Artificial Intelligence Based System for Human Resources Appraisal

A thesis submitted in partial fulfilment of the requirements for the degree of
Doctor of Philosophy

by

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Abstract

Current organisations face many challenges and changes that have resulted from human and technological developments in modern society. Human capital is an active component of an organization's economic value. To benefit from this resource, an effective performance appraisal system must be designed. Such a system should provide job descriptions for all the employees. Additionally, it should contain comprehensive data about all employees in the past and present and determine their capabilities, skills, experience, and level of competence to identify the extent of their contribution to achieving business goals. Knowing the employee's performance level enables management to identify deficiencies in their performance and work. That can help the management to improve performance by identifying appropriate training courses so they can perform their tasks efficiently and effectively. It is important for the organisation to obtain a comprehensive and clear picture of the duties and responsibilities of all its employees by having job descriptions for all its functions and having all data related to employees, their abilities, qualifications, and previous experience. This research focuses on the urgent need for human resources management systems to take advantage of technological developments using artificial intelligence as a means to achieve the goals of human resource management in accordance with the vision and mission of the organisation and, more specifically, in a fast, accurate, and more objective way. The study has been organised into six phases with regard to developing a performance appraisal system. The study began by providing job descriptions for all organisational jobs, followed by using computer programmes to enter all data related to the employees in all roles they previously held and departments they worked in within the organization. Subsequently, a questionnaire was designed and distributed to employees in many universities and companies to understand the employees' opinions about (1) the importance of job descriptions and the performance evaluation form, and (2) the importance of using Artificial intelligence in the appraisal system. The researcher inserted the artificial neural network into the applicable performance appraisal system in order to develop it. The new system has been implemented in the College of Business Administration in Jeddah. The researcher then conducted personal interviews to explore the views and experiences of managers after using the advanced system. Most of the opinions, about 80%, were in favour of using the newly developed human resources management system instead of the previous system because it showed many added benefits, such as speed, accuracy, and comprehensiveness of objective information about the employee, in addition to the ease of making the right decisions.

Publication Based on this Research

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- Ahmed, Alrashedi and Maysam Abbod. (2021). "Impact of Utilising Artificial Intelligence for Job Description". 4th International Conference on Data Science and Applications (ICONDATA'21),4-5 June 2021, online.

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Declaration

It is hereby declared that the thesis in focus is the author's own work and is submitted for the first time to the Post Graduate Research Office. The study was originated, composed and reviewed by the mentioned author in the Department of Electronic and Electrical Engineering, College of Engineering, Design and Physical Sciences, Brunel University London, UK. All the information derived from other works has been properly referenced and acknowledged.

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List of Abbreviations

AI	Artificial Intelligence
ANN	Artificial Neural Network
ANOVA	Analysis of variance
DT	Decision Tree
GA	Genetic Algorithm
HR	Human Resource
HRM	Human Resource Management
JD	Job Description
LR	Liner Regression
PA	Performance Appraisal
PAS	Performance Appraisal System

Chapter 1 - Introduction

1.1. Introduction

Organizational success and stability in the labour market are considered one of the most important factors that can affect the employee's performance. Organizations can not expect employees to perform effectively if they do not know and understand precisely what tasks they are performing (Mishra, 2010). Therefore, job descriptions have become important for every job so that the employees are fully aware of everything related to their work in order to perform it with complete success. The idea of a job description has two sides. The first is for the benefit of the employee, as he knows the responsibilities and duties he has to perform (Sahoo & Mishra, 2012). And the second is for the benefit of the organisation to make sure that the employees will perform their duties as they should in order to achieve their organisational goals, in addition to using job descriptions as a criterion to measure the employees' performance levels and take appropriate decisions towards them (Ibid). Because the organisation aims to raise the efficiency of its performance, it is important to measure the employees' performance annually to know their performance level and whether that level achieves the organisation's objectives or not (Raju & Banerjee, 2017). The organisation has to know what the causes of the faults are, and how they can change them to adjust them. To keep pace with the rapid developments in modern technologies, it is necessary for organisations to use them as much as possible, in a way that suits their activities and to benefit from them (Bozeman & Corley, 2004). The organisation should use everything that can help to develop its work activities. For this, the current research focused on making use of artificial intelligence algorithms to improve and increase the benefits of the performance appraisal system in organisations (Pandey et al., 2020). The research tested some artificial intelligence software in the performance appraisal system, such as linear regression, decision trees, and genetic algorithms, but found that neural networks are the most suitable for a performance appraisal system (Amiri et al., 2020). The researcher piloted the new performance appraisal system in the College of Business Administration, and after completing the evaluation, he conducted personal interviews with the managers who had used the newly developed system. The results of the analysis of personal interviews showed that managers supported using the new system instead of the old system because of its advantages such as speed, accuracy, objectivity, and the ability to take appropriate decisions for the level of employees' performance. These

opinions encouraged the researcher to suggest that the system should be widely applied to other universities and companies.

1.2. Benefits of Appraisal Systems

According to Yee and Chen (2009), performance appraisal is one of the most critical tasks performed by human resource management in institutions, particularly in the context of economic variables that require institutions to determine the level of performance of employees in order to achieve their objectives. Every organisation must retain the talented in order to benefit from their contributions to increasing the organisation's production. Additionally, it must ensure that its employees are satisfied with the performance appraisal system; otherwise, numerous issues will arise that will jeopardise the organization's goals (Idowu, 2017).

Any performance appraisal system must take into account the possibility of employees harbouring doubts about it, in order for the evaluation process to run smoothly and achieve its objectives (Tuytens and Devos, 2012). Organisations use the performance appraisal system because of its many benefits to the organization and employees, which are as follows:

1. Knowing the level of employee performance (Idowu, 2017).
2. Provide employees with feedback on their performance level (Andreeva et al., 2017).
3. Take appropriate decisions related to employee performance such as (compensation / bonuses / promotion)
4. Assist higher levels in setting standards and goals commensurate with the organization's performance (DeNisi & Murphy, 2017).
5. Determine the performance that needs development and improvement "Ibid."
6. Identify the strengths and weaknesses of employees (Cesário & Chambel, 2017).
7. Determine the distinguished and weak employees (Aminudin et al., 2018).
8. The employees understand their performance level, which drives them to self-improvement and development.
9. Employees will feel satisfied and motivated to perform better than before (Park, 2017).
10. Raise the morale of the employees (Bakker & Demerouti, 2018).
11. The administration sets future plans for employee development.
12. Help to discuss employee performance.
13. Improving communication between managers and subordinates (Bakker & Demerouti, 2018).

14. Achieving fairness among employees to standardize evaluation standards.

15. Supervising managers decision to know their objectivity to employee performance (Ryu & Hong, 2020).

16. Use clear performance criteria to measure the achievement of goals which can help to determine the effectiveness of current plans (Abualoush et al., 2018).

17. Helping to plan a career path (Ismail & Rishani, 2018).

18. Helping to plan manpower in proportion to the nature of the organization's work.

1.3. Challenges of Appraisal Systems

Despite the importance of the appraisal system, it is considered emotionally exhausting. Top management faces many problems due to the employees' rejection towards the appraisal's results. The period after knowing its results will become a difficult period because employees question the criteria that is used in the evaluation and the objectivity of the evaluator (Ahmad et al,2019).

There are many problems that can prevent and impede evaluation plans from achieving their goals effectively, and these problems include the following:

1. Unclear purpose of the performance appraisal system (Alharbi, 2018).

2. Too much time wasted in the evaluation process (Nadeem et al.,2020).

3. Using unclear performance indicators to measure achievement of goals (Madhakomala et al., 2020).

4. Poor communication and delay in providing feedback with employees (Brand et al., 2020).

5. Focus on measuring employee performance behaviour in a specific period, not for the whole.

6. HRM has not linked the performance appraisal system results with the Incentives and compensation systems.

7. Limiting the evaluation of a part of the work, not the whole of it.

8. Confidentiality and non-disclosure of its results (Obisi, 2011).

9. Resident subjectivity (influenced by aura, leniency or strictness) (Nikpeyma et al., 2014).

10. Fear of employee reactions (Obisi, 2011).

11. The results of the performance appraisal do not motivate the employees because they feel dissatisfied with the results (Nikpeyma et al., 2014).

12. Link the evaluation to a specific time.

13. Determine a short time for the evaluation, even though the performance evaluation is a year.

Furthermore, there are numerous concerns and challenges that have not been looked and remain unresolved, including those relating to gender influence on task units and the impact of existing instruments for monitoring key performance indicators. Measuring these manually and alongside those who have used AI would offer more insight on them, notwithstanding their importance. These are concerns and obstacles that have not been addressed, despite the fact that AI and the manual tools use in measuring performance are incredibly crucial. Furthermore, while advancements in AI and the adoption of technology factors goes hand-in hand, the perspectives of gender on performance evaluation should be being taken into account when evaluating the impact of performance evaluation by any software system or AI. It is possible that artificial intelligence will have a significant impact on how employees use their work engagement in the near future. It is also possible that AI will have an impact on how gender performance in workplace will be measure in the near future. It's important to point out that the gender impact is measure by tasks completion through extensive research.

It is possible that other issues, such as how employees will improve their tasks, will hinder the adoption of AI by employees in the near future. It is possible that employees will experience stress as a result of the increased burden and responsibility that will be placed on them as a result of AI implementation, regardless of whether the technology is implemented. The prevalence of many of these has been identified as being disproportionately high, particularly when it comes to the factors that prevent employees from achieving success with AI. In addition, the impact of employee engagement on an organization's ability to perform better in terms of profitability has gone unnoticed in the past, despite its importance. It is possible that the effect of performing tasks with AI will have a significant impact on the outcome, in a manner similar to the effect of working with all the necessary resources required to achieve excellency.

1.4. Motivations

In our contemporary time, societies are experiencing tremendous technological developments. These developments affect business efficiency and increase production with high quality and mass production. Therefore, it was necessary for organizations to pay attention to follow-up, benefit for what suits for them to maintain an excellent position in the market. Camelia and Oana (2018), saw that one of the most important resources that organizations should focus on

is the human. The human resource is the most important resource available to organizations. The employee is the one who manages and carries out the administrative process as a whole, which including planning, organizing, directing and implementing (Batisti, 2018). Adding to that, it is the only component that can be trained and developed both externally and independently. In addition to that, he is the only one who uses guided feelings to choose between the many available alternatives, so it was necessary to pay attention to them and work on developing them to ensure the success of the organization in achieving its goals.

