **3.3.5 Artificial Intelligence (AI) - Enabled Compensation and Benefits and Employee Engagement (EE)**

Compensation and Benefits (C&B) systems and processes in Human Resource Management practice have a substantial effect on employee motivation, satisfaction, and engagement. Because of the incorporation of Artificial Intelligence (AI) into the administration of compensation and benefits, organizations' management of reward systems have become more transparent, professional, and equitable.

AI payroll systems and compensation management tools are designed to eliminate biases of all kinds, including gender, age, and longevity in the company. These systems are designed to ensure the principle of "equal pay for equal work" and are baseless in human judgement (Eubanks, 2018). The increased fairness and objectivity in compensation are reflected in the employee's trust in the organization and in the perceived organizational justice fairness of the system, both of which are crucial for active engagement in the organization. Employees are more likely to remain engaged and sustain their emotional and cognitive work activities when they

feel the compensation system is fair and awards are allocated on a meritocratic system.

Beyond equity, AI technologies also affect the efficiency and accessibility of compensation functions. AI systems handle multifaceted compensation structures, allowing employees instant access to real-time salary analyses and information on current and potential benefits as well as incentives. Employees can self-service pay-related inquiries or discrepancies, removing lag and ambiguity (Vrontis et al., 2021).

Moreover, AI systems offer adaptable and individualized distribution of incentives.

AI can configure recognition to individual employee preferences and performance milestones by using effort, skills, and predictive data to customize recognition. This approach to compensation system acknowledges employees' work, and also nurtures their goals and aspirations. Employees who are well recognized by the organization for their effort, and work towards goals, are more likely to be inspired and committed to organizational objectives (Budhwar et al., 2022).

Opportunities for self-improvement by AI-empowered C&B systems in the form of learning credits, bonuses, or wellness incentives foster self-motivation. It encourages employees to take responsibility of their development processes, resulting in increased satisfaction at their work. The combination of autonomy with recognition creates a powerful driver of employee engagement. Thus, it is most certain that AI-

powered C&B offers efficient operations and equitable chances, all the while fostering psychologically safe and growth-oriented workplaces. Such systems foster motivation and loyalty, which, coupled with equity and transparency, engage the workforce as AI compensations and benefits systems align with growth. Hence, the following hypothesis is proposed:

**Hypothesis 4: AI-enabled Compensation and Benefits can positively improve Employee Engagement.**

### **3.3.6 Artificial Intelligence (AI) - Enabled Performance Management and Employee Engagement (EE)**

Performance management (PM) is a key human resource function that assists organizations in attaining success by integrating individual performance with corporate strategic objectives. The advent of artificial intelligence (AI) has changed Performance management (PM) from a once periodic appraisal process conducted in retrospect to a system that is continuous, dynamic, and data driven. AI-powered Performance management (PM) systems equip managers with analytical tools that help them assess employee performance with greater accuracy and efficiency. These systems employ predictive analytics and behavioural data to identify patterns, evaluate productivity, and ascertain the criteria of improvement with greater accuracy than had previously been possible (Manoharan et al., 2011; Hughes et al., 2019).

AI in Performance management (PM) is beneficial mainly because of the feedback loop from AI systems that is continuous and constructive. Instead of relying solely on monthly, quarterly, or annual reviews, AI systems produce continuous performance data that enable employees to adjust their performance activities in real-time so that they align with the objectives of the organization. This feedback loop increases performance related transparency that enables organizations to act proactively by implementing continuous feedback systems. As a consequence, employees become more cognizant of their performance and are empowered with the means to achieve their objectives.

With the use of artificial intelligence comes the minimization of the subjectivity and biases typically associated with performance assessments. There is greater trust equity and trust within the employee-manager relationship when these systems utilize unbiased evaluation of data. Employees who have the belief that assessments are accurately and equitably evaluated report enhanced feelings of recognition and appreciation and display greater participation in their work.

Using AI for performance assessments helps report employees with greater analytical performance aids in promoting distributed balancing of workloads within the performance team. Tools such as AI feedback systems, performance analytics, and digital goal-setting worksheets encourage constant and transparent communication

and result in increased accountability and performance oversight. On the basis of the relevancy of communication, Buck and Morrow (2018) suggest that collaboration and unified team purpose, both essential for employee engagement, rest upon the flexibility of communication.

Intelligent performance analytics supporting a feedback rich environment fosters employees' belief that their efforts are recognized while also ensuring their sustained development is emphasized. This belief is associated with an increase in their satisfaction and emotional commitment to the organization.

From a strategic perspective, AI in PM serves as a catalyst in developing a culture of excellence and perpetual advancement. Employees tend to be more engaged when they are aware of the importance of their role in the organization, and when employers provide feedback to assist in their improvement. If employees feel the outcomes of their efforts (e.g. advancement, learning privileges, or public praise), their engagement will rise (Votto et al., 2021).

In conclusion, AI-enabled PM systems help increase employee engagement in a workplace that is transparent, equitable, responsive, and supportive of growth. By offering employees a myriad of differentiated opportunities that stem from objective feedback and evaluations, AI enhances individual organizational performance and

deepens the relationship of the employee to the organization. Hence, we suggest the following hypothesis:

**Hypothesis 5: AI-enabled Performance Management can improve Employee Engagement.**

### **3.4 Research design**

A research design is an outline or blueprint for the research that explains how the various elements will be combined logically and cogently to answer the research questions. A research design usually comprises the following: the methods of data collection, the equipment utilized, their application, and the analysis of the results (Cooper & Schindler, 2003). As stated, mentioned, the research's research plan adhered to the fundamentals of a quantitative approach.

According to this methodology, quantitative data were gathered and statistical techniques were applied to construct and test hypotheses. The statistical analysis and results were discussed and reported in the following chapter. This section will cover the research design, including purpose and forms of investigation.

In order to address the research questions and explain the nature of the relationship between the variables, the research's objectives are to test the hypotheses. An explanatory research method was used to examine the relationships between the variable's employee engagement, AI-enabled human resource planning, AI-enabled

recruitment and selection, AI-enabled training and development, AI-enabled compensation and benefits and AI-enabled performance management. based on the literature reviews, conceptual framework, and hypotheses developed for this research.

### **3.5 Population of Study**

This research chooses Manufacturing industries located at Kulim Hi-Tech Park, Kulim, Kedah, Malaysia. The population for this research consist of employees across several levels in the organizations, ranging from supervisor to top management. Quantitative methods allow for accurate inferences about a big population with a small number of responses, making them more cost-effective for research (Cavana et al.,2001).

A appropriate sample size is affected by three main elements.The amount of confidence desired, the margin of error, and the variability of the population (Lind, et al., 2002).

### **3.6 Sample Size**

Sample size refers to the quantity of units that must be surveyed in order to get accurate and dependable results; hence, it must be sufficiently large to estimate the population's characteristics and produce results that are realistic (Cresswell, 2009).

As a result, sample size is a crucial factor in establishing the accuracy and reliability of the data that is provided.

Due to limited access to data and poor cooperation from companies involved, this research just focus on two companies and their 600 employees. The sample consist of 234 based on Krejcie and Morgan’s (1970) formula. However, the research has decided to increase the sample size to 350 respondents .

### 3.7 Sampling Techniques

A good sampling strategy includes steps that let the researcher make judgments depending on how the sample is measured. The target population is chosen from the range of employees from selected organizations, ranging from supervisors to top management. The samples were drawn from the two selected companies by using convenience sampling technique.

**Table 3.1 Population and Sampling Size**

Company Name	Company Ownership	Population	Sample Size
Mace Instrumentation <u>Sdn Bhd</u>	Local	400	222
SLP Resources Bhd	Local	200	128
Total		600	350

### **3.8 Unit of Analysis**

A unit of analysis is a sort of unit that is used in research to assess the variables under investigation. The objective of this research seeks to examine the effect of artificial intelligent -enabled human resource management practices on employee engagement.

Since each employee's reaction need to be analyzed in order to understand the effect of artificial intelligent -enabled human resource management practices on employee engagement, the unit of analysis used for this research is individual. As such, the surveys were asked to be answered individually by the selected respondents.

### **3.9 Instrumentation and Measurement of Variables**

The primary focus of this research is on the effect of artificial intelligent -enabled human resource management dimension on employee engagement. The operational description of this research is given in Table 3.2. The instruments and measurements of these variables are covered in chronological sequence in the subsection that follows.

**Table 3.2 Operational Definition of Variables.**

Concept	Operational Development	Items	Source
Employee Engagement	<p>Schaufeli et al. (2002) defined employee engagement as a positive, fulfilling, and work related state of mind, encompassing three dimensions: vigour, dedication, and absorption.</p> <p>An employee is said to have vigour when they exhibit high levels of energy and resilience.</p>	8	Schaufeli and Bakker (2003)
AI - Enabled Human Resource Planning	<p>AI-enabled HRP is the system that fosters employees' effective functioning of the system by the optimal matching of the organizational manpower needs and the employees' individual potentialities and longitudinal development</p>	3	Karatop et al.(2015)

	(Budhwar et al., 2022).		
AI - Enabled Training and Development	Employee training and development is a conceptual process of guiding employees toward the attainment of relevant knowledge, changing their mindsets, and building the necessary competencies to perform their roles and help the organization meet its goals (M.A. Camilleri, 2021).	4	Bell et al.,(2008)
AI - Enabled Recruitment and Selection	. AI-enabled Recruitment and Selection (R&S) refers to the use of artificial intelligence technologies to improve recruitment process productivity and effectiveness. With AI in RS, recruiters can be more precise in the screening, evaluation, and selection of prospective candidates, and	4	Van Esch et al.(2020) ,Torres and Mejia (2017)

	HR managers can handle large volumes of applications with greater ease (Kumar, 2012).		
AI - Enabled Compensation and Benefits	According to Eubanks (2018), C&B systems more accurately support bias-free pay equity and fairer payroll decisions (both in the positive and negative directions) and bias-related issues in compensation and payroll decisions on the basis of gender, age, and experience.	3	Behrend and Thompson (2011), Manoharan et al.,(2011)
AI - Enabled Performance Management	AI-enabled performance management (AI-enabled PM) refers the application of artificial intelligence to analyze performance data, identify performance gaps, and recommend appropriate interventions, such as just-in-time training, upskilling	3	Azadeh et al.(2018), Manoharan et al.(2011)

	availability, or advanced capability training (Manoharan et al., 2011; Hughes et al., 2019).		
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This research used validated instruments from earlier research to successfully assess variables, as detailed in the subsections below. The variables were assessed using a seven-point Likert scale, with 1 indicating Strongly Disagree to 7= Strongly Agree, excluding demographics. The seven-point measurement scale is widely accepted in industrial and academic research circumstances. Additionally, caution was exercised during data interpretation. The following provides a detailed explanation of the research instruments used.