This study focuses on the importance of using artificial intelligence in the performance evaluation system to capitalise on its advantages such as speed, objective accuracy, the ability to verify information and its presence in one place to facilitate the process of making decisions with infinite accuracy. This accuracy will lead to determining employee levels, so that management can take motivational methods, whether they are positive, encouraging or negative deterrent.

The motivation for this study is the following:

- Clarify the importance of the job description system for employees to know their responsibilities and duties (Fulbright, 2020).

- Use job description as one of the important criteria for measuring the employee performance level.

- Clarify the importance of the performance appraisal system to determine performance levels and knowing the strengths and weaknesses of employees (Lesener, 2019).

- Draw the attention of organizations and companies to take advantage of modern technologies to develop their systems and functions.

- Distinguishing between the readiness challenges of implementing AI to boost employee performance and the actual challenges.

- Use the job requirements and duties imposed by management to highlight how AI will Improved productivity and accountability for employees

- Use practical experience to demonstrate the importance, benefits, and impact of the AI software which has been used in performance appraisal system.

- Experiment the new performance appraisal system through the experience of its implementation and then taking the managers' opinions about its effectiveness after relying on Artificial Neural Network to prove its effects in developing and improving the system (McGill & Perona, 2017).

1.5. Aim and Objectives

The aim of this study is to help the HRM to achieve its goals by using artificial intelligence to develop the employees' performance according to the work requirements specified in the job description and the new responsibilities that have been added for the employees by their managers to achieve the organizational goals. To achieve this goal, we must define the other sub-objectives to be achieved in order to achieve the main objective:

1. Obtain an accurate and developed job description for all functions of the organization.
2. Availability of basic business information, the sequential steps in the required work procedures during the performance of their responsibilities in the job.
3. A fair and objective performance appraisal that includes all data which has related to employees in terms of their capabilities, skills and general behaviour.
4. Provide information on all training programs that cover all employee needs and help to develop their performance.
5. Identify deficiencies in employee performance and work to improve and develop them by choosing the appropriate training programs for them.
6. Determine the problems that may hinder the maximum use of the proposed program for human resources management and work to find suitable solutions.
7. Assist human resources management in implementing the proposed program and enabling it to benefit from it to the maximum extent possible
8. Clarify the importance and advantages of using the performance appraisal system and work to expand its use between organizations and companies.

1.6. Contributions to Knowledge

The researcher believes that any study that has been discussed and obtained a PhD has added a contribution to the research in some way. The researcher sees that his study contributed to the research through the following:

- Although there are general rules and foundations for research that must be followed, every researcher has his own way of dealing with these foundations that depends on his experiences, abilities and skills. Therefore, my research must have a contribution that differs from other research in some way.
- Data and information are available to everyone, but each researcher has a special flaw in dealing with this information and data to serve the ideas and goals of his research.

- Finally, this contribution is the clearest and most powerful one. All researchers have studied the relationship between effects on performance and have produced results which became known to researchers. This research includes all the important influencing employee's performance. Without a job description, organizations will not be able to have the expected effect on employee's performance.

The only way to guarantee maximum impact is to have a job description. The employee will not achieve the highest degree of performance, regardless of his capabilities and skills, and the positive effects which are available, unless he knows his duties and job responsibilities until he performs them successfully.

1.7. Research Methodology

Lee et al. (2017) expressed that the research methodology is the investigation of a problem or phenomenon in order to find a solution to it in structured and specific ways, and these methods lead to an increase in understanding through the interrelated processes in a scientific way to collect, analyse and interpret information (Newman, 2006).

In this study, the researcher used a quantitative approach based on collecting information by means of a questionnaire. The questionnaire is the most powerful research tool used in collecting quantitative data and it usually consists of short questions carefully formulated to fit the researcher's data needs. After unpacking the data, the researcher used mathematical and statistical methods to obtain unified and specific results. The researcher also analysed the statistical data in an objective and neutral manner and did not rely on the explanatory method that may be affected by the subjectivity of the researcher when interpreting results in order to achieve research ethics (Melnikovas, 2018).

1.8. Thesis Outline

This thesis consists of seven chapters and is organized as follows:

Chapter 1: This chapter contains a brief introduction to the study and a review of the importance of the performance appraisal system with the identification of the problems it faces, whether in design or implementation, and the goals and objectives of using artificial intelligence in developing the performance appraisal system were discussed. This chapter includes a brief description of the research methodology, contributions, and the thesis contents.

Chapter 2: This chapter is focused on proving the importance of job descriptions on employee performance, in order to be used in a performance appraisal program in addition to using AI tools developments. The chapter begins by presenting most of the factors which affect the

employee's performance based on the job description. In addition, the factors affecting the employees' performance, namely motivation and job satisfaction. Such factors can only achieve their highest impact rate in the presence of job description. In other words, the effect of these factors will not work if the employee does not know his responsibilities and the duties of his job.

Chapter 3: This chapter focuses on the research methodology which focuses on the philosophy espoused by the researcher on the importance of artificial intelligence for the development of a performance appraisal system. Aspects of the system design are given particular attention aiming to achieve a valid conclusion. The method includes a hypotheses formulated to collect information related to the research problem. The information is gathered using a questionnaire that has been checked and validated to determine its usability. Finally, this chapter discusses mathematical and statistical methods used in analysing the data and interpreting the results objectively.

Chapter 4: This chapter includes survey questionnaire data collection and analysis. The data is analysed using SPSS program in order to evaluate the usefulness of artificial intelligence in human resources management, in particular job descriptions and performance appraisal.

The data analysis is performed to establish the sample's demographics, background characteristics, and the variable frequencies. The study is focused on the following factors:

- Monitoring the objectivity of the manager's decisions related to the employee's performance
- Using descriptive statistics to show respondents' views on the factors extracted.
- Pearson's correlation coefficient was used to show whether a linear correlation has been found between the various scales. The result has been showed that all dimensions were positively and significantly correlated with each other, which meant there was a consistency in scores between all scales related to attitudes.

- The researcher also has used linear regression to determine the relationships between variables to confirm the correctness of the hypotheses. The results of the linear regression analyses have confirmed the nine hypotheses which have been put by the researcher.

Chapter 5: This chapter is dedicated to the appraisal system design and implementation. Detains are given of the system's components and its database. It also gives details of the system usability and ultimately how the system can support the utilisation of artificial intelligence.

The performance appraisal system is a collection of web pages that can be accessed through a browser with the following specifications:

- System users are system administrators / managers / employees.

- The database contains information about the company, job description, job responsibilities/duties, skills, employee information, employee previous experience, previous training, employee evaluation in the previous years, attendance, employee assessment history, employee's issues, complaints against employees, training programmes, task actions, and employee reports.

- The system is designed to be home pages that contain information about the job description, employees, employee evaluation, and proposed actions by management based on evaluation results.

Chapter 6: This chapter explains the performance appraisal program which has been developed using a Neural Network algorithm. The work is divided into three stages:

- **Stage 1:** Examined modelling algorithms such as linear regression, genetic algorithms, decision trees and neural networks. The accuracy of the aforementioned algorithms has been compared and the neural network algorithm has been selected due to its advantages.

- **Stage 2:** The developed neural network model is integrated into the appraisal system based on 28 performance evaluation elements. The algorithm can evaluate the employee's performance and identify if training is required for a particular task.

Stage 3: The developed system is evaluated by using personal interviews with 10 managers who applied it in their departments, and then the evaluation results were analysed to find out their views of its quality compared to the previous system.

Chapter 7: The final chapter of this thesis concludes the work on how to work with the developed program including artificial intelligence/performance evaluation and job description/work procedures. The chapter also gives possible direction for future work.

Chapter 2 - Literature Review

2.1. Introduction

Most organizations emphasize that performance development depends on motivations and training and programs which are offered by the organization. However, many factors affect the performance positively or negatively, but unfortunately, they have not been given proper attention by the organization. The researcher, when studying previous research, will divide the factors which influence performance into three types of influences, the internal influences emanating from the individuals, the external influences coming from the organizational environment, and the duple influences that can be considered as external and internal at the same time as shown in Figure 2.1.

In the research phase, the researcher noted that most of the research conducted were not limited to study the relationship between the independent variable and the dependent variable but added another variable that mediates the two relations to give indirect results between them.

Duple Affect Influence

Motivation and Job Satisfaction

External Influences

Environment, Policies, Training Empowerment, Stresses, Promotion, leadership, conflict, Competition, Engagement, Performance Appraisal, Job Descriptions Work procedures, Artificial Intelligence.

Job Performance

Internal influences

Values and Ethic ,Specialization, Experiences, Citizenship, Achievement

Figure 2.1 Internal, external and double factors that affect job performance.

The Internal Influences: are composed of Values and Ethics, Specialization, Job experience, Citizenship, Organizational and Achievement as shown in Figure 2.2.
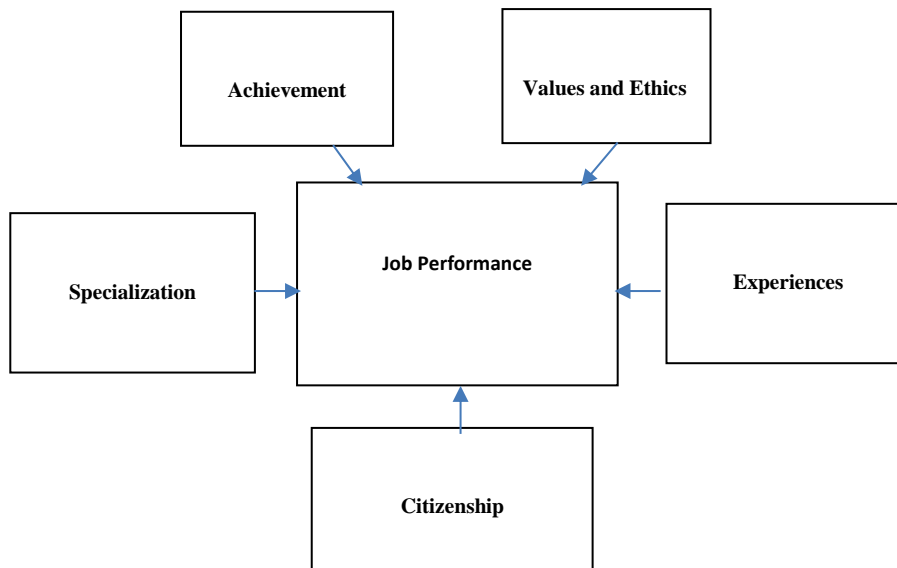
Figure 2.2. The internal factors affecting Job performance.

The External Influences: organizational environment, organizational policies, organizational empowerment, job stresses, training, subjective well-being, promotion, leadership, conflict, competence, job engagement, performance appraisal, job descriptions, Artificial Intelligence as shown in Figure 2.3.
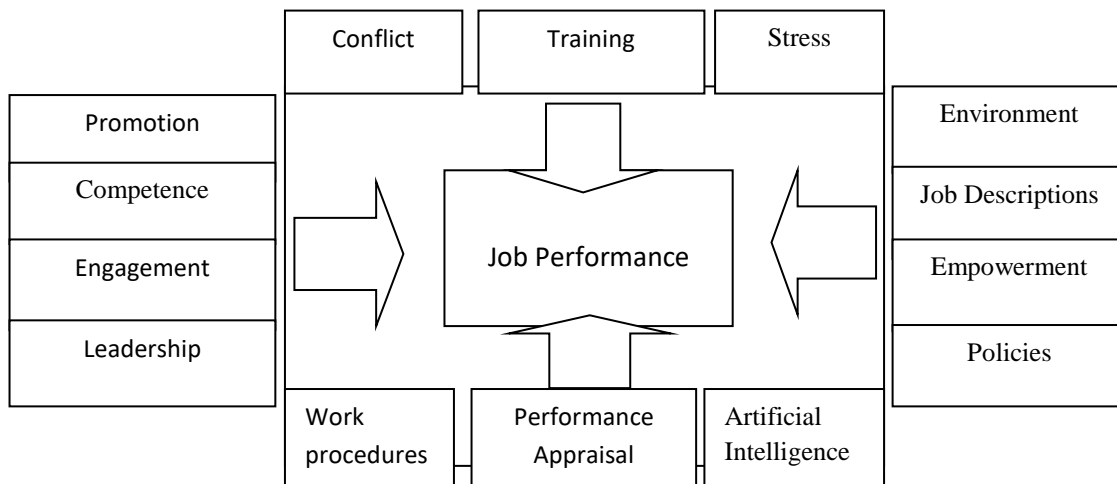
Figure 2.3 The external factors affecting Job performance.

The Double Effect Influence: Motivation and Job Satisfaction, both of which are either internal or external influence. They have a dual effect internally and externally. The employee can be motivated to work internally with values and sense loyalty and belonging to his organization, and motivated by duty, feeling the importance of commitment to achieve the goals of his work and excellent performance. Also, he may be motivated externally stimulated by the organizational culture and its policies. Also, he can be guided by organizational leadership for optimal performance. He can as well be stimulated by fear of evaluation or

conflicts within work, peer competition as well as training. Besides participation plays a role in motivating the employee to perform well. On the other hand, the employee may feel satisfied with internal motives such as values, loyalty, belonging, achievement and externally such as promotion, the of results evaluation, victory over a colleague or competition as shown in Figure 2.4.

Figure 2.4 The double affect factors which affect the job performance.

2.2. Literature Review

Many factors or concepts have been carried out in many studies to determine the extent of their impact on performance, whether directly or indirectly. Those studies have focused on everything that can affect individuals and groups to push them to take specific behaviour that affects their performance for their work tasks and thus to achieve organizational goals. To review the background of these factors, the researcher will review them in groups which are an internal, external, and bilateral effect as follows:

2.2.1 Internal Influences

Values and Ethics: have a significant role in encouraging or deterring a performance (Al-Mahasneh, 2011). Their impact is a real and sustained motivation. This power is derived from within individuals and cannot be easily manipulated or altered. This is because it is based on cumulative events that have led to concepts which are difficult to change. Organizations cannot oblige employees to have specific values if they are not present (Sparrow, Chadrakumara & Perera, 2010). Paine and Organ (2000) has stressed that when human resources in any organization have strong values, this will reflect on their work performance; this can create significant competitive advantages for the organization among others (Dugguh & Dennis, 2014). A study was conducted to find out the impact of work values and ethics on citizenship and performance of tasks in Local and Foreign Invested Firms. It has shown that Values, work norms, work ethics, and intrinsic values with their driving force, influence citizenship and job performance (Sparrow, Chadrakumara & Perera, 2010).

Specialization: based on Tucker's (2017) article which referred to the importance of specialization to the organization and as well as to the employees, he argues that specialization in a specific field leads to experience and excellence. When employees become specialized in performing specific tasks, this can lead to increased productivity and revenues in the organization, especially in the era that is characterized by advanced technological and technological progress. Also, specialization facilitates the process of identifying the required skills. Therefore, we can quickly determine the appropriate training program. Unfortunately, there are some disadvantages related to specialization, which may negatively affect performance.

Specialization is characterized by repetition that causes boredom to the employee, then dissatisfaction which leads him to lose interest in work, which affects the performance. Besides, specialists always feel that they do not need training, which may lose them development in their field. On the other hand, for their narrow specialization, they may feel that they are not doing important work. They perform part of all but not all work procedures and thus do not feel like others. Also, when the specialist is absent, and there is no one doing his job for lack of specialization, the work performance of the organization will be effected (Somers & Birnbaum, 2000). Adebayo et al. (2015), in their study on the strength and weakness of the division of labour and the functional specialization of the staff at the University of Nigeria Library, have found that although specialization would facilitate and accelerate work which enhances their jobs, it could be stressful and boring. But as their production increases, they will feel satisfied, and this feeling may reduce their boredom. Therefore, organizations should rely on the idea of job rotation to avoid their employees feeling bored

This feeling can change if they start to feel that they are productive and comfortable. This way will make them feel satisfaction with their work. There is a high probability that feelings of satisfaction will not only reduce the likelihood of employees leaving their work, but it also will increase their productivity. In order to avoid the feeling of fatigue, boredom and exhaustion due to careful specialization, Organizations must rely on the idea of rotation.

Job Experience: Hunter's (1983) findings from his study of the causal effect of experience on knowledge and ability to perform showed that experience had a direct and significant impact on knowledge and had a direct and less effective impact on performance. Since performance does not only depend on experience, but also relies on the desire to perform; the employee may be an expert at work, but there are other factors that affect his desire, so he does not provide all his knowledge. The employee's effects on performance were indirectly influenced by his impact on knowledge which had a substantial impact on performance. In another study

conducted to determine the relationship between job experience and job performance, it was found that the relationship between them was moderated by two variables: length of experience and job complexity (Schmidt, Hunter and Outerbridge,1986). The result was that there was a definite relationship between job experience and job performance for all levels of experience required in jobs, whether involved or not. Dokko, Wilk and Rothbard (2009) see that organizations prefer employees who have previous experience in similar businesses because they expect to transfer their different prior knowledge directly to improve the organization's performance (Rynes, Orlitzky & Bretz, 1997).

Citizenship: Al-Mahasneh (2015), in his study exploring the impact of organizational citizenship behaviour on job performance in the greater Amman municipality, found that organizational justice, job satisfaction, and organizational commitment have a positive effect on motivating the organizational citizenship behaviour, while job satisfaction and organizational commitment act as mediating Variables between the organizational justice and organizational citizenship behaviour. This means that there is no direct impact on justice and organizational citizenship behaviour. Also, job satisfaction has a positive relationship with a job commitment. He also has defended that there are five standard styles of behaviours related to organizational citizenship behaviour, such as altruism, courtesy, sportsmanship, conscientiousness, civic virtue, and peacekeeping and cheerleading. Those styles can affect the job performance positively (Podsakoff et al., 2009). Mallick (2015) in her article has tried to define the relationship between organizational citizenship behaviour and organizational performance. The study found that organizational citizenship behaviour has an essential relationship with job performance. Moreover, that altruistic dimension has a strong relationship to job performance, while the dimension of civic virtue has no importance. Also, it was found that human resources management practices can affect the level of the relationship between organizational citizenship behaviour and job performance negatively or positively. This means that organizational citizenship behaviour, organizational justice, job satisfaction, and organizational commitment have a relationship to performance.

Achievement: In a study conducted to determine the relationship between the self-motivation for achievement and job performance and satisfaction, it was found that the relationship between the motivation for achievement and the performance is stronger than its relationship with satisfaction. Also, it was found that employees who have self-stimulation do not need external incentives to work like others (Aloysiu & Christy, 2012). Rabideau (2005) discussed that achievement motives consist of the need for accomplishment and the fear of failure. A performance-approach goal is to achieve efficiency as determined by others. A performance-

avoidance goal is to avoid inefficiency as considered by others. A mastery goal is to focus on developing the efficiency itself in job performance. Also, it has been shown that achievement motives (need for achievement, fear of failure) have an indirect effect on achievement, but the achievement objectives have a direct impact on achievement and thus on performance (Elliot, McGregor & Gable, 1999). Based on Roney and O'Connor (2008) study which examined the relationship between achievement objectives and specific aspects of target goals (goal difficulty / expectancy, framing), with performance as predictors of academic performance. The result has shown that both a performance- approach and mastery had a positive relationship with performance through the goal difficulty which predicts a better performance, while performance-avoid has a negative relationship with performance through negative framing as mediated factor. This has meant that there was an undirected relationship between achievement goals and performance.