### 3.9.1. Demographic Variables

Ten(10) demographic data points were gathered and provided for this research. Demographic data includes respondent gender, age, education level, employment status, position in the organization, years of experience, income range, marital status and location. We used nominal and ordinal scales to measure all of the data.

### 3.9.2 Employee Engagement

Employee engagement has emerged as one of the most essential management principles. According to Bailey et al. (2017), increasing employee engagement

improves both individual and organizational performance. Employee engagement relates to an employee's mental, physical, and emotional bond to their profession and company. Engaged employees identify their own needs, team demands, and company objectives. Engaged employees improve company efficiency, maintain for a longer period, and encourage others. In this research, the dependent variable is employee engagement, which is measured the employees concerns. The Employee Engagement was measured using eight (8) items from Schaufeli et al. (2006) research.

### **3.9.3 AI- Enabled Human Resource Planning**

AI-enabled Human Resource Planning (HRP) is the integration of artificial intelligence technologies into strategic operations such as forecasting workforce requirements, detecting future skill demands, and matching manpower supply with organizational objectives. The AI- Enabled Human Resource Planning was measured using three (3) items from Karatop et al. (2015).

### **3.9.4 AI- Enabled Recruitment and Selection**

AI-enabled Recruitment and Selection (R&S) is the use of artificial intelligence technology to automate, optimize, and improve several stages of the hiring process, such as sourcing, screening, assessing, and on-boarding applicants. AI in RS helps

human resource professionals to rapidly handle massive numbers of applications, improve candidate-job matching, and decrease biases associated with traditional selection approaches.

In this research, the AI-enabled RS construct is measured using four items: (1) Removes biases, (2) improves job matching, (3) improves job opening messaging, and (4) efficiently manages vast amounts of data. The AI- Enabled Recruitment and Selection was measured using four (4) items from van Esch et al. (2020) and Torres and Mejia (2017) research.

### **3.9.5 AI- Enabled Training and Development**

AI-Enabled Training and Development (T&D) is an innovation that applies certain training and development technologies and individualized processes to enhance employee learning, develop competencies, and advance careers. The most beneficial employee training programs focus on specific training programs, such as, employee orientation, management training, and operational training, providing a foundation for structured employee development. The survey for this research has a questionnaire. The survey is based on AI-enabled training and development used by Bell et al. (2008). The survey is made up of four (4) items.

### **3.9.6 AI- Enabled Compensation and Benefits**

AI-enabled Compensation and Benefits (C&B) is the use of artificial intelligence technologies to administer, analyse, and optimize employee compensation, rewards, and welfare programs in a fair, efficient, and data-driven way. The use of AI into C&B activities enables organization to reduce manual errors, bias, and ensure consistent application of compensation policy across all employee levels. AI-powered payroll systems have the ability to eradicate discriminatory pay practices based on gender, age, and experience, advancing the idea of equal pay for equal labour. This perceived fairness in compensation has been identified as a key determinant of employee satisfaction and engagement.

AI also improves openness and accessibility by letting employees to access real-time data on their salary, benefits, and incentive structures via self-service systems. The questionnaire developed by Behrend and Thompson (2011) and Manoharan et al., (2011) was used to measure AI-enabled compensation & benefits. It consists of three (3) items.

### **3.9.7 AI- Enabled Performance Management**

AI-enabled Performance Management (PM) is the use of technology to assist in, automate, and optimize the processes of evaluating, tracking, and cultivating

employee performance. It shifts the focus of performance reviews from being subjective, periodic, and manual to becoming real-time and driven by continuous feedback.

AI becomes a relevant and useful tool in providing HR departments with timely and accurate assessments of employee contributions across varying levels, identifying skill deficits, and recommending training or the need to develop competencies. AI-enabled performance management was measured by the questionnaires of Azadeh et al. (2018) and Manoharan et al. (2011), which consisted of a total of three (3) items.

**Table 3.3 Summary of Instrument and Measurement**

Variables	Items	Scale	Source
Demographic	10	Nominal & Ordinal	Researcher
Employee Engagement	8	Interval	Schaufeli and Bakker (2003)
AI- Enabled Human Resource Planning	3	Interval	Karatop et al. (2015)
AI- Enabled Recruitment and Selection	4	Interval	Van Esch et al. (2020), Torres and Mejia (2017)
AI- Enabled Training and Development	4	Interval	Bell et al.,(2008)
AI- Enabled Compensation and Benefits	3	Interval	Behrend and Thompson (2011) , Manoharan et al.,(2011)
AI- Enabled Performance Management	3	Interval	Azadeh et al. (2018), Manoharan et al. (2011)

### **3.10 Data Collection Strategy**

The dependability of the research findings depends in large part on the acquisition of sufficient data, which will support the researcher's findings and conclusions. According to Sekaran and Bougie (2010), primary and secondary sources can provide data for a research. For this research, the primary data gathering method was utilized. The primary data collecting process consists of a series of procedures or steps for acquiring and preparing the data. By using data-collection strategies, we can methodically gather information on the people, things, and phenomena that we are studying as well as the environments in which they take place.

The survey questionnaire approach was used to gather data for this research since it used a quantitative methodology. Questionnaires are the most efficient technique for gathering data since the researcher knows what needs to be collected and how to analyze that data. The approach for collecting data for this research was the use of self-administered questionnaires.

Self-administered questionnaires give respondents the opportunity to respond to the questionnaire at their convenience and increase response rates while fully protecting their privacy. Data collection was undertaken between June 2025 and August 2025. For this research, questionnaires were sent by the researcher to the Human Resources units of the respective companies via WhatsApp.

The Human Resources representatives distributed the questionnaires to the target respondents. The researcher subsequently collected all of the completed questionnaires from the Google Forms. The survey technique was chosen for its cost-effectiveness, bias-free the environment, minimum attacks, and confidentiality (Sekaran & Bougie, 2010).

### **3.11 Data Analysis Strategy**

Data analysis, according to Hair et al. (2010), is the act of identifying and measuring the variation in the variables. As a result, it's critical to identify the kinds of statistical analysis methods that were employed to examine the data that was gathered in the preliminary phases of the research. In accordance with that, the data collected from survey questionnaires was analyzed in this research using the descriptive and inferential data analysis approach. Descriptive analysis explains the data, while inferential analysis evaluates and tests research ideas.

This research's data analysis involves various methodologies, which are discussed in the stages below. First, data will be analyzed for reliability and validity. Continuously, the data will be evaluated by descriptive, correlation, and regression analysis. The questionnaire results from this research were analyzed using Multiple linear regression.

First, a reliability analysis was carried out on the research's variables. A scale's internal consistency is evaluated in reliability analysis to determine whether the scale is consistently measuring the same concept (Sekaran & Bougie, 2010).

This ensures that instruments measure a construct as intended and generate consistent results when used repeatedly. Factor analysis validates the validity of measures by ensuring they belong to the correct construct. According to Hair et al. (2010), factor analysis is used to test the fundamental structure of the research variables and look at how the variables relate to the research's dimensions. By organizing complex data sets into a manageable, interpretable, and relevant collection of components, it becomes easier to determine if the items of each variable are organized together (Cavana et al., 2001).

Descriptive Analysis increases understanding of the critical role that descriptive analysis, in both general and education research in particular, it will play in the scientific method. It explains how quantitative descriptive analysis can function as a part of causal research or stand alone as a comprehensive research output.

Similarly, descriptive analysis was utilized in this research to display the demographic data of the respondents. This analysis will also show data like frequency distribution, central tendency measurements, and the dispersion of the primary variables. The numbers are generated to provide an overview of respondents'

perceptions of the research's constructs, followed by an estimation of data distribution.

Correlation analysis was carried out to evaluate the strength of the association between the independent and dependent variables. Correlation analysis identifies the correlation between variables that is linear and its strength and direction. The correlation coefficient's (r) value falls between -1.0 and +1.0 (positive and negative). According to Hair et al. (2010), a positive r value implies a direct relationship, while a negative r value shows an inverse relationship. This number represents the intensity of correlation between two metric variables.

**Table 3.4 Correlation Coefficient Range**

<b><u>Correlation Coefficient Range</u></b>	<b><u>Strength of Association</u></b>
<b><math>\pm 0.50</math> to <math>\pm 1.00</math></b>	Strong
<b><math>\pm 0.30</math> to <math>\pm 0.49</math></b>	Moderate
<b><u><math>\pm 0.10</math> to <math>\pm 0.29</math></u></b>	<u>Low</u>

**Source: Cavanna et al. (2001)**

The regression analysis is one of the most popular statistical analysis methods for examines the correlation between the independent and dependent variables (Sekaran & Bougie, 2010). It is employed to demonstrate how significant the independent

variable and the dependent variable are related prediction. The values of regression coefficients range from 0 to 1. When the dependent variable's value is 1, all of its variance can be statistically illustrated through the independent variables. In contrast, a score of 0 indicates that the independent variables are unable to account for any of the dependent variable's variance (Saunders et al., 2009).

Hypothesis testing is used in this research to determine the links between the variables. To determine the strength of the correlations between the independent and dependent variables, regression analysis was performed. This helps analyzed variables and provide probability assessment results for a suggested model. It generates data to enable hypothesis testing, leading to empirical findings.

### **3.12 Summary**

This chapter outlines the research's methodology, including the theoretical framework, operational definitions of variables, measurements, survey instruments, sampling, data collection strategies, and data analysis methods to address research questions. Additionally included were the specifics of the research's population and sample. And also, it explains how to assess the reliability and validity of construct instruments. The analytical results presented in Chapter Four.

## CHAPTER 4

### RESULTS

#### 4.1 Introduction

The statistical analysis results of the research data are detailed in this chapter. The initial section of this section presents the survey responses and data screening process. The descriptive statistics of the data are detailed in the subsequent section, which is followed by a reliability and factor analysis. To test the hypotheses of this investigation, correlation analysis was conducted, followed by regression analysis. The chapter concludes with the results of the hypotheses test and a summary about the chapter.

#### 4.2. Survey Responses

##### 4.2.1. Survey Responses

The response rate is a primary measure of how reliable and representative the results are for the target population (Sekaran & Bougie, 2010). There were 350 questionnaires administered to targeted employees of two companies via Google Forms, of which 328 completed the questionnaires for a response rate of 94%. 10 questionnaires were incomplete, and after removing these, 318 responses were valid, which is 91% of the questionnaires sent.