2.2.2 The external influences

Organizational environment: Jayaweera (2015) conducted a study on hotels in England to examine the relationship between environmental factors of work (physical, psychological and social) and job performance and work motivation. The consequence indicated that the work motivation mediates the relationship between the organizational environment and performance. Based on this relationship, we can predict job performance, particularly in the case of employee enthusiasm to achieve the goals. Because in this situation, he was motivated by internal motives that may mitigate the impact of the undesirable environment and make it possible that some of its objectives may be achieved by achieving the objectives of the organization. Other research has connected working conditions and job performance (Fine & Kobrick, 1978; Mohapatra & Srivastava, 2003; Naharuddin & Sadegi, 2013; Brill, Margulis & Konar, 1985; Chandrasekar, 2011; Doldenand Ward, 1986; Davis, 1984; Vischer, 2008). It shows that physical and psychosocial factors will guide to increase performance (Buhter, 1997; Chandrasekar, 2011). Oswald (2012) discusses the link between working environment on worker performance at reproductive and child health care providers in Tarime district. The study discovers that the work environment has a negative influence on performance level of employees, especially when there is a lack of work building equipment and medicines. Employees realize that work requirements are not available and no matter how much effort they make, there will be no production (drugs) to achieve the main goal. Samson, Waiganjo & Koima (2015), in their study conducted to determine the impact of workplace environment on employee performance, showed that physical factors (office planning and design) were found to have no impact on the

job performance. It was because they saw office design planning as a luxury rather than a necessity that affects their feelings or job performance.

That was as a result of the fact that they considered these factors as luxuries, and they would not have a significant impact on their feelings or their job performance. However, there was a significant influence of psychological balance factors (harmony, social support of officials) as it supports the feelings of workers and makes the working environment a social environment with strong human relations with positive emotions. On the other hand, the physical, psychological and social impact was moderate

Organizational Policies: Katou and Budhwar (2007) have looked to find the impact of human resources management policies on organizational performance in Greek Manufacturing Firms. The summary of the results was that organization has to use an ideal set of management practices that will yield tremendous results in all circumstances. The majority of these studies (Bamberger & Meshoulam, 2000; Boxall & Purcell, 2003; Hughes, 2002; Gerhart & Fang, 2005) concentrate on the human resources management policies which are related to recruitment, training, promotion, incentives, benefits, participation, health and safety have positively affected organizational performance. Huselid and Becker (1996), have seen that there was a causal relationship which means that human resource policies affect organizational performance. However, Gerhart (1999)believes the idea that the opposite is true. Shi and Konrad (2017), have looked for whether there is a causal relationship between high-performance worksystems and organizational performance. The result showed that there were binary effects between the two factors. High-performance worksystems affect organizational performance and performance result provides data and resources that need support and change from the between high-performance worksystems. When they study the causality between human resource policies, practice and performance, they found that previous practices contributed positively to subsequent productivity and vice versa.

Organizational Empowerment: Poorsafaei and Alimir (2014), mention that empowerment is to give authority to employees so that they can perform their work freely and confidently. They will succeed in their tasks and working hard to develop the organization. When managers support their subordinates, they will be spreading a culture of supporting among all organizations which facilitates achieving competitive advantage (Lech & Folton, 2008). The finding showed that there was an appositive interaction between individual characteristics and employee empowerment, also between the organizational culture and employee empowerment. Also, there was an appositive contact between job skills and employee empowerment, but there was no relationship between the organizational structure and employee's empowerment.

According to Demirci and Erbaş(2010), empowerment is the official power derived from the managers to subordinates to make a valid decision and responsibility for the results of their work. This responsibility leads to achieving the goals of the organization. In addition to that, it helps them to learn new skills that help to develop and improve the work performance. Empowerment leads to continuous improvement and staff satisfaction. Some negative behaviours may arise from managers as a reaction to confronting their subordinates or employees who refuse to accept more significant responsibilities and prefer not to cooperate with colleagues, which negatively affects organizational performance. Tickner (2010), has examined in his thesis the effect of empowerment strategy on job performance in the public sector. The result has proved that empowerment has helped to improve staff performance, and other functions within the organization should facilitate such improvements. Jeffery and Farooq (2015), in their article, have discussed the effect of job burnout as a mediating factor in the relationship between structural empowerment, organizational citizenship behaviour and job performance at four banks in the public and private sectors. They have explained that there is a healthy relationship between structural empowerment, organizational citizenship behaviour, and job performance. It also has been demonstrated that job burnout strongly correlates structural empowerment with functional performance. Also, organizational citizenship weakly mediates the two relationships.

Job Stress: Abu Al-Rub (2004), has explained the relationship between Job Stress, Job Performance, and Social Support from colleagues among hospital nurses and the impact of social support from colleagues on performance stress. The results indicate that social support from colleagues leads to reduced work stress for the reason that the employee's sense that colleagues around him appreciate his position support him and stand beside him, which leads to higher performance. Plus, those who are under pressure will be at a low level of performance for not focusing on their task. As a result, the supportive nurses will perform better than others. Nawazand Ansari (2017) have investigated the relationship between job stresses on job performance with perceived organizational support as a moderator. The finding of this study was that the assistance of perceived organizational support reduced job stress. Likewise, employees with significant organizational support, despite their job stress, performed their work and other tasks too. Whitfield and Cachia (2018) conducted interviews to find out the impact of work pressure on staff performance. The responses have focused on stressful situations that caused mistakes in work. A negative staff relationship leads to stress, but the supportive relationship will relieve stress. Stress leads to the pressure that negatively affects performance.

Training: Elnaga and Imran (2013) studied the influence of training on employee performance. The study points out that continuous training which is provided by the organization on a regular basis is significant to develop and improve staff performance. Training programs must be defined based on actual needs. Aswell, training has an active role in enhancing new and current employees to get a promotion in the future. Effective training develops employee's abilities, skills, knowledge, so it has a positive impact on performance. Nassazi (2013) has found that the company's policy required training for all staff to avoid confronting employee resistance to employees who have been trained.

Colleagues who have not been trained will try to impede the use of skills and information obtained by the trainee, so they gave the opportunity to develop everyone, resulting in improved staff performance. Another study determined the impact of training on employee performance of district five administration offices, Bole Sub-City, Addis Ababa, Ethiopia. The results were that the training had a positive effect on employee performance, but there was a weakness in the identification of employee needs and the presence of skills for both trainers and trainees, as well as weak evaluation criteria (Asfaw, Argaw & Bayissa, 2015). Another study assessed the impact of training and development on staff performance in selected branches of the Agricultural Development Bank. It showed that systematic training, in line with the organization's culture, is a guarantee for the development of employees' performance and for achieving their goals and objectives. (However, the training has provided continuous methodological organization to be utilized, and the budget for training has not been utilized by the employees (Nguah & Asare, 2015).

Promotion: Castillo et al. (2017) illustrated that although each level in the organization has unique criteria which must be met by the employee to be promoted, there are common standards among all levels such as personal traits, job satisfaction, experience and performance's skills. The employee will not be promoted if these standards are not met because the organization has identified job performance as one of the most critical factors for promotion. The best period of positive performance is the pre-upgrade time in which staff are working hard and try to develop their performance to ensure that they get promoted. After the promotion of a staff member, they may find negative behaviours or periods of running out of work. Peter (2014) has indicated in his study, that promotion in Dar Es Salaam City Council has a positive impact on staff and organizational performance as a whole. The researcher has pointed out that promotion stimulates a good performance and good relations among colleagues. Also, Mustapha and Zakaria (2013) have viewed the effect of promotion on job satisfaction among academics in higher public institutions in Malaysia. They have found that there was a definite relationship

between promotion and job satisfaction. Because job satisfaction is related to mental and physical well-being, it also positively affects performance (Spector, 1997).

In contrast, sometimes promotion hurts employee's performance because when employees know that there is the probability of promotion, and they are provided with relative performance, they will improve their current job performance. The employee who is selected based on best current performance, unfortunately, would not be suitable for the next job and his performance would be less than before. In addition to that, employees who were not promoted would also have lower performance, because they feel the promotion system is unfair (Chan, 2017).

Leadership: Nguyen et al. (2017), in their study about the effect of transformational - leadership style and management control system on managerial performance, found that a transformational-leadership style is favourable. In addition, it was found that it has direct but inconclusive impact on administrative performance system, and the use of accounting information and performance-measurement system. According to a study conducted by Montano et al. (2017) to explore the relation between the different kinds of leadership with functional and mental performance. The study discovered that (relations-oriented leadership, task-oriented leadership, transformational leadership, and distinct interaction between leader and follower, transformational leadership) have a positive relationship with job performance and mental health such as, well-being, psychological functioning, stress, burnout, and health complaints.

On the other hand, destructive leadership showed opposed relation with mental health which acts as a mediator between leadership and job performance. Another study conducted by Ogbonna and Harris (2000) has given different results to the influence of leadership on performance. The leadership style is linked indirectly to a performance by mediating the relationship to organizational culture.

Bello (2012) has discussed the power of characteristics and the impact of ethical leadership on work performance. He has focused on trust and commitment to have a clear understanding of this relation. He has made recommendations inspired by the guidance of many corporate leaders in managing ethical issues (Collins, 2010; Trevino & Brown, 2004, Upadhyay & Singh, 2010). As such, leaders must be responsible for the ethics of work in the organization and ensure presence of a strong moral culture in the workplace, with emphasis on the participation of all staff in ethics training programs. He has to reward the moral behaviour of the productive workers, since incentives will cause complacency, in addition to the fact that morality itself is

used as an incentive and motivation especially when it represents a general culture of the organization. These leadership characteristics can positively affect the performance of work.

Conflict: Jehnand Mannix (2001) identified models of group conflict during project implementation time. Its summery is that conflict is a continuous process of change, rather than astatic event (Coser, 1970; Deutsch, 1969). It maybe affects individual's performance positively if the conflict is with tasks not with relationships, and to be in the middle of the activity period, so they can discuss the new perspectives for the implementation of tasks, with a little pressure associated with the end of the project completion period.

The conflict will not negatively affect the group performance if its members have similar values and have mutual trust and respect with open discussion during the intermediate stages of project implementation. In contrast, a negative impact on performance will be as a result of the conflict of tasks starting from the beginning of the project and continues to be higher before the end of the project. In this case, the conflict will not be useful, and it becomes destructive to job performance because workers will waste their time discussing conflicts, and try to win over other parties, which affects their performance and achievement of the work goals (Jehn, 1997). Peterson and Behfar (2003) in their investigation have found that most of the previous studies have focused on the level of performance which varies by the level of conflict, but they have not discussed another possibility that conflict is a reaction to feedback on the performance of the previous group. Also, contrary information about the previous group performance increases career and relationships conflict, while the group which is characterized by confidence among its members, will have no conflict in their relations.

Competition: A study was conducted by Cooke (2010) on golfers to clarify the impact of competition on their performance. The result was that the competitive pressure during the game increased their energy, which helped to improve their performance to win the game. Yip, Schweitze and Nurmohamed (2018) in their article have discussed that lousy speech affects the behaviour of competition. It encourages performance efforts, but rough work in cooperation is detrimental to performance. Also, they have found that lousy speech can encourage immoral behaviour and prevent creative performance. Murayama and Elliot (2012) have found that there is no agreement on the relationship between competition and performance, and whether it has an impact that helps or hinders performance. There are those who see it as positive and useful to strengthen performance such as Scottish philosopher and economist Adam Smith (1776/1937), and there are those who see it hinder performance like Thomas Hobbes (1651/1994). In the end, the researchers see competition as not entirely beneficial and not entirely detrimental to performance.

Job Engagement: Wellins, Bernthal and Phelps (2005) have discussed the importance of engagement and its impact on performance. Also, engagement is an initiative from top to bottom leaders who understand a fertile environment full of enthusiasm, trust, and loyalty. Rich, Lepine and Crawford (2010) have shown that engagement plays a role in the interrelationships between antecedents "value congruence, perceived organizational support, and core self-evaluations" and the two dimensions of performance which are task performance, organizational citizenship behaviour).This role is more comprehensive than research using familiar concepts such as job involvement, job satisfaction, or core self-evaluations because it depends on a relatively narrow view of the self. Thus, we can say that an employee, when engaged in the work, invests his cognitive, emotional and physical abilities in the performance of their roles, this investment will be more evident in the performance of the task and behaviour of organizational citizenship behaviour. But on the other hand, an employee needs to be commanded or encouraged by his superiors in order to share his colleagues in their work or work extra time. Anthony-McMann et al. (2017) have argued the relationship between engagement and workplace stress and burnout. They have given a different result than was thought about the importance and benefits of job engagement on job performance Kahn (1990). They have discovered that job engagement has negative relations with the burnout and stress. Because the burnout and stress have an effect as a mediator between job engagement and job performance. Unfortunately, job engagement will not give the same results as previously expected. The employee may be interested in participating, but the pressures of work and the physical and psychological exhaustion are more severe than the participant desire. The discussion concluded that engagement is not a generalized term or a comprehensive concept. In addition to that, it benefits as organizational phenomenon depends on the clarity of purpose and accuracy in the selection of the measures which are used to determine its actual effects.

Performance Appraisal: Ochoa et al. (2012) have viewed the factors Influencing Employee Performance Appraisal System. They found that there are five factors have a positive impact on Performance Appraisal System which are implementation process, interpersonal relationships, rate accuracy, informational factors, and employee attitudes. They have found that implementation process has a higher impact on the Performance Appraisal System than other factors. If management is concerned about these factors, Performance Appraisal System will become an effective means to influence job performance. Khan (2013) has discussed how the performance appraisal system role can be a motivation tool for employee's future performance. He has given some suggestions on the effectiveness of the evaluation. It can be summarized that It clarified the importance of dependence of performance appraisal on the

existence of a job description as a criterion for knowledge job descriptions to know precisely the duties and responsibilities of the employee and what are the abilities and skills necessary to perform the job successfully. There should be regular review of job descriptions, job design and the work environment based on the performance evaluation. New methods of evaluation involving all staff should be used without exception. Financial as well as non-financial incentives have to link to the evaluation system. It is also necessary that training programs depend on the results of the evaluation system. Finally, it is very important to discuss the results of the evaluation with the employee to see his opinion. Based on Iqbal et al. (2013), in their study discussing the influence of performance appraisal on employee's performance involving the Moderating Role of Motivation, found that because employees are the most critical resource, Therefore, they must be developed and improved in order to achieve the organizational objectives. and therefore, Human Resource Management through managers must measure their performance annually to ensure their efficiency. The lack of resident's skills will negatively affect the outcome of the evaluation of performance and lose its impact on employees.

Job descriptions:

The term "job description" refers to written descriptions of a particular job, that describe the general tasks involved on all the related duties and responsibilities in a statement that outlines the specifics working conditions of the position in question (Frost S. (2019). Making an initial job analysis is standard procedure before beginning to write a job description. This stage involves analysing all of the tasks and their respective resources required in order for the tasks to be completed. Generally, job description gives information about how the job is organised in terms of what the job entails. It also reveals the necessary qualifications or skills as well as the resources required for the job. However, while most job descriptions are written in a way that tells you about the job, some are just lists of skills. A lot of the time, in job description, the statement focus about what the organization want and don't think about what could happen. This focuses on the person's skills and the needs of the company.

Pato (2013) has explained the importance of job description, the importance of their use to prevent operational and administrative problems of the organization. He has mentioned the importance of obtaining seven elements in job descriptions, which are: job activities, rationality, and realistic goal, unimplemented tasks and other tasks that will be implemented in the future without unexaggerated or underestimate their importance, with clarity, and determining the appropriate cost for preparation and use.

The availability of those items will lead to ensuring the placement of the right man in place, specialization, status, time cost and the right employer which means the competitiveness of the organization. Banerjee (2017) has evaluated the role of the job description in locating the employee performance mainly in some selected manufacturing organizations in the city of Pune, India. Her evaluation summarizes that the unclear description of the functions led to poor performance of the employees at all organizational levels. Because staff were not known what was expected of them to perform, they were dissatisfied. Moreover, the organization has not evaluated their performance as it is expected by comparing their performance to what is described in job descriptions. All these aspects negatively affected the worker's performance and productivity.

Harju, Hakanen and Schaufeli (2016) have asked how employees can prevent job boredom and promote an advanced engagement that will maintain the well-being of the job crafting. They also have asked if structural resources and social resources have a role in job formulation, and challenges. Structural resources include diversity of tasks, opportunities to develop new skills or processes, and independence. Social resources include social support, supervisory training, and feedback. Can the organization's resources be used to select new, better tools or methods for performance? And can those in charge of job descriptions predict ways that are less boring for employees so that they are more motivated to participate? Also, other results showed, that the fear of job boredom and the desire for work engagement will call for an increase in job crafting, and as well to other functions, so this in the long term will cause an accumulation of resources at all jobs. Finally, to obtain a good job description, the organization should think about how to reduce boredom; encourage job engagement, and well-being in the work environment in order to raise the performance efficiency and work productivity (George, 2009; Game, 2007; Barbalet, 1999)

Jacobson, Trojanowski and Dewa (2012), in their article, have described how the appropriate job description helps the organization in getting the right staff in the selection process to choose the best applicants who have all the conditions required in the job description. Also, that will help the employee to know their role which is required and expected from them accurately. Knowing that will facilitate tasks to be done successfully. The job description is essential for all administrative processes. Organizations post it to media to attract candidates, then use the descriptions as questions to identify the best candidates and refer to the terms of appropriate skills, abilities, and behaviour. When the employee discharges his daily work, he uses his job description to know his duties and responsibilities accurately as the organization wants. On the other hand, it is used in performance appraisal processes to compare his performance with what

is specified in the job description. The organization by developing accurate job descriptions for all its functions, employees will know how to perform their jobs exactly as the organization expects

Any decisions regarding training and development, or even dismissal, will not be surprising to any employee, because it was based on policies and procedures that are clear to all. In short, the job description is also necessary and essential for the activities of the organization. It also represents the backbone of the employee based on the job description. employee is selected and the procedures for performing his work are determined, and each of his performance evaluation, promotion or punishment is based on the extent of his commitment to the job description (Rohr, 2016).

Work Procedures: Brodbeck (2002) defined a business process as an organizational design statement written by the organization to define the sequence of work steps and the employees involved in its completion and their respective work. There are different types of procedures from one job to another and there are special procedures for employees, organization, written and unwritten procedures

- Written procedures are formal and must be detailed in the Procedures Manual (Schlager, 2005).
- Unwritten procedures, which are informal and considered important and necessary, must be studied by managers because they affect the style of work performance and the formal procedures in the organization (Kay & Gorman, 2012).

The organization must be concerned when designing procedures by following it up periodically for the possibility of adding and deleting some unimportant steps. Both managers and employees with experience are among the factors that interfere in changing the official procedures, whose steps differ when implementing them (Antonsen et al., 2008). Informal communications between employees who perform the same work play a big role in changing and modifying formal work procedures so as to share employees' opinions among themselves about the best ways to implement joint work (Rogers, 2003).

The work procedures (Ab Wahid, Corner & Tan, 2011) have many benefits, both for the organization and for the employee himself, as follows:

- Fast achievement.
- Standardization of performance for similar businesses.
- Avoid work chaos.

- Reduce steps for using forms.

- Reduces employee intellectual effort.

- Tighten monitoring of implementation.

- Raise employee morale to know and understand all steps of work procedures.

While effects in formal work procedures include:

- An old one needs to be changed.

- Complex needs to be simplified.

- Unnecessary multiple steps.

- Business delay leads to red tape and inertia.

Artificial Intelligence: Rodríguez, Hermosillo and Lara (2012) have defined artificial intelligence as a scientific field designed to simulate the behaviour of the human brain by devices, both of them are considered as an information processing machine. Also, they have asked whether the machine is thinking. To answer that question, they discussed the idea that brains are similar to computers in being information processing machines, and computers are waiting for the right program to become a smart machine which speaks in a human way, but the truth and reality, even though the machines speak natural language, is that they do not really understand what they are talking about (Rodríguez, Hermosillo & Lara, 2012).