The response rate is primarily due to the effectiveness of the online survey methodology that allowed respondents to fill in their questionnaires using any of their digital devices. Survey administered process was enriched by representative members of the organizations conducting timely follow-ups and reminders to respond to the questionnaires to encourage rapid response. The response rate for the survey is summarized in Table 4.1.

**Table 4.1 Summary of Response Rates**

<b>Details</b>	<b>Frequency</b>	<b>Rate</b>
<b>Questionnaires Distributed</b>	<b>350</b>	<b>100%</b>
<b>Questionnaires Returned</b>	<b>328</b>	<b>94%</b>
<b>Usable questionnaires</b>	<b>318</b>	<b>91%</b>
<b>Response Rate</b>		<b>94%</b>

**4.2.3. Non-response Bias**

Non-response bias is a critical factor in survey-based research, and it is the bias that arises when the respondents to a survey are apart from those who did not respond (Sax, Glimortin & Bryant, 2003). Despite the fact that the survey questionnaires for this research were distributed and collected within the designated time frame, a small number of employees elected not to participate. According to Pearl and Fairley (1985), there is a potential bias that necessitates investigation, irrespective of the quantity of non responses. Consequently, a non response bias test was implemented

to ascertain whether there are any related gaps between the respondents and non-respondents of this investigation. An independent-sample t-test was conducted to compare the variables of this research in order to evaluate the presence of non response bias.

To evaluate the presence of non response bias, an independent-sample t-test was conducted to compare the variables within this research. The initial 50% of the data set (Group One) was classified as early respondents, while the remaining 50% (Group Two) was categorized as late respondents. Table 4.2 provides a summary of the t-test results.

**Table 4.2 Summary of t-test results for Non response Bias**

<b>Variable</b>	<b>t-value</b>	<b>Significance</b>
Employee Engagement	- 8.963	<.001
AI- Enabled Human Resource Planning	- 11.256	<.001
AI- Enabled Recruitment and Selection	- 8.893	<.001
AI- Enabled Training and Development	- 9.760	<.001
AI- Enabled Compensation and Benefits	- 9.178	<.001
AI- Enabled Performance Management	- 9.822	<.001

Since the t-test value and p-value of each of the six research variables was significant, the test results showed significant differences between these two groups of respondents across all variables. It was determined that non response bias was not

a significant concern in this research because there were no differences between these two groups of respondents.

### **4.3. Data Cleaning**

According to Tabachnick and Fidell (2006), information on file should be checked and verified prior to the commencement of data analysis to inform the nature of the results that could be produced following such analysis. Therefore, this section explains the data screening methods used in checking for missing values and outliers, as such erroneous figures can threaten the validity of the researcher's findings.

#### **4.3.1. Missing Data**

Having other relevant data with some information still missing is what Hair et al. (2010) call absent data. While there are no universally accepted standards regarding the amount of missing data justifiable for statistical inference, a missing rate is generally considered acceptable (not significant) if it is below 5% (Tabachnick & Fidell, 2019). If the amount of missing data is very small (i.e.,  $\leq 5\%$ ) as in this case, very simple imputation methods, such as using the mean of the data, are fine (Meyers, Gamst, & Guarino, 2017). The research indicated missing values for 3% of the data set. Gaps were filled through the mean for each of the variables, thus preserving the completeness of the data set as well as the value of the data in subsequent analyses.

### **4.3.2. Outliers**

Outliers are defined as observations that possess unique traits and significantly deviate from others (Hair et al., 2010). Coakes and Steed (2003) assert that outliers should be removed from the data if their values are substantial, as they can compromise the dependability of the results. For this study, outliers detection was accomplished through the use of Boxplots, Histograms, Q-Q Plots, and Descriptive Tables. The findings of this analysis were delineated in Appendix C. Following several evaluations, 19 outlier items (6% of the usable data) were excluded from a total of 318 items, available for subsequent statistical analysis.

### **4.4. Demographic Profile**

According to Field (2013), a demographic profile provides insight into a research's population and serves as a reference point for analysis.

The demographic profiles were included in this investigation. Demographic profiles were identified, namely gender, ethnicity, age, educational level, employment status, position in the organization, years of experience working in this organization, income range, marital status and location. Table 4.3 provides detailed demographic distributions for respondents.

**Table 4.3 Frequency distribution of the respondents by demographic profile**

<b>Demographics</b>	<b>Profile Frequency(n)</b>	<b>Percentage(%)</b>
<b>Gender</b>		
Male	163	51
Female	155	49
<b>Total</b>	<b>318</b>	<b>100</b>
<b>Ethnicity</b>		
Chinese	119	37
Indians	91	29
Malay	96	30
Others	12	4
<b>Total</b>	<b>318</b>	<b>100</b>
<b>Age Category</b>		
21 to 30 Years Old	79	25
31 to 40 Years Old	158	50
41 to 50 Years Old	55	17
51 to 60 Years Old	21	6
60 Years and above	5	2
<b>Total</b>	<b>318</b>	<b>100</b>
<b>Educational Level</b>		
Diploma	83	26
Bachelor Degree	159	50
Master Degree	65	20
Doctorate Degree	8	3
Other Professional Qualification	3	1
<b>Total</b>	<b>318</b>	<b>100</b>
<b>Employment Status</b>		

Contract	76	24
Permanent	242	76
<b>Total</b>	<b>318</b>	<b>100</b>
<b>Position in the Organization</b>		
Supervisor and above	208	65
Managers and above	110	35
<b>Total</b>	<b>318</b>	<b>100</b>
<b>Years of experience working in this organization</b>		
Less than 1 year	33	11
1 to 3 years	109	34
4 to 6 years	109	34
7 to 9 years	22	7
10 years and above	45	14
<b>Total</b>	<b>318</b>	<b>100</b>
<b>Years of Income Range</b>		
Less than RM2,000	22	7
RM2,001~RM5,000	145	46
RM5,001~RM8,000	106	33
RM8,001~RM11,000	32	10
RM11,001 and above	13	4
<b>Total</b>	<b>318</b>	<b>100</b>
<b>Marital Status</b>		
Single	102	32
Married	195	61
Divorced	21	7
<b>Total</b>	<b>318</b>	<b>100</b>
<b>Location ( Place of Residence)</b>		
Kedah	272	86
Penang	46	14
<b>Total</b>	<b>318</b>	<b>100</b>

According to Table 4.3, from 318 respondents, 163 (51%) were male, while 155 (49%) were female. The male to female ratio was almost equal. Considering that the research's title is not related to gender, this ratio is expected. The respondents' ages were classified into 5 ranges, the majority of which were 31 to 40 years old, accounting for 50%, was followed by 21 to 30 years old, who were 25%. The 41 to 50 year old age group made up 17% of the research population. Only a small percentage of 2% were 60 years and older. The data indicates that 75% of respondents are under 40 years of age.

Table 4.3 indicates that the majority of participants in this research were Bachelor degree holders, at 50%, followed by diploma holders at 26%. Individuals with a Master's degree represent 20% of the population, whereas merely 3% of respondents possess a Doctorate degree, and an additional 1% hold "Other" qualifications, including professional certifications, and are employed in comparable roles to those in the categories mentioned above.

Based on the demographic breakdown of the respondents, there was an approximately equal share of all roles, with the exception of the supervisory and lower tiered positions, in the manufacturing sector. The largest portion, 65%, had supervisory roles and above. Also, 35% of the respondents who completed the survey fell in the category of managerial positions and above.

34 % of the respondents indicate their work experience is in the range of 1 to 3 years and 4 to 6 years and 14 % have 10 years and above and 11 % have less than 1 year. The other 7 % of respondents have experience ranging from 7 to 9 years. Based on the collected data, it can be concluded that 79% of respondents have under 6 years of experience working with the organization, and 45% of respondents have under 3 years of experience working with the organization.

Based on the income range, most of the respondents (46%) earned RM2,001 to RM5,000, 33% earned RM5,001 to RM8,000, 10% earned RM8,001 to RM11,000, and 7% earned less than RM2,000, and only 4% earned more than RM11,001. However, 86% of respondents of this research indicated that their income is below RM8,000, and 53% indicated that their income is below RM5,000. For the marital status, most respondents are married (61%), and the rest are singles (32%), divorced (7%). Most of the respondents residence area who filled out the questionnaire are from Kedah (86%) and 14% were from Penang.

#### **4.5. Descriptive Analysis of Research Variables**

After correcting the data set, a descriptive analysis was performed to clarify the raw data and to define the overall condition of all research variables, including the mean, standard deviation, maximum, and minimum values (Sekaran & Bougie, 2010).

**Table 4.4 Descriptive statistics of the constructs**

	N	Minimum	Maximum	Mean	Std. Deviation
EE	318	1.00	5.00	4.4674	0.75847
AI- Enabled HRP	318	1.00	7.00	5.9591	1.19706
AI- Enabled R&S	318	1.00	7.00	6.0849	1.15185
AI- Enabled T&D	318	1.00	7.00	6.0181	1.14378
AI- Enabled C&B	318	1.00	7.00	6.0713	1.16880
AI- Enabled PM	318	1.00	7.00	5.9958	1.24101
Valid N ( listwise )	318				

From the research participants' response cross the variables, the average responses to questions about AI- Enabled Recruitment and Selection were the most positive (M=6.0849, SD=1.15185). This was followed by questions about AI- Enabled Compensation and Benefits (M=6.0713, SD= 1.16880), AI- Enabled Training and Development (M=6.0181, SD=1.14378), AI- Enabled Performance Management (M= 5.99581, SD= 1.24101), AI- Enabled Human Resource Planning (M=5.9591, SD= 1.19706), and questions about Employee Engagement (M=4.4674, SD=0.75847). The mean scores of the variables of the research were based on a 7-point Likert scale and employee engagement was based on a 6-point Likert scale. Overall, these mean response scores indicated a moderate level.

## **4.6. Fundamental Statistical Assumptions**

At this stage, the data were prepared for inferential analysis by assuring the fulfillment of statistical assumptions. This research conducted fundamental assumption tests, including assessments of normality, linearity, and multicollinearity.

### **4.6.1. Normality Test**

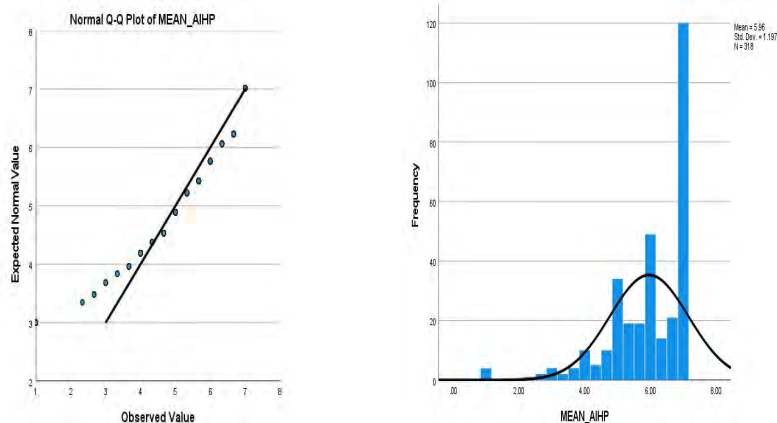
Normality is one of the most important assumptions in regression analysis study (Field, 2013), and it helps to see if the data scores are spread out normally. Razali and Wah (2011) say that a statistical method or a graphical method can be used to find out if a set of data is regular. Meanwhile, Sekaran and Bougie (2010) said that you can check if the research variables are normal by looking at them graphically and by getting univariate and multivariate skewness and kurtosis. In order to find out how far the data actually deviated from the normal distribution, this research used both statistical and graphics methods to check for normality. Most of the time, skewness and kurtosis are used to check if the data distribution is normal by looking at how spread out the data is. According to Hair et al. (2010), a critical number of less than -2.58 or greater than +2.58 means that the assumption of normality is not true. According to George and Mallery (2010), data is in the normal distribution if the number is between -2 and +2.

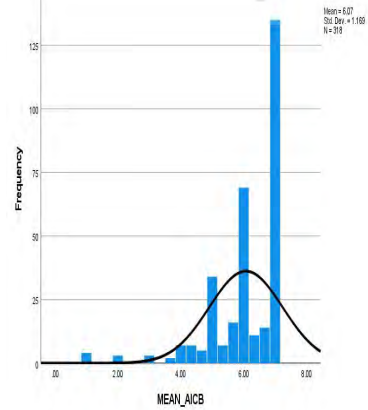
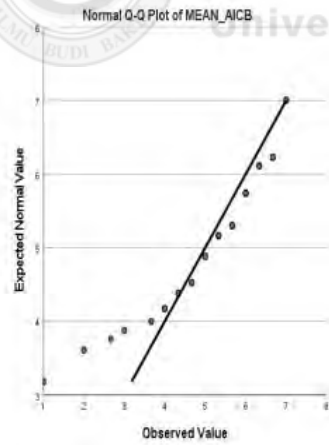
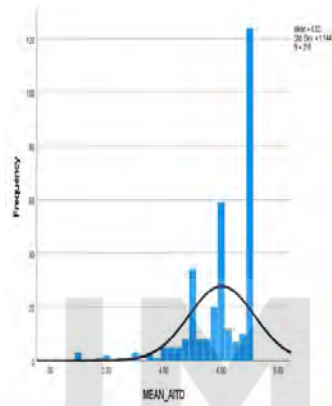
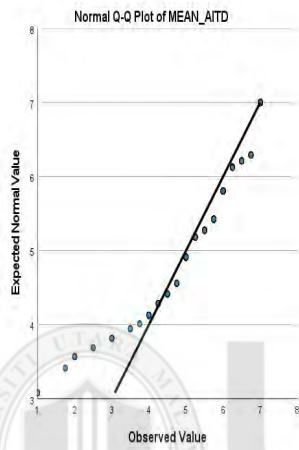
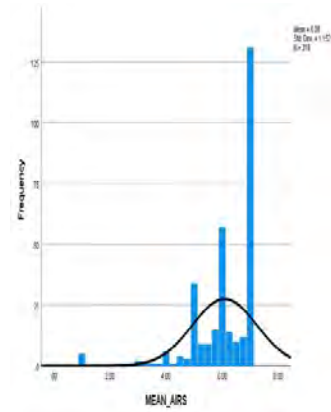
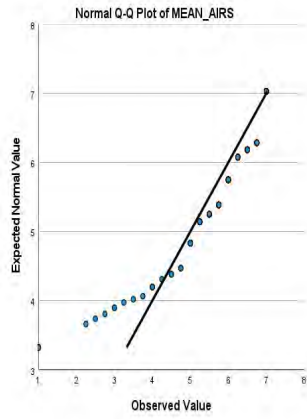
Table 4.5 indicates the skewness and kurtosis of the variables examined in this research, with the results reported below.

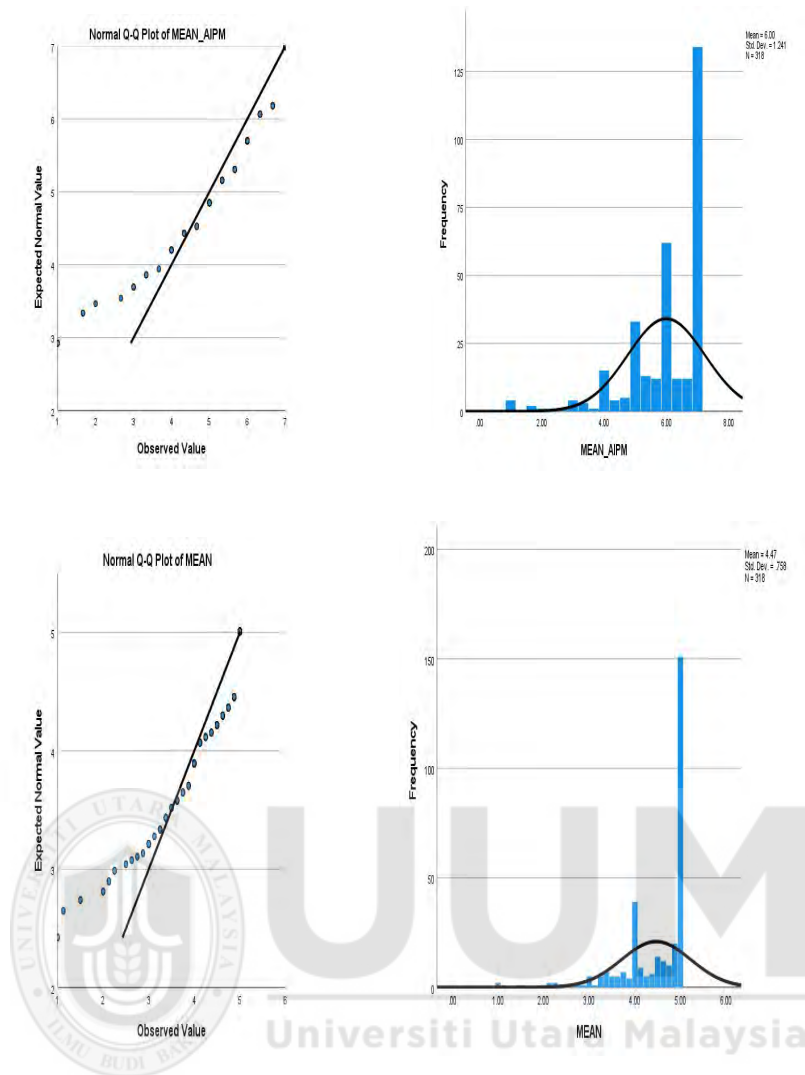
**Table 4.5 Results of skewness and kurtosis for normality test**

	Skewness		Kurtos	
	Statistic	Std. variable	Statistic	Std. variable
EE	-1.889	.137	4.258	.273
AI- Enabled HRP	-1.489	.137	2.808	.273
AI- Enabled R&S	-1.949	.137	5.144	.273
AI- Enabled T&D	-1.649	.137	3.737	.273
AI- Enabled C&B	-1.840	.137	4.378	.273
AI- Enabled PM	-1.889	.137	4.258	.273

Histograms and normal probability plots are two types of graphs that can be used to check for uniformity. According to Field (2013), when the sample size is more than 200, the shape of the distribution should be looked at to judge the graphics method. The histograms and normal probability plots of the four research variables can be seen below in Figure 4.1.







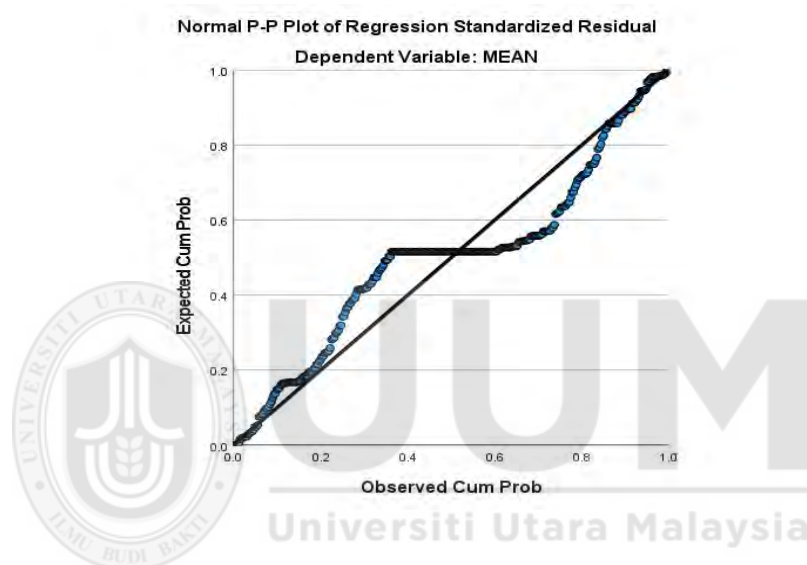
**Figure 4.1 Histograms and the normal probability plots for normality test of the research variables**

All the bars in Figure 4.1 were close to the normal curve, which means that the research factors did not break the normality assumption (Field, 2013).

#### **4.6.2. Linearity Test**

Linearity testing identifies the link between independent and dependent variables, hence predicting the correct direction of the hypotheses. A positive value signifies that the association is deemed positive. This research evaluated linearity by standard

multiple regression analysis and examined the residuals using a Normal Probability P-P Plot (Hair et al., 2010). A conventional P-P plot of regression standardized residuals was created for independent variables concerning the dependent variable. The results of the linearity test for the research variables are illustrated in Figure 4.2 below, confirming the conclusions of the linearity test.



**Figure 4.2 illustrates the results of the linearity test.**

Considering the residual plots of each variable for this research , the linearity test showed a straight-line relationship with the predicted dependent variable, indicating that the linearity assumption is not violated.

#### **4.6.3. Multicollinearity Test**

Hair et al. (2010) describe multicollinearity as one independent variable being explainable by the influence of another independent variable with a correlation of greater than 0.90. The tolerance value and variance influence factor (VIF) were used

to measure multicollinearity in this research as well. The tolerance value refers to the variability of a variable that other variables have not explained, while VIF is the contrary to the tolerance. A 0.10 tolerance value is a cut-off, while 10 is the cut-off for VIF (Hair et al., 2010).