Masum et al. (2018) have proposed a framework of intelligent human resources information based on the use of hybrid artificial intelligence tools, such as automated learning and knowledge-based approaches, so that data can be collected without human intervention, stored, summarized accurately, processed to derive new information to support the decision-making process. This approach will accomplish business more quickly, accurately and cost less which leads to the competitive advantage of the organization. It will also assist human resources management in planning, reporting, assessing policies, forecasting needs, training and forecasting staff performance, all those without human intervention. It is possible to say that Artificial Intelligence is a new generation of technology that will make the perfect machine capable of simulating human behaviour entirely and whose components are small (Simmons & Chappell,1988). We should know that artificial intelligence is not about one technology, it is a set of different technologies to obtain high-quality products and services in less time and cost. All professionals can take advantage of these technologies for all Human Resource functions such as recruitment, selection, training, development, performance management, compensation and reward (Jain & Radivojac,2017).

Brynjolfsson and Hitt (2000) have discussed how computers contribute to business performance and economic growth. Computers will become cheaper, stronger and more capable of reducing the costs of coordination, communications and information processing. The authors argue that technical assistance to organizations in in its work by reducing costs and improving production quality, would make the returns on computer investment much higher than expected. by reducing costs and improving the quality of production that would make the proceeds of computer investments much higher than expected. The remarkable decline in computing and communications costs will lead to a significant restructuring and improvement of the economy.

Goodhueand Thompson (1995) conducted a study to understand the relationship between information systems and individual performance. Technologies (hardware, software, and data) are tools used by individuals to carry out their tasks. These tools are influenced by individual characteristics such as training, computer experience, and motivation, so they can quickly benefit from it. This study has suggested using a comprehensive theoretical model called task-technology fit. The study has mention that the use of information technology should have a positive impact on the performance of the individual, and also must be an appropriate technology with the tasks carried out. It is essential to understand that the use of more systems will not necessarily lead to success, it is not important for the organization to use technology like other organizations, but it is important to take advantage of it. Also, the study has showed that there is a relationship between task characteristics, technology properties, individual characteristics, and user ratings to task-technology fit. Kolbjørnsrud, Amico and Thomas (2016) believed that Artificial intelligence will soon be able to do administrative tasks that consume more than half of managers time in tasks, coordination and control faster and better and at a lower cost. Managers who deal with artificial intelligence as researcher, explorer, analyst, work evaluator, in addition to giving the organization different scenarios to solve problems. All these will make them the organization trust their advice and take them as advisor in the decision-making process. Artificial intelligence will prove to be the cheapest, most efficient and objective invention for human beings, but that does not mean that managers should be distracted, they will concentrate on things that none can do except humans, such as judgment, empathy, and data formulation (Kim & Park, 2018). They are the ones who input data and operate the device. However, on the other hand, we must know that the extent and dimensions of the value of information technology depend on external and internal factors of companies in addition to their regulatory resources with the competitive environment in which it operates. The absence of these factors will negatively affect organizational performance

(Melville, Kraemer & Gurbaxani, 2004). Kumar, Pandey and Kaushik (2017) have pointed out that, the process of selecting best candidates depends on the identification of the skills and job requirements from job descriptions, and then the candidates submit the CV, which the human resources staff arrange manually and after that choose the best. This process takes a long time for staff.

By using smart technology, the system will receive millions of CVs and match them to the database to choose the best matches using the least time and cost. This is much better than traditional methods. Choi, Lee and Yoo (2010), in their study investigating the impact of information technology and memory systems on the team performance, have found that the system of mutual memory helps to share knowledge among members and this way positively affects the performance of organizational teams. Al-Hosani et al. (2017) have focused their study on the electronic procedures in the Directorate of Human Resources Management in a selected organization in the Kingdom of Bahrain through its ability to reduce the use of paperwork and to improve performance and speed of delivery. The results of the study have shown that hardware and software collect, organize, and analyse information and data to be retrieved in quantity, quality, and timing required (Laudon and Laudon, 2006; Alter, 2002).

All of the above helps to prepare reports, records and all the organizational procedures and functions. It also maintains employee records as well as the importance of training employees to use available technology. Strohmeier (2018) has conducted a Delphi exploratory study to determine whether in the future human resources management can link the Internet business to be an independent management. The result has showed that there is a significant development in human resources management of the Internet and its functions. There were many results indicating that there would be considerable online adoption in the procurement management functions which will change the organizational functions, and the qualifications required to deal with these developments. Because organizations must follow the technological developments and try to take advantage of them as much as possible, Using the cloud must be used to store document, and significant information in one place, so that it is safe and can be accessed in any time through the internet (Stone, Neely & Lengnick-Hall, 2018).

2.2.3 The Double Affect Influences

Motivation: Ajang (2007) distributed a survey to know student opinions on what incentives are best for them among a list of ten motivational factors to motivate them to work in the future. Respondents identified promotions, recognition, expectations, good salary, organizational /management styles, and satisfaction, which was the most important compared to others. Job

satisfaction was the primary motivation for work and performance, regardless of age or sex differences among respondents. Another study conducted by Zaza (2014) explored the role of work motivation on employee performance, but this time it was done on teachers at a school in Port Clang, Selangor,

Malaysia. It was found that there is an apparent relationship between motivation and performance. Based on Johnson (1986), theories of motivation and productivity are used to measure the impact of incentives on performance. The result is that teachers enter the teaching field to help the student and their reward is to satisfy that goal (expectancy theory). They also found that work environment, its content, and training enhanced the effectiveness of the job and their satisfaction. They continued to perform their functions efficiently (equity theory). Also, when teachers have additional responsibilities for dealing with their students and have the power to control them, while improving their educational environment that will supports the idea that motivations affect performance (job enrichment theory). All of these factors supported the fact that incentives affect workers, which drives them to perform better. The organization must improve their motivational update techniques to enhance staff ethics performance and production (Maduka & Okafor, 2014). Furthermore, demographic factors such as gender, age, and educational qualifications do not affect the results of the study when using moral or material incentives to influence performance, due to the superior financial incentives on those factors in the stimulus (Al-Qudah, 2016). Nabi et al. (2017), in another study, showed that external motivation, job enrichment, performance appraisal, relationships and security, decision-making power, and growth opportunities have a significant impact on staff performance. However, for financial rewards, employees after a period will feel they need them again, which puts a financial burden on organizations. Also, in some cases, career enrichment may produce undesirable results, and some staff feel stressed by increased burden and responsibility, especially for employees who are not entirely motivated by achievement. Likewise, rewards have a significant effect on engagement, and employee engagement will be motive to enhance organizational performance (Waqas &Saleem, 2014). In addition, Al-Nsour (2011) explained that financial incentives a positive and important role in motivating performance, but they may also negatively affect the employee performance. Incentives, if are not relevant to the goals' achievement, fair and timely, will not only lose their relevance, but they will have a negative impact. Staff will want to receive it without merit and without any further effort

Job Satisfaction: Yee (2018) has viewed the connection between job satisfaction factors and job performance among academic staff in Malaysian private universities. In his study, job

satisfaction such as job security, relationship with colleagues, recognition, advancement, working condition, and remuneration. He discovered that the rewards had nothing to do with academic members, while recognition factor was the most active influence on their performance. Argyle (1989) has argued that the relationships between job satisfaction and performance are not stable. There is a link between absenteeism and satisfaction, also between turnover and satisfaction, but it is stronger in the case of turnover. Moreover, the relationship between low satisfaction and turnover is clear. McGuigan (2015) has investigated a role of satisfaction and it is connection with other work factors and their effect on performance. The result has displayed that psychological health performed as a moderator in the link between job satisfaction and absenteeism. Also, there was a considerable indirect effect of workplace stress on job performance through task-orientated coping. Furthermore, there was a considerable indirect impact for work motivation on job performance passing through innovation and task orientated coping.

Abid (1990) has questioned whether a critical link exists between job satisfaction and job performance; and what variables affect it. The result has shown that both the type of leadership and the characteristics of the job, if presented in a positive way, such as independence, feedback on their performance, job relevance and rewards, would have a substantial impact on both job satisfaction and job performance. He also found a cause/effect relationship between job satisfaction and performance; each factor will affect the other alternately. Another study has been conducted by Hasham (2004) to identify the extent to which satisfaction is a prerequisite for motivation to develop performance and productivity. The results presented direct measures of behaviour toward participation, interactions, and satisfaction. It also explained that when the needs of the work environment, such as appreciation progress, responsibility, growth, creation, and challenge at the workplace, have been satisfied, this will encourage a sense of belonging which leads to motivation. The study also states that the Democratic leader who has communication skills and gave the opportunity to employees to participate in the decision-making process and tries hard to make them feel satisfied toward their work environment, that feeling will enhance and develop their performance and productivity.

2.3. Analysis of The Previous Empirical Research

Previous research studies indicate that AI is at the heart of many modern HR management systems. Numerous modern HR management systems, such as HireVue's "conversational AI-powered recruitment platform," "textio," and "Dataiku," are built on AI. Their benefits and drawbacks are determined by their efficiency and effectiveness. Currently, the metrics for

efficiency and effectiveness of AI in HRM have sparked the interest of many researchers worldwide, who have made significant contributions to its development and implementation. Theoretical research on the use of artificial intelligence in human resource management is advancing rapidly; that is, interest in the use of AI in HR management is rapidly advancing theoretically (Bhardwaj et al., 2020; Kolbjrnsrud et al., 2016; Tambe et al., 2019; Abdeldayem and Aldulaimi, 2020). It is important to note that the aforementioned works (see Table 2.1) continue to focus on system evaluation and the development of specific methodologies that were never implemented. However, little discussion has taken place about how to use certain AI technologies, as well as how to evaluate the tools for usage in real-world applications. As a result of prior successful implementations of AI in HR management, inspired by the works of Masum et al. (2018), Qamar et al. (2021), and Strohmeier and Piazza (2015), It is possible to establish decisively that prior research studies on AI in HR management did not pay sufficient attention to the practical and intricate problems in HRM that involve uncertainty.