Collinearity for the independent variables of this study is shown in Table 4.6. Since the correlations between the variables were less than 0.90, multicollinearity was not an issue. For this research, the VIF value, with the tolerance value, indicated that there was no multicollinearity issue.

**Table 4.6 Multicollinearity test**

Coefficients <sup>a</sup>	Collinearity Statistics	
	Tolerance	VIF
	AI- Enabled Human Resource Planning	.195
AI- Enabled Recruitment and Selection	.108	5.288
AI- Enabled Training and Development	.075	3.306
AI- Enabled Compensation and Benefits	.149	6.734
AI- Enabled Performance Management	.169	5.902

a. Dependent Variable: Employee Engagement

#### 4.7. Factor Analysis and Reliability

An important aspect of determining the quality of measure in a quantitative research involves understanding the reliability and validity of the research instruments, and

tools. Thus, this section examines the results of the reliability analysis as well as the common method variance and factor analysis.

#### 4.7.1. Reliability Analysis

After conducting the necessary tests to ensure all data sets observed the statistical assumptions, the researcher proceeded to examine the research variables for the stability and consistency of the measuring instruments through the reliability tests.

The researcher calculated the Cronbach's Alpha coefficient to assess the reliability of the questionnaires. According to Hair et al. (2010), data can be considered reliable if the Cronbach's Alpha is 0.6 and above. The reliability test results of this research are summarized in Table 4.7 below, while a detailed analysis of the results.

**Table 4.7 Reliability test result**

Variable	Cronbach's Apha	Original	No. of Items	Strength (after Item Deleted)	No. of Items
E E	0.972	8	8	Excellent	
AI- Enabled HRP	0.957	3	3	Excellent	
AI- Enabled R&S	0.953	4	4	Excellent	
AI- Enabled T&D	0.949	4	4	Excellent	
AI- Enabled C&B	0.954	3	3	Excellent	
AI- Enabled PM	0.955	3	3	Excellent	

The reliability analysis on the 8 items of employee engagement scale developed by Schaufeli and Bakker (2003) produced a Cronbach's Alpha value of .972 (Excellent).

Secondly the reliability analysis on independent variable of this research, on the 3 items of AI- Enabled Human Resource Planning scale developed by Karatop et al. (2015) produced a Cronbach's Alpha value of .957 (Excellent). Continues by the second independent variable of this research on the 4 items of AI- Enabled Recruitment and Selection scale developed by Van Esch et al. (2020) and Torres and Mejia (2017) produced a Cronbach's Alpha value of .953 (Excellent). The third independent variable of this research on the 4 items of AI- Enabled Training and Development scale developed by Bell et al. (2008) produced a Cronbach's Alpha value of .949 (Excellent). The fourth independent variable of this research on the 3 items of AI- Enabled Compensation and Benefits scale developed by Behrend and Thompson (2011), Manoharan et al. (2011) produced a Cronbach's Alpha value of .954 (Excellent). The last independent variable of this research on the 3 items of AI- Enabled Performance Management scale developed by Azadeh et al. (2018) and Manoharan et al. (2011) produced a Cronbach's Alpha value of .955 (Excellent). None of the items were removed from dependent and independent variable. The research variables are now reliable enough to be used in regression.

#### **4.7.2. Common Method Variance**

Podsakoff et al. (2003) define common method variance (CMV) as the variance that is attributed to the method of measurement rather than the construct that the

measures are believed to represent. The procedure entailed the incorporation of all measurement items into a model through an exploratory factor analysis. If the majority of the variance is accounted for by a single factor or if all of the measurement items are loaded on that factor, it suggests a problem with common method variance.

In summary, the CMV test results of this research indicated that factors were extracted, with the first principal component value being below 50% (Podsakoff et al., 2003), and the total variance accounted for by these factors is 71.53%.

Consequently, it can be determined that there is no indication of common technique bias in this research.

#### **4.7.3. Factor Analysis**

A factor analysis is conducted to evaluate the validity test of all the questionnaires.

Factor analysis is employed to evaluate the fundamental structure of the research variables and to investigate the relationship between the variables and the research's dimensions (Hair et al., 2010). It assists in determining if the items of each variable are clustered and/or in simplifying large data sets by categorizing them into interpretation, meaningful, and controllable categories (Cavana et al., 2001).

The Bartlett's test of sphericity and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy are used in this research to assess the applicability of factor analysis. Both metrics assess whether there is a correlation between the items and confirm that the identity matrix and the correlation matrix between the items differ significantly. Accordingly, the Bartlett's test of sphericity must be significant ( $p < 0.05$ ) and the KMO value must be more than 0.5 (Hair et al., 2010). According to Zikmund et al. (2010), the more appropriate the data obtained, the higher the KMO value (above 0.5 to 1.0). Field (2013) states that a KMO number between 0.5 and 0.7 is considered mediocre, 0.7 to 0.8 is considered acceptable, 0.8 to 0.9 is considered great, and values more than 0.9 are considered superb. The dependent and independent variable factor analysis results are shown in the subsection that follows.

#### **4.7.3.1. Factor Analysis for Employee Engagement**

All the items under Employee Engagement constructs were sent for a factor analysis and the results confirmed all items were well aligned under one component with KMO measure of sampling adequacy was .941 and the Bartlett's Test of Sphericity was significant (Chi-Square=2876.533,  $p=0.000$ ). Although the factor explained a total variance of 79.26% which was above than 60%, it was very strong level (Hair et al., 2010). Hence, no items were omitted from Employee Engagement questionnaires. Table 4.8 presents the results of this analysis in detail.

**Table 4.8 Factor Loadings for Employee Engagement**

<b>Component Matrix<sup>a</sup></b>	
	<b>Component</b>
	1
At my work, I feel bursting with energy.	.808
At my job, I feel strong and vigorous.	.894
I'm enthusiastic about my job.	.918
My job inspires me.	.929
I feel happy when I am working intensely.	.895
I am proud of the work that I do.	.915
I get carried away when I am working.	.829
When I get up in the morning, I feel like going to work.	.926
Eigenvalue >1	6.341
% of variance	79.26
KMO	.941
Bartlett's Test	2876.533
df	28
Sig.	.000

**4.7.3.2. Factor Analysis for AI- Enabled Human Resource Planning**

All the items under AI- Enabled Human Resource Planning constructs were sent for a factor analysis and the results confirmed all items were well aligned under one component with KMO measure of sampling adequacy was .700 and the Bartlett's Test of Sphericity was significant (Chi-Square=661.304, p=0.01). Although the factor explained a total variance of 82.58% which was above than 60%, it was very

strong level (Hair et al., 2010). Hence, no items were omitted from AI- Enabled Human Resource Planning questionnaires. Table 4.9 presents the results of this analysis in detail.

**Table 4.9 Factor Loadings for AI- Enabled Human Resource Planning**

<b>Component Matrix<sup>a</sup></b>	
	<b>Component</b>
	1
Avoids manpower shortages.	.847
Allows better training and development (T&D).	.937
Allows better Recruiting and Selection.	.939
Eigenvalue >1	2.477
% of variance	82.58
KMO	.700
Bartlett's Test	661.394
df	3
Sig	<0.01

#### **4.7.3.3. Factor Analysis for AI- Enabled Recruitment and Selection**

All the items under AI- Enabled Recruitment and Selection constructs were sent for a factor analysis and the results confirmed all items were well aligned under one component with KMO measure of sampling adequacy was .867 and the Bartlett's Test of Sphericity was significant (Chi-Square=1345.163, p=0.000). Although the factor explained a total variance of 90.12% which was above than 60%, it was very

strong level (Hair et al., 2010). Hence, no items were omitted from AI- Enabled Recruitment and Selection questionnaires. Table 4.10 presents the results of this analysis in detail.

**Table 4.10 Factor Loadings for AI- Enabled Recruitment and Selection**

<b>Component Matrix<sup>a</sup></b>	
	<b>Component</b>
	1
Eliminates biases.	.945
Enhances job matching	.962
Provides better job opening communications.	.940
Efficiently handles large volumes of information.	.949
Eigenvalue >1	3.605
% of variance	90.12
KMO	.867
Bartlett's Test	1545.163
df	6
Sig	0.000

#### **4.7.3.4. Factor Analysis for AI- Enabled Training and Development**

All the items under AI- Enabled Training and Development constructs were sent for a factor analysis and the results confirmed all items were well aligned under one component with KMO measure of sampling adequacy was .973 and the Bartlett's Test of Sphericity was significant (Chi-Square=1459.076, p=0.000). Although the factor explained a total variance of 89.25% which was above than 60%, it was very

strong level (Hair et al., 2010). Hence, no items were omitted from AI- Enabled Training and Development questionnaires . Table 4.11 presents the results of this analysis in detail.

**Table 4.11 Factor Loadings for AI- Enabled Training and Development**

<b>Component Matrix<sup>a</sup></b>	
	<b>Component</b>
	1
Provides high degree of interactivity with other users.	.953
Improves learning opportunities.	.940
Improves employee engagement.	.955
Improves employee skills.	.931
Eigenvalue >1	3.570
% of variance	89.25
KMO	.973
Bartlett's Test	1459.076
df	6
Sig	0.000

**4.7.3.5. Factor Analysis for AI- Enabled Compensation and Benefits**

All the items under AI- Enabled Compensation and Benefits constructs were sent for a factor analysis and the results confirmed all items were well aligned under one component with KMO measure of sampling adequacy was .771 and the Bartlett's Test of Sphericity was significant (Chi-Square=1068.274, p=<0.01). Although the factor explained a total variance of 92.47% which was above than 60%, it was very

strong level (Hair et al., 2010). Hence, no items were omitted from AI- Enabled Compensation and Benefits questionnaires. Table 4.12 presents the results of this analysis in detail.

**Table 4.12 Factor Loadings for AI- Enabled Compensation and Benefits**

<b>Component Matrix<sup>a</sup></b>	
	<b>Component</b>
	1
Efficiently tracks employee details.	.911
Efficiently assists in collecting employees' information concerning their compensation and benefits (C&B).	.940
Efficiently calculates and determines the salary parameter of employees concerning their jobs.	.922
Eigenvalue >1	2.774
% of variance	92.47
KMO	.771
Bartlett's Test	1068.274
df	3
Sig	<0.01

#### 4.7.3.6. Factor Analysis for AI- Enabled Performance Management

All the items under AI- Enabled Performance Management constructs were sent for a factor analysis and the results confirmed all items were well aligned under one component with KMO measure of sampling adequacy was .757 and the Bartlett's Test of Sphericity was significant (Chi-Square=1007.99,  $p < 0.01$ ). Although the factor explained a total variance of 91.45% which was above than 60%, it was very

strong level (Hair et al., 2010). Hence, no items were omitted from AI- Enabled Performance Management questionnaires. Table 4.13 presents the results of this analysis in detail.

**Table 4.13 Factor Loadings for AI- Enabled Performance Management**

<b>Component Matrix<sup>a</sup></b>	
	<b>Component</b>
	1
Fairly evaluates employees.	.910
Identifies employees who need further improvement.	.940
Accesses employee performance at all levels.	.893
Eigenvalue >1	2.744
% of variance	91.45
KMO	.757
Bartlett's Test	1007.98
df	3
Sig	<0.01

In conclusion, all variables in this research have undergone appropriate statistical analysis and have been considered valid, satisfying the criteria for regression analysis. Consequently, the data gathered in this research is appropriate for doing regression analysis.

#### **4.8. Inferential Analysis**

##### **4.8.1. Correlation Analysis**

The research variables were evaluated with the Pearson correlation to assess the relationship. According to Hair et al. (2010), there are two correlation extremes. There is no relationship among the variables with a correlation of 0, whereas with a correlation of +1 or -1, the relationship is a perfect one. Correlations were evaluated using Cohen's (1998) evaluation metric on a range of 0 to +1/-1, wherein the correlation (r) is evaluated between the bands 0.1 to 0.29 (weak), 0.3 0.49 (medium), and over 0.50 (strong).

According to the hypothesis, the variables employee engagement, AI -Enabled Human Resource Planning, AI -Enabled Recruitment and Selection, AI -Enabled Training and Development, AI -Enabled Compensation and Benefits, and AI -Enabled Performance Management are positively correlated as shown in Table 4.12.

**Table 4.14 Pearson Correlation Analysis**

	<b>EE</b>	<b>HRP</b>	<b>R&amp;S</b>	<b>T&amp;D</b>	<b>C&amp;B</b>	<b>PM</b>
<b>EE</b>	1					
<b>AI -Enabled HRP</b>	.712**	1				
<b>AI-Enabled R&amp;S</b>	.699**	.880**	1			
<b>AI -Enabled T&amp; D</b>	.737**	.834**	.937 **	1		
<b>AI-Enabled C&amp;B</b>	.712**	.819**	.875 **	.908**	1	
<b>AI-Enabled PM</b>	.737 **	.712**	.855**	.897**	.881**	1

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

Based on the results reported in Table 4.14, the correlation results of AI -Enabled Human Resource Planning and employee engagement can be classified as strong (.712) although the rest of the variables' results were strong ( $> .50$ ). Furthermore, none of the variables exhibited a negative indication, indicating that all predictive variables maintain a positive correlation at a significance level of 0.01. In other words, the data of this research supported the existence of positive relationships between the research variables of employee engagement, AI -Enabled Human Resource Planning, AI-Enabled Recruitment and Selection, AI -Enabled Training and Development, AI-Enabled Compensation and Benefits, and AI -Enabled Performance Management. Despite the favorable results of the correlation analysis supporting the assumptions, it cannot establish causal relationships (Zikmund et al., 2010). Consequently, to investigate the impact of diverse interactions and variable combinations, regression analysis is recommended to further evaluate the research hypotheses (Hair et al., 2010; Zikmund et al., 2010).

#### **4.8.2 Regression Analysis**

According to Sekaran and Bougie (2010), regression analysis is one of the most common ways to figure out how closely two factors are related in statistical analysis. It can also be used to show how important the independent variable is in predicting the dependent variable. In this research, regression analysis is used to first find the

factors' direct effect on the dependent variable. The second step of the research is to find out how strong the relationships are between the independent and dependent variables. The results of the regression analysis for each step in the development process are shown in the next part.

#### 4.8.2.1. Analysis Results of the Direct Relationship

This paragraph presents the analytical results about the predictive efficacy of AI-Enabled Human Resource Planning, AI-Enabled Recruitment and Selection, AI - Enabled Training and Development , AI-Enabled Compensation and Benefits, AI - Enabled Performance Management on the engagement of manufacturing employees. To evaluate the direct impact of the research variables and to test the hypotheses, a simple regression analysis was used. The whole report of the regression analysis findings is accessible in Appendix C, while the summary of these results is displayed in Table 4.15.

**Table 4.15 Summary of the direct relationship between Independent and Dependent Variable.**

##### Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.766 <sup>a</sup>	.587	.580	.49139

a. Predictors: (Constant), MEAN\_AIPM, MEAN\_AIHP, MEAN\_AICB, MEAN\_AIRS, MEAN\_AITD

**ANOVA<sup>a</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	107.027	5	21.405	88.647	.000 <sup>b</sup>
	Residual	75.338	312	.241		
	Total	182.365	317			

a. Dependent Variable: Employee Engagement

b. Predictors: (Constant), AI-Enabled Human Resource Planning, AI-Enabled Recruitment and Selection, AI -Enabled Training and Development, AI-Enabled Compensation and Benefits, AI -Enabled Performance Management

Independent Variable	$\beta$	SE	t-value	p
<b>AI -Enabled HRP</b>	<b>.157</b>	<b>.052</b>	<b>3.003</b>	<b>.003</b>
<b>AI-Enabled R&amp;S</b>	<b>-.063</b>	<b>.073</b>	<b>-.867</b>	<b>.387</b>
<b>AI -Enabled T&amp;D</b>	<b>.159</b>	<b>.088</b>	<b>1.810</b>	<b>.071</b>
<b>AI-Enabled C&amp;B</b>	<b>.051</b>	<b>.061</b>	<b>.835</b>	<b>.404</b>
<b>AI -Enabled PM</b>	<b>.203</b>	<b>.054</b>	<b>3.754</b>	<b>&lt;.001</b>

**Dependent Variable: Employee Engagement**

Firstly, the measurement of the direct effect of the independent variable (AI -Enabled Human Resource Planning) on the dependent variable (employee engagement) was presented. The analysis results indicated that AI -Enabled Human Resource Planning has a positive relationship with employee engagement. Based on the results obtained from the regression analysis ( $\beta=.157$ ,  $t=3.003$ ,  $p=.003$ ), it was ascertained that AI -Enabled Human Resource Planning is a good predictor of employees' engagement. Therefore, this result supported the first hypothesis (H1) of this research confirming

there is a positive relationship between AI -Enabled Human Resource Planning and employee engagement.

Next, the direct effect of AI-Enabled Recruitment and Selection construct has a negative relationship with employee engagement. Contrary to the expectation, AI-Enabled Recruitment and Selection have a negative but non-significant relationship with employee engagement as reflected by the regression analysis ( $\beta=-.063$ ,  $t=-.867$ ,  $p=.387$ ). This result not supported the second hypothesis (H2) of this research.

Continuously the third independent variable AI -Enabled Training and Development construct a positive relationship with employee engagement, however, the relationship is not significant as reflected by the regression analysis ( $\beta=.159$ ,  $t=1.810$   $p=.071$ ). This result did not support the third hypothesis (H3) of this research.

The AI-Enabled Compensation and Benefits construct a positive relationship but non -significant with employee engagement as reflected by the regression analysis ( $\beta=.051$ ,  $t=.835$ ,  $p=.404$ ). AI in compensation and benefits not play a strong role in employee engagement in this model. This result not supported the fourth hypothesis (H4) of this research.

The last independent variable AI -Enabled Performance Management construct strong positive and highly significant relationship with employee engagement as

reflected in the regression analysis ( $\beta=.203$ ,  $t=3.754$ ,  $p=<0.01$ ). AI -Enabled Performance Management play a strong roll among other independent. This result supported the fifth hypothesis (H5) of this research.

#### 4.9 Hypotheses Test Results

**Table 4.16 Summary of the research hypotheses test results**

No	Hypotheses Result	Statement
H1	AI-enabled HRP can boost employee engagement	Supported
H2	AI-enabled R&S can positively enhance employee engagement.	Not Supported
H3	AI-enabled T&D can develop and improve employee engagement.	Not Supported
H4	AI-enabled C&B can positively improve employee engagement.	Not Supported
H5	AI-enabled PM can improve employee engagement.	Supported

#### 4.10. Summary

This chapter detailed the research's data analysis and relevant findings. The results of the preliminary analysis and the data cleaning tests are presented first. This chapter included the empirical findings of the tested hypotheses in addition to the findings of the demographic profiles and descriptive statistics of the research variables looked at in this research. The findings of the correlation analysis showed that all of the

research variables had positive correlations with one another. The findings of the regression analysis demonstrating the direct correlation between selected independent and dependent variable were also significant. In summary, the research's results indicated that the first and fifth hypotheses of this investigation were supported, while the second, third and fourth hypothesis, was not supported. Additional discussion and conclusions regarding these discoveries elaborated upon in the subsequent chapter, outlined their theoretical and practical implications.



## CHAPTER 5

### DISCUSSION AND CONCLUSION

#### 5.1. Introduction

This chapter encompasses the results of this research, divided into five segments. A summary of the research is presented in the first part, followed by a discussion of the objectives pertaining to the findings. This research's contribution emphasizes the significance of the research into the body of current literature, policy, and managerial contributions that could aid decision-makers. The research's limitations are then discussed, along with potential directions for future research based on those constraints. The research is finally summarized and concluded in this chapter.

#### 5.2. Recapitulation of the Study Findings

The main objective of this research is to assess the relationship between AI-Enabled Human Resource Planning, AI-Enabled Recruitment and Selection, AI-Enabled Training and Development, AI -Enabled Compensation and Benefits, AI -Enabled Performance Management and employee engagement among the employees in manufacturing factories located at Kulim Hi-Tech Park, Kulim, Kedah. The study shows that the impact of artificial intelligence-enabled human resource management

on employee engagement is significant, based on survey responses from 318 respondents.

Then, in evaluating the direct relationship between the variables, hypotheses H1 and H5 proposed a positive correlation between AI-Enabled Human Resource Planning, AI -Enabled Performance Management and employee engagement, and it was supported. On the other hand, hypotheses H2, H3 and H4 is not supported.

### **5.3. Discussion on the Findings**

This research investigated how employee engagement in the manufacturing industry is affected by Artificial Intelligence (AI)-enabled HRM practices, particularly HRM planning, recruitment and selection, training and development, compensation and benefits, and performance management. The findings illustrated a complex relationship, with certain AI-enabled activities having a considerable positive impact on engagement while others had minimal effect or no effect.