Table 2.1 Summary The Previous Empirical Research

Author(s)	Concept	Key Findings
Goodhue and Thompson (1995)	Propose a study to better understand the relationship between information systems (IS) and personal performance.	According to the findings of the study, the usage of information technology should have a positive impact on an individual's performance, and it should also be a technology that is appropriate for the tasks that are being performed.
Kolbjørnsrud, Amico and Thomas (2016)	The fact that AI will prove to be the most affordable, most efficient, the study investigated the impact of AI on HR.	It is revealed that AI will soon be able to perform administrative duties that currently spend more than half of a manager's time in tasks, coordination, and control in a faster, more efficient, and more cost-effective manner All of this lead to the company putting their trust in their AI-based system as an advisor in the decision-making process.
Masum et al. (2018)	Automated learning and knowledge-based approaches for human resources management	Data can be collected without human intervention, stored, summarized accurately, processed to derive new information to support the decision-making process
Tambe et al. (2019)	Causal reasoning, randomization, and process formalization are conceptualized for economically efficient and socially appropriate AI-	The decision-making impact of AI on workforce analytics has been investigated. Operation, Data Generation, Machine Learning, and Decision Making are proposed life cycles for an AI-supported HR practice.

	management of human resources.	
Abdeldayem and Aldulaimi, (2020)	Study the adoption of AI in Human Resource Management for Public Sector In Bahrain	The finding indicate that HR jobs can save time by using AI to do administrative tasks, reduce the workload of shared service centres and help desks by performing HR transactions, recruit, and keep employees, and measure the return on investment (ROI).
Bhardwaj et al. (2020)	investigate the relationship between AI and human resource functions in the information technology industry of Delhi region of India.	The finding indicates that there is positive relationship innovativeness and ease of use of AI in human resource operations. That is Innovativeness and user-friendliness have a strong correlation with the impact of artificial intelligence on human resources (HR).
Qamar et al. (2021)	The study uses content and structural analyses to determine the scope and impact of AI applications in HRM operations,	HR can benefit from AI in learning and development, in performance evaluation, and in payment as well it is expected to go in the future implementation to "Expert systems" and various form of Artificial intelligence (AI)
Mehraj and Baba, (2019)	The study evaluates the use of intelligent computer-aided technologies to automate the career advising and counselling process.	The study's findings revolve around the consideration of many AI-based career assistance and counselling methods. It shows that the right technique for identifying AI use in HR is an individual's personality traits, and in order to gain fresh insights about career trajectory, trends, and success determinants, appropriate data must be gathered and analysed. By AI
Strohmeier and Piazza, (2015)	Identify AI's potential in HRM and proposed incorporating AI into HRM in order to improve performance over time.	According to the findings, AI has a lot of potential in HR management. Human Resource Management (HRM) professionals have made a variety of proposals on how to make better use of AI in HR.
Kumar, Pandey and Kaushik (2017)	Proposed the usage of smart technology to be employed to receive millions of CVs and match them against a database in order to select those who are the best matches.	The findings, indicate that the process of selecting the best candidates is dependent on the identification of skills and job requirements from job descriptions, and that smart technology makes this process much less time-consuming than when candidates submit their CVs, which the human resources staff arrange manually and then select the best candidates.
Al-Hosani et al. (2017)	Proposed an electronic procedures to be used in the Directorate of Human Resources Management in an	According to the findings of the study, the computing resources in AI responsible for collecting, organising, and analyzing information and data should be within the acceptable quantity, quality, and timeframe required. Hence this will

	organisation selected in the Kingdom of Bahrain.	alleviate the manual use of paper and improve performance as well as deliver information more quickly and efficiently
Strohmeier (2018)	Delphi exploratory study to ascertain whether human resource management in the future can be linked to the Internet business in order to function independently.	There has been substantial advancement in the management of human resources for the Internet and its activities. As a result of these advances, several reports suggested strong online usage in procurement management functions.

Following the evaluation of the relationship between artificial intelligence and human resource functions, it was discovered that there is a positive relationship between innovativeness and the ease with which artificial intelligence may be used in human resource operations. It follows that one of the efficacy and efficiency criteria is based on the concept around the AI tool, as well as the tool's user-friendliness (Bhardwaj et al., 2020). Additionally, it has been demonstrated that artificial intelligence is both economical and efficient when it comes to HR operations. It has reduced by more than half the amount of time a manager spends on tasks, coordination, and control. Therefore, time is of the essence in this case. As a result, enterprises must place their trust in artificial intelligence as a decision-making process tool (Kolbjrnsrud et al., 2016). It was also discovered that causal reasoning, randomization, and process formalisation are economically efficient and socially appropriate for AI-management of human resources since they lead to the life cycles of an AI-supported human resources practise (Tambe et al., 2019). This is some of the evidence that prior research suggested may be used to demonstrate how the efficiency and effectiveness of artificial intelligence in human resource management could be improved. Unfortunately, AI and human resource functions were not explicitly examined. The prior studies did not provide a critical explanation or justification for the outcome of the effectiveness and efficiency criteria surrounding AI technology HR management. More importantly, despite the fact that prior research found AI to be both affordable and efficient in HR operations, the current research does not show the states in which AI is both affordable and efficient. Given that speed of operation metrics are required for AI application in human resource management, this research found that there was a deficiency in appropriate provisions for the amount of speed metric in the evaluation of AI-based HR Management. Furthermore, despite encouraging trust in AI in the decision-making process, there are no criteria for the decision-making offered by the previous research.

Previous research has established that the use of information technology has a positive impact on an individual's performance (Goodhue & Thompson, 1995). This entails that implementing a tool that automates a manual system, not only makes the operation more effective and efficient, but also ensures that individual performance improves. This study provides credence to the idea that enabling automation results in improved individual performance. Similarly, it was revealed that there has been significant progress in HR management and its activities on the Internet (Strohmeier, 2018). That is, advancements in the Internet have a significant impact on the use of AI in HR management. As a result, AI for HR management is widely used in the public sector (Abdeldayem and Aldulaimi, 2020), its implementation could widely be applied in an online synchronous mode. This claim gives support to the notion that AI in HR management has the potential to expand to include hitherto unimagined schemes. Furthermore, previous research has also highlighted the scope and impact of AI applications in human resource management operations (Qamar et al., 2021) It is expected that in the future, AI in HR management can be beneficial in performance evaluation, and various forms of organizational operations. The scope of the AI applications described in previous studies does not include the underlying effects that will influence the success of AI adoption in HRM. Despite AI's potential in HRM and the ease with which it appears to improve HRM performance over time, previous studies lack of ways to improve AI in HRM (Strohmeier and Piazza, 2015).

2.4. Summary

The second chapter was about the literature review for the factors which affect the employee performance. The researcher has divided them into three factors as internal influences that stem from the employee and the external influences that come from the work environment. in addition to have other influences that have an internal and external impact,' which he called the double effect factors. By presenting these effects and their relationship to performance, the researcher concluded the importance of the employee's knowledge of the job description, because no matter how smart, loving and knowledgeable employees are, they will not be affected by the expected efficiency without the employee's knowledge of the job description of his job. Therefore, it was important to provide the job description for each employee, in addition to the work procedures for their jobs to ensure that the employee knows his duties and responsibility and how to perform them as required. It also has to rely on periodic performance evaluation of employees to know their level of performance to quickly intervene to amend deficiencies or to know how to benefit from high-productivity employees.

In this study, the researcher will focus on using a program to evaluate the performance of employees that is based on job description, work procedures, and artificial intelligence. These technologies can deal with information by collecting it with other data, and then saving processing and, retrieval with linking them with to other information and data, and they also put many alternatives to solve problems safely, quickly and accurately in a way that humans cannot do.

The use of artificial intelligence helps to choose the best decisions using the availability of all information and data, extract the correct ones to develop alternatives and choose the most appropriate one. They are smart organizations that I organizations benefit from artificial intelligence, which integrates a range of different technologies together to give a high-quality output in the least time and effort and cost. Computers are also able to reduce the costs of information processing, communications and coordination of Artificial intelligence by reducing costs and improving the quality of production will help organizations to operate and increase their production with the highest efficiency beyond human perception. We must know that the value of information technology is determined by the ability to use it by individuals and their suitability with the tasks they perform. Finally, the ability of smart devices and programs to collect, organize, analyse and retrieve information in a timely and efficient manner makes reliance on it not an entertainment, but an administrative responsibility for organizations' success.

Chapter 3 - Research Methodology

3.1. Introduction

As defined by Neuman (2006), research is the systematic investigation of a problem or phenomenon in order to find a solution to it in an organised manner. These methods, which involve a systematic process of gathering, analysing, and interpreting information, aid in improving understanding (Leedy & Ormrod, 2005). The introduction and literature review in the two preceding chapters discussed the significance of artificial intelligence in the development and improvement of the job description process, respectively. This chapter discusses the fundamental concepts and principles of research methodology, which are used to determine the strategy that will be used to achieve the objectives. Furthermore, it provides an explanation of the rationale for the selection of the questionnaire, its design, and the samples used in the research. In addition, it describes the tools and procedures that were used in the study, as well as the methods that were used to analyse the data that was collected (Ahituv et al., 2002).

3.2. Research Methodology

It is critical for the researchers to understand the research philosophy since it will aid them in designing their research and identifying data collection methods and statistical tools and techniques for analysing and evaluating outcomes. This current research discuss the methodology adopted in order to clarify the approach of presenting the research outcome. Creswell (2007) has defined Ontology as the study of the nature of reality, its properties, and social phenomena. It explains the researcher's perspective on reality as subjective or objective assessment (Blaikie, 2003). Subjective implies that someone interprets reality according to his personal beliefs and emotions (Nussbaum, 2003). As a result, this will have an effect on research, both in terms of site selection and interpretation (Burrell and Morgan, 2017). On the other hand, it may view reality objectively, which implies the research would refrain from imposing various viewpoint on towards solving problem (Bryman, 2008). In this approach, the research will be regarded as the social phenomenon driven-research revealing the truth from opinions cannot change. Indeed, it is the researcher's goal to uncover there is free of intervention or alteration in the course of undergoing the research (Orlikowski & Baroudi, 1991).

This current study utilised a quantitative method based on questionnaires to collect data, relying on mathematical and statistical methods to get precise results. The research then analysed data objectively and neutrally, avoiding interpretative ideas based on subjectivity in interpretation.

3.3. Research Philosophy

It is significant that researchers are capable of pinpointing which of the epistemological traditions will be chosen to work with (Grbich, 2007). From an academic point of view, research is significant to discover the relationships between variables using the methodology of scientific research to add new scientific facts to the fields of knowledge. Research is divided into three types: exploratory, descriptive, and explanatory research.