#### **5.3.1 The Level of Employee Engagement, Human Resource Management and Artificial Intelligence**

The research evaluated the level of employee engagement in conjunction with the implementation of Artificial Intelligence (AI) in Human Resource Management (HRM) practices. The findings showed that employee engagement of the sampled

respondents was overall reasonably high. This means that most of the employees showed a high level of concentration, commitment, and enthusiasm in their work.

As mentioned in the research, the implementation of AI in HRM practices, particularly in the areas of Human Resource Planning and Performance Management, showed a positive and strong relationship with employee engagement. This positive relationship was highlighted through the strong regression coefficients. This means that the use of AI in HR managerial tasks enhances fairness, efficiency, and streamlining of customized HR principles, thereby strengthening the employees' trust, motivation, and loyalty. However, the effects of AI on Recruitment & Selection, AI in Training and Development, and in Compensation & Benefits were less significant, suggesting that not all AI in HR functions directly leads to an increase in employee engagement. The research suggests that employee engagement greatly increases when AI is purposefully and ethically included into HRM, however its impact differs by the specific HR aspect being automated or upgraded.

### **5.3.2. The Relationship AI-enabled Human Resource Management (HRM) and Employee Engagement**

AI-enabled Human Resource Management (HRM) has a positive relationship with employee engagement, although the strength of this relationship is determined by the specific HR function. In Human Resource Planning, AI assists in predicting the number of staff needed and in managing the schedule to reduce the risk of having too

few or too many people. As an example, predictive analytic can identify peaks in production and allocate more employees. This increases productivity and makes employees feel that their workload is balanced, in turn improving their security and commitment to the organizational objectives.

The results of the regression analysis indicate that there is no relationship, to a statistically significant degree, between AI-enabled training and development and employee engagement. In this case, a more meaningful positive relationship between the two variables is most unlikely. Even though the relationship is positive, and thus to a certain degree exists, this shows that AI-enabled training and development may not play a noteworthy role in influencing employee engagement in this case

AI takes the focus away from traditional annual reviews in Performance Management by allowing for real-time monitoring and ongoing feedback. AI dashboards can monitor daily performance and indicate in real-time either wins or losses. This method allows employees to receive timely recognition concerning performance and receive e coaching on how to improve in ways that foster motivation, accountability, and engagement.

This research has found that there is no positive relationship between AI-enabled recruitment and selection processes and employee engagement levels. AI does prove beneficial with its operational efficiencies and the ability to create a technical profile

of applicants. However, AI has a tendency to screen candidates using keyword analysis and attainments, bypassing the consideration of the applicant's softer skills and cultural fit. This can lead to the employee mismatching their skills with the role and the organization which aggravates the feelings of exclusion and disengagement. This is the reason that this research does not support the positive correlation between AI-enabled recruitment and selection with employee engagement.

In general, the findings suggest that the utilization of artificial intelligence in human resource management potentially improves employee engagement. This is especially true for the specific functions of human resource planning, performance management, and employee supervision. However, roles that are more administrative, such as compensation and benefits, training and development, and recruitment and selection, are likely to require more human relationship approaches which involve engagement, transparency, and equity. This indicates that the use of artificial intelligence should not be aimed at replacing human functions, but rather complementing human functions, emphasizing the importance of managing human resources to enhance employee experience.

### **5.3.3. The Relationship AI-enabled Human Resource Planning (HRP) and Employee Engagement**

The results of this research show that Human Resource Planning (HRP) that uses AI has a strong, positive relation with employee engagement. AI tools help businesses

better predict the number of employees they will need, make the best use of their schedules, and match their workers with their production needs. For instance, prediction analytic can figure out when production will be at its highest and assign extra workers ahead of time. This keeps workers from getting stressed out when there aren't enough workers or they have too much to do. When tasks are allocated evenly, it gives employees the perception of company support. Employees appreciate equitable resource distribution and systematic planning. These kinds of positive views lead to more active thinking, feeling, and doing. In conclusion, the research shows that AI-enabled HRP not only makes businesses more efficient, but it also makes workers more engaged by making sure that planning is fair, clear, and based on what employees in the workforce need.

#### **5.3.4. The Relationship AI-enabled Recruitment and Selection (R&S) and Employee Engagement**

This research found that AI-enabled Recruitment and Selection has no positive relationship with employee engagement. Therefore, the hypothesis is not accepted.

AI based recruitment improvements refer to being faster, more consistent, and more objective when screening and shortlisting candidates. However, these improvements only affect the recruitment phase and do not impact employees' long-term attitudes and behaviors. Employee engagement is encouraged by daily interactions and managerial support. Meaningful roles in one's job and recognition, plus opportunities

for growth are much more effective than the methods in which employees are recruited. Furthermore, AI-driven recruitment processes focus in large part on hard skills and credentials. These processes often ignore subjective qualities, such as organizational and teamwork, and interpersonal approaches. Less human involvement in the hiring phase further AI programmed selection results in inadequate opportunities for candidates to establish primary emotional ties to the entity beforehand. Because Recruitment and Selection are commonly viewed as one-off administrative procedures, the impact of those processes does not carry on to affect employees' motivation, devotion, or enthusiasm for the system after the employment is finalized. Therefore, the research has demonstrated that AI-enabled Recruitment and Selection has no impact on employee engagement.

### **5.3.5. The Relationship AI-enabled Training and Development (T&D) and Employee Engagement**

This research shows that AI-enabled Training and Development (T&D) has no significant relationship with employee engagement, and therefore, the hypothesis has to be rejected. AI tech in T&D has the potential to offer personalized learning experiences through the analysis of skill deficiencies and the recommendation of targeted provision. This, however, does not lead to employee engagement. Employees might view training that is in moderation or implemented as organizational policy as an actual means of enhancing their skills. Moreover,

employee engagement depends more on core components of the work environment, like support from management, the degree of autonomy in one's role, and organizational culture, more than on the methods of training adopted. AI-enabled Training and Development (T&D) is not likely going to foster employee engagement owing to lack of significant human involvement, coaching, clearly defined training objectives, measurable outcomes, and evident relationship to advancement in the employee's career. This leads to the conclusion that there is an insignificant relationship between AI-enabled Training and Development and employee engagement.

### **5.3.6. The Relationship AI-enabled Compensation and Benefits (C&B) and Employee Engagement**

The results of this research suggest that employee engagement is not significantly influenced by AI-enabled Compensation and Benefits (C&B). Although AI systems in C&B can guarantee payroll accuracy, automate benefits management, and offer data-driven insights into compensation structures, employees typically regard these functions as standard organizational obligations rather than motivators of engagement. An AI system that helps organizations maintain on-time salary payment and accurate leave balance tracking may help prevent dissatisfaction; however, it does not necessarily foster emotional attachment, commitment, or enthusiasm for the organization. Employees appreciate the company having a system in place that

ensures fair compensation, but they consider it a basic expectation, not a motivational factor. Furthermore, the employees may become disengaged and feel negatively towards the system, especially if the AI system is deployed using a transactional approach that does not communicate openly, and recognize or value individual employee efforts. These findings indicate that, although AI-enabled C&B improves efficiency and minimizes administrative errors, it must be supplemented with human-centered strategies, including open communication, career-based incentives, and recognition programs, to improve employee engagement.

### **5.3.7. The Relationship AI-enabled Performance Management and Employee Engagement**

The results of this research indicated that AI-enabled performance management had a strong and positive relationship with employee engagement. AI-driven performance management systems enhanced the evaluation process by providing continuous performance monitoring, objective assessments, and timely feedback. These systems reduced human bias by relying on data analytics to measure employee performance based on clear and consistent criteria. For example, AI tools were able to track individual progress, identify performance patterns, and highlight areas for improvement in real time. This allowed employees to clearly understand performance expectations and receive constructive feedback that supported their development. When performance evaluations were perceived as fair, transparent, and

accurate, employees felt recognized and valued by the organization. As a result, employees demonstrated higher levels of cognitive, emotional, and behavioral engagement. In conclusion, the findings showed that AI-enabled performance management not only improved performance evaluation effectiveness but also strengthened employee engagement by promoting fairness, clarity, and continuous performance improvement.

#### **5.4. Contribution of the Study**

This research has made various contributions to the research in human resources, notably with aspects that enhance human resource management and facilitate the application of Artificial Intelligence in employee engagement. The research is anticipated to benefit the Malaysian manufacturing sector by providing recommendations for organizations, thereby enhancing human resource management and ultimately improving overall employee engagement in Malaysia. The subsequent subsections examine the theoretical and practical contributions of this research, along with its implications for policymakers.

##### **5.4.1. Theoretical Contribution**

This research offers multiple theoretical contributions to Human Resource Management and employee engagement. Firstly, it widens the application of

established theories, specifically Kahn's Theory of Employee Engagement, and Social Exchange Theory within the area of AI-enabled Human Resource Management (HRM). By integrating these frameworks, the research clarifies the impact of digital transformation on the psychological, emotional, and cognitive aspects of employee engagement.

By exploring the cumulative effect of different AI-enabled HRM areas (e.g., Human Resource Planning, Recruitment, and Selection; Training and Development; Compensation and Benefits; Performance Management) on employee engagement, this research addresses a gap in the literature. Previous scholarship has usually examined these functions independently; however, this research develops a more complete model to show the functions and model's structure and those of other variables interdependently.

Finally, this research adds to the literature by presenting primary data from the manufacturing sector in Malaysia. Previous research has been predominantly in the West; thus, we have a limited understanding of the role different industrial and cultural settings play in shaping engagement. By conducting this research in Malaysia, this research contributes to the advancement of theoretical understanding from the perspective of an emerging economy.

This research contributes to the continuing discussion regarding whether AI increases or decreases employee engagement. The results indicate that certain characteristics of AI-enabled HRM substantially improve engagement, whereas others have lower or negative correlations. This finding emphasizes that the influence of AI is not consistent but rather dependent on the particular HRM function and organizational context.

#### **5.4.2. Management/Practical Contribution**

This research provides a variety of practical contributions for business executives, managers, and HR practitioners. The findings offer specific explanations for the strategic application of AI-enabled HRM to enhance employee engagement. Organizations can utilize these findings to ascertain that HRM dimensions such as Human Resource Planning and Performance Management are most efficient in boosting engagement, hence focusing investments in these areas.

Next, this research demonstrates the need to achieve equilibrium between the technology and people aspect. AI has the ability to streamline tasks and improve productivity; however, managers must take care to preserve the trust, feelings of job security, and emotional attachment to the work. In the interest of protecting the emotional attachment of the work, continued engagement hinges on balanced, equitable rule setting, and unhidden AI-generated decisions.

Next, this research shows human resources managers the opportunity to design for AI allocation systems that advance the productive outcome of the organization and the experience of the individual equally. Motivated, trust, and sustained commitment can be cultivated with the fair allocation of performance evaluation systems and the articulate design of incentive systems, even in a closed-loop system.

Lastly, findings of this research contribute to the refinement of policies and practices of industry in the context of the adoption of artificial intelligence made with a commitment to ethical inclusivity. These findings could guide managers and decision makers to design systems that achieve the feeling of being valued, supported, and empowered in a digitally driven work environment.

#### **5.4.3. Policy Makers**

This research research also addresses the needs of policymakers and regulators. To begin, the results indicate the shortcomings in the standards and frameworks relating to the integration of AI in HRM with the concern of fairness, inclusion, and employee welfare. These findings may assist policymakers in developing regulations aimed to protect employees from the threats of job loss, biased automation, and loss of social interaction. Second, the research supports the need to promote the ethical use of AI within the government and industry. Regarding policymakers, in the case of regulators, there is a greater chance of helping organizations with the ethical use

of AI by providing more detailed regulations concerning transparency, accountability, and data protection. This policy approach is intended to ensure that new technologies assist rather than replace human labor.

Third, this research helps in the informing of developing strategies to grow a functioning being. The results are applicable to decision makers to justify the promotion of actions of re-skilling, up-skilling, and continuous learning activities to help individuals remain dynamic and responsive to technology. Finally, the research demonstrates that HRM designed with AI can help achieve other national objectives such as improved productivity, increased innovation, and economic growth that is sustainable. These conclusions can assist decision makers in policy formulation that integrates the pace of technology with the development of human capital.

### **5.5. Limitation and Future Research Recommendation**

This research has shed light on the phenomena of employee engagement on AI-enabled HRM practices, yet a few weaknesses need to be considered. First, the research was conducted on 318 employees of only two manufacturing companies located at Kawasan Perusahaan Kulim, limiting the ability to generalize the results to other industries, other geographical areas, or other organizational contexts. Second, the research examined only the manufacturing sector, not considering the other sub-sectors that may have different organizational culture, leadership style, and HRM

practices. Third, the research was cross-sectional and, therefore, could not establish a cause-and-effect relationship between the dimensions of AI-enabled HRM and employee engagement because it only collected one set of data at one point in time. In addition, because the data were obtained from self-reporting surveys, there could have been response bias, as the data may contain responses that were socially desirable and thus not true representations of the participants' perceptions and behaviors.

Expanding the scope of future studies to include more industries and geographical areas will likely enhance the degree to which the results of research in this domain will be generalizable. Models taking into consideration the longitudinal impacts of AI-enabled HRM on employee engagement and the potential for the formation of causal relationships will likely be more fruitful. Additionally, the use of mixed methods, especially the combined methods of survey questionnaires and interviews or focus group discussions, will yield richness in the understanding of the AI HR practices of employees and the perceptions they hold. Future studies could also account for organizational culture, leadership style, and employee characteristics as potential moderators to gain a better understanding of the extent to which these variables impact the efficacy of AI-enabled HRM. Finally, to overcome the above-mentioned methodological constraint, this research recommends a mixed-method

design for future research where the quantitative and qualitative methods are used collaboratively to strengthen the research findings.

## **5.6. Summary**

This research builds upon Kahn's Theory of Engagement and Social Exchange Theory (SET) in the arena of AI Applications in Human Resource Management (HRM) and offers practical advice for HR managers on the ethical and constructive use of artificial intelligence. Using Social Exchange Theory, the author proposes that AI-enabled HR practices, implemented in a manner that promotes fairness, transparency, and the support of employee well-being, would be most likely to elicit positive, reciprocal behaviors such as trust, commitment, and engagement.

The research offers recommendations for policy formulation by stating that the application of equity, transparency, and employee well-being must be the central focus of adopting AI in HR to maintain a beneficial employee–organization exchange. Automation that is both ethical and transparent positively influences the employee's perception of support from the organization and subsequently their engagement. On the contrary, a lack of governance and transparency in automated systems diminishes trust and counteracts reciprocal relationships.

The research investigates employee engagement amid the operationalization of AI in Human Resource Management (HRM) systems, specifically focusing on the potential of AI-integrated HRM systems to foster employee engagement on organizational roles and operational level. As such, the study aims to analyze the intersection of employee engagement and automated AI HRM systems to offer actionable insights on fostering engagement through the operationalization of AI in HRM systems. Consequently, the study aims to bridge the knowledge gap on the engagement of employees and operational automation in HRM systems through the integration of AI, aiming to encourage the engagement of employees in operational roles and encourage the fostering of employee engagement in organizational roles and operational levels. Consequently, such integration of AI in HRM systems represents a potential knowledge gap and operational level engagement of employees.

The AI-enhanced HRM demonstrates the potential for significant positive impact on employee engagement in a responsive way. While AI technologies provide means to streamline HR processes in more efficient, accurate, and insightful ways, the impact potential of such technologies is only actionable when paired with a human-centered approach. This approach means, in alignment with Social Exchange Theory, that organizations must demonstrate and signal care and support for employees through the AI adoption process via clear, open, and active lines of communication, coupled

with appropriate training and ongoing dialogue to foster a more positive, committed, and engaged employee experience.



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## APPENDIX A

### UNIVERSITI UTARA MALAYSIA

Othman Yeop Abdullah Graduate School of Business (OYAGSB)



### SURVEY QUESTIONNAIRE

Dear Participants,

My name is Alii Vaani D/O Subramaniam and I am a Master of Human Resource Management student of Universiti Utara Malaysia under the supervision of Professor Dr. Subramaniam A/L Sri Ramalu. I am currently undertaking research on The Effect of Artificial Intelligent -Enabled Human Resource Management Practices on Employee Engagement in Manufacturing Sector . You have been randomly selected to participate in this study and I would appreciate it very much if you could kindly answer all the questionnaires as accurately as possible. It will take approximately 10-15 minutes to complete all these 35 survey questionnaires and the information given by you will influence the accuracy and the success of this study.

**Your answers will be kept strictly confidential and will be used for academic purposes only.** Should you have any query regarding this research, please do not hesitate to contact me. Your participation in this study is greatly appreciated.

Thank you for your time and cooperation in completing this questionnaire.

Yours sincerely,

**Alli Vaani Subramaniam**

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**SECTION A: DEMOGRAPHIC INFORMATION** The following questions are meant for analysis purpose only. Kindly answer by marking a tick (✓) in the appropriate box.

Email: \_\_\_\_\_

1. Gender

Male

Female

2. Ethnicity:

Malay

Chinese

Indians

Others

3. Age:

21 to 30 years old

51 to 60 years old

31 to 40 years old

60 years old and above

41 to 50 years old

4. Educational level:

Diploma

Doctorate Degree

Bachelor Degree

Other Professional Qualification

Master Degree.

Please specify: \_\_\_\_\_

5. Employment Status

Contracts

Permanents

6. Position in the Organization:

Supervisor and above

Assistant Manager and above



7. Years of experience working in this Organization:

- Less than 1 year                       7 to 9 years  
 1 to 3 years                               10 years and above .  
 4 to 6 years.

8. Income range:

- Less than RM2,000                       RM8,001~RM11,000  
 RM2,001~RM5,000                       RM11,001 and above  
 RM5,001~RM8,000

9. Marital Status:

- Single     Married

10. Location

- Penang     Kedah



**SECTION B: Artificial Intelligence -Enabled Human Resource Management**

This section measures the degree of your **Artificial Intelligence -Enabled Human Resource Management** with your company. Please mark a tick (√) on the box  that best describes your preferred answer to the question on the scale of “1” for Strongly Disagree to “7” for Strongly Agree.

No	Items	1	2	3	4	5	6	7
1	Avoids manpower shortages.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Allows better training and development (T&D).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Allows better Recruiting and Selection.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**SECTION C: Artificial Intelligence -Enabled Recruiting and Selection**

This section measures the degree of your **Artificial Intelligence -Enabled Recruiting and Selection** with your company. Please mark a tick (√) on the box  that best describes your preferred answer to the question on the scale of “1” for Strongly Disagree to “7” for Strongly Agree.

No	Items	1	2	3	4	5	6	7
1	Eliminates biases.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Enhances job matching.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Provides better job opening communications.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Efficiently handles large volumes of information.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**SECTION D: Artificial Intelligence -Enabled Training and Development**

This section measures the degree of your **Artificial Intelligence -Enabled Training and Development** with your company. Please mark a tick (√) on the box  that best describes your preferred answer to the question on the scale of “1” for Strongly Disagree to “7” for Strongly Agree.

No	Items	1	2	3	4	5	6	7
1	Provides high degree of interactivity with other users.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Improves learning opportunities.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

No	Items	1	2	3	4	5	6	7
3	Improves employee engagement.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Improves employee skills.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**SECTION E: Artificial Intelligence -Enabled Compensation and Benefits**

This section measures the degree of your **Artificial Intelligence -Enabled Compensation and Benefits** with your company. Please mark a tick (√) on the box  that best describes your preferred answer to the question on the scale of “1” for Strongly Disagree to “7” for Strongly Agree.

No	Items	1	2	3	4	5	6	7
1	Efficiently tracks employee details.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Efficiently assists in collecting employees’ information concerning their compensation and benefits (C&B).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Efficiently calculates and determines the salary parameter of employees concerning their jobs.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**SECTION F: Artificial Intelligence -Enabled Performance Management**

This section measures the degree of your **Artificial Intelligence -Enabled Performance Management** with your company. Please mark a tick (√) on the box  that best describes your preferred answer to the question on the scale of “1” for Strongly Disagree to “7” for Strongly Agree.

No	Items	1	2	3	4	5	6	7
1	Fairly evaluates employees.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Identifies employees who need further improvement.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Accesses employee performance at all levels.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### SECTION G: Employee Engagement

This section measures the degree of your **Employee Engagement with** your company. Please mark a tick (√) on the box  that best describes your preferred answer to the question on the scale of “1” Almost Never(A few times a year or less), “2” Rarely(Once a month or less), “3” Sometimes(A few times a month) , “4”Often (Once a week), “5”Very Often (A few times a week) and “6”Always (Every day)

No	Items	1	2	3	4	5	6
1	At my work, I feel bursting with energy.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	At my job, I feel strong and vigorous.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	I'm enthusiastic about my job.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	My job inspires me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	I feel happy when I am working intensely.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	I am proud of the work that I do.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	I get carried away when I am working.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	When I get up in the morning, I feel like going to work.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