Exploratory research is used to verify a problem that was not previously studied clearly to obtain a better understanding. It helps to design a better search for the method of collecting data and selecting topics. This type of research is based on qualitative methods (Swedberg, 2020).

Descriptive research is a method that describes the characteristics of a specific phenomenon or segment. It describes, explains and validates the hypotheses and does not address the reasons. It may also include quantifiable methods (Nassaji, 2015).

Explanatory research is a procedure for studying a problem that has not been well researched before. It explains the problem in detail by description but does not provide definitive solutions. It also helps to identify appropriate tools to determine the amount of information and the type of research that should be used (Decoteau, 2017).

Love et al. (2002) have clarified that there are two research paradigms which most researchers are following their research: 'positivism' and 'interpretivism'.

Positivism: Westwood and Clegg (2003) believed that reality is a stable situation that can be observed and described in an objective manner without intervention of the researcher. These observations must be subject to repeat testing (Guba & Lincoln, 2005).

Interpretivism sees that truth can only be understood through subjective interpretation, as it is difficult for the researcher not to influence his research and these interpretations are the product of previous scientific knowledge (Schwartz-Shea & Yanow, 2013).

This study is descriptive and explanatory. It aimed to describe and explain the importance of artificial intelligence in improving and developing job description and performance appraisal to raise the efficiency of employees' performance. In addition to defining the relationship between technology adoption and the use of technology and the relationship between using technologies and job descriptions and performance appraisal. The researcher in this study has

followed the research paradigm (Positivism). He has identified the research problem by observing the conditions of work during his work as an administrator and as a lecturer. He believed that using technologies, especially artificial intelligence, would positively affect the Provence developing.

The researcher has developed hypotheses which have derived from his reading in science and theories (Avison & Malaurent, 2013; Myers & Kwon 2013). Then, the researcher has collected information and data in the correct and reliable ways through a quantitative approach (questionnaire) (Westwood & Clegg, 2003). The researcher considered the questionnaire's results as a fact that has represented the research sample 'respondents', which were representative of the research community. That fact has been statistically analysed in an objective manner which has meant the researcher has not interfered by giving his self-explanation, so the results can be generalized (Sayer, 2010).

3.4. Research Design

Parahoo (2006) has defined that research design is a description of the study's goal, factors affecting the desired outcome, and its associated questions (such as what, how, when and where) that relate to data collection and analysis technique, with the clarification of data collection techniques and sample selection approach and how the extracted data will be analysed (Gray, 2004). When a researcher is designing his research, he will focus on two questions; will he test an existing theory? Or build a new theory; will he follow the deduction or induction Concept? (DeVaus, 2001).

The researcher in this study has used deduction, which was logical thinking that depends on the correct information (previous theories) obtained by the researcher. Because the researcher would like to prove correct results, he would begin with putting hypothesis, then he tries to verify them by using results of previous research and analysis the questionnaire results, so he can obtain specific and valid conclusions.

3.5. Quantitative Research

According to Fellows and Liu (2008), quantitative research relies on objective external facts rather than a subjective inference (Easterby-Smith et al., 2002). It uses statistical techniques and tables to distinguish and infer facts and causal relationships between variables and their relationships with each other (Naou, 2002). Also, it recognizes relationships with theories, assumptions or previous research findings. This research is distinguished by the objectivity of the researcher, as there is neither interference nor bias during research.

The researcher in this study has used quantitative method research because it is more suitable for the type of required information and purpose of the study. He has used a questionnaire to find out the respondents' opinions to test the hypotheses. Because the data which will be obtained are related to the scientific theories conception and came out as a questionnaire's result, it was logical that it would be fact. This fact has been explained in an objective manner because it was not related to social or psychological matters that require the qualitative method to interpret.

In addition, the questionnaire data has been analysed by using statistical techniques, to clarify the causal relationships between variables and their relationships with each other (Picciano, 2004).Moreover, the researcher used the results (the guide) to evaluate the research hypothesis and come up with generalize facts without bias (Golafshani, 2003).This fact will clarify the importance of artificial intelligence in developing and improving the performance appraisal and job description process to raise the efficiency of employee performance.

The quantitative elements are the responses to a one-dimensional five-point scale closed-ended question on "Technological Artificial Intelligence Role in Raising the Efficiency of Employee Performance as HR Management Objectives," ranging from 1 (strongly disagree) to 5 (strongly agree). As a result, the quantitative elements measured are: "Performance appraisal with 11 items", "Performance and Software Benefit with 6 items", "Performance Aims/objectives with 5 items", "Job Description with 13 items", "Clarity with 8 items", "Importance with 5 items", "Utilisation of Artificial Intelligence with 11 items", and "Technology Adoption Factors with 8 items". The rationale for using a quantitative approach in this study is that the research will result in the development of theoretically based hypotheses. The type of element that is included in the qualitative portion of this research, on the other hand, includes impressions and perspectives gathered through observation and responses to open-ended inquiries, involving the impact of artificial intelligence in performance appraisal systems on employee performance. This was accomplished through the use of ten open-ended questions (see Tables 6.6 to 6.10).

3.6. Background of the Research Hypotheses Formulation

Hypotheses are guesswork and imaginations that translate expected research goals and results in a logical way. The researcher in this study has formulated hypotheses based on the results of the researchers' theses and readings of articles and papers that were related to his study, in addition to his observations, personal experiences and his experiences in administrative work and as a lecturer in the College of Business. The researcher has used nine hypotheses to find

out the relationship between two variables, the independent which leads to changes in the result, and the others, a dependent variable (Performance Appraisal, job description) that are affected by the independent variable.

The researcher in this study has formulated the simple and the alternative hypothesis (the alternative directional hypothesis) in an accurate, concise, and consistent way with scientific facts. The good formulation of hypotheses has helped the researcher to collect data which was only related to the research problem. The researcher has tried to verify the validity of the hypotheses to measure the evidence supporting it or against it as accurately as possible.

3.7. Data Collection

Collecting information is one of the longest stages of scientific research. The researcher is faced with many ways to collect his information and he has to choose the most suitable methods for the subject of his studies (Walliman, 2017). There are several methods which are used by researchers such as interviews, observations, case studies, documents and records and surveys.

3.7.1 Information Collection Method

The researcher must identify all information collecting methods to choose the appropriate one for his research. In this current study, the researcher has chosen a questionnaire as a tool for collecting information, because it is the most appropriate method for his subject and purpose. In addition, using a questionnaire has many benefits, such as speed, access to distant places, while covering a large number of respondents in a short time, with low cost. In addition to that, obtaining a written data because the respondent's opinion has not been affected by the researcher and the respondent does not need to clarify his identity (Wright, 2005).

Data collecting is the hardest and longest stage of research. It can be a big problem for a researcher because most of its problems are due to things beyond the researcher's abilities. Those problems include the difficulty of obtaining permission to distribute the questionnaire, as well as the lack of interest of individuals to answer or lack of understanding for some questions.

Fortunately, the researcher has not faced such difficulties, because he was a member of Jeddah University which has facilitated getting permission to distribute the questionnaire. The Dean of Business Administration College orders the Department of Human Resources to distribute the questionnaire through social media platforms to all faculty members and other administrators in all their faculties. The researcher's telephone number is attached to the questionnaire in order to communicate with him if there was any query regarding the questions.

Due to the clarity of the questions and the high level of respondents' education as well as, their daily dealings with the computer, there have been no questions about the questionnaire. As a result, respondents clearly understood and answered all questions.

3.7.2 Questionnaire Design

In this study, the questionnaire was divided into five sections that included demographic questions, and other four sections that related to performance appraisal, job descriptions, artificial intelligence and technology adoption factors. These questions are designed to illustrate the importance of artificial intelligence in improving job descriptions and performance appraisal which leads to improve employees' performance. Demographic questions were used to help researcher to understand the general characteristics of the respondents, thus facilitating the analysis of the data.

As much as possible, the researcher tried to have 43 as an appropriate number of questions to cover all aspects of the study, to not negatively affect the respondent's desire to fill out the questionnaire. To verify the validity of the questionnaire, it has been verified by comparing it with a previous questionnaire for a similar study.

Both closed and open questions were used by the researcher. The researcher also used the 5-point Likert standards to allow the individual to express the extent of his or her consent to the questionnaire (ibid). In order to ensure that the questions are properly organized, the researcher focused on formulating the questions in a clear, precise and simple manner to avoid ambiguity (Churchill & Iacobucci, 2002). The ambiguity of a question may increase the probability of rejection or incorrect answer to the question, which lead to error in the measurement process.

In addition, the questions were asked in a sequential manner, ranging from the general concepts of performance appraisal and job description to the importance of artificial intelligence and technology adoption. That question would help to find out the respondents' attitude towards the relationships between the search variables which help to improve the job description process and performance appraisal, thus as a result increasing the efficiency of employees' performance.

The researcher divided the questionnaire into five sections to help the respondent to understand the purpose of the questionnaire, thus, to arrange his ideas (Churchill & Iacobucci, 2002). Finally, the questions were reviewed several times before distributing the questionnaire, to make sure that they were clear and not repetitive (Brace, 2018).

3.7.3 Questionnaire Validity

After reviewing the questions, the researcher in his study has verified the questionnaire validity and reliability by taking several steps as follows:

- Using Cranach's alpha to measure scale reliability and the questionnaire internal consistency. The scale gave very good results which have confirmed the reliability of the questionnaire.

- The questionnaire was approved by the research ethics committee at Brunel University.

- As a preliminary test, the questionnaire was distributed to a small number of 40 respondents to test the clarity of the questions. Just as the researcher expected, there were not any objections or clarification requests, except for some administrators about knowing the exact meaning of artificial intelligence. Based on this observation, a definition of artificial intelligence was attached to the questionnaire.

3.8. Sample Study

3.8.1 Introduction

When conducting a survey, the researcher will not be able to take the opinions of the entire population, therefore he must resort to taking a fraction of them. This fraction is called a sample. It is the selection of a small number of the total population that has the same characteristics of the original community to which he belongs to participate in the study.

When sampling, researchers should include elements of the target population that must be sampled (Churchill & Iacobusi, 2002). After selecting the target items, the sample type is selected and then the appropriate size is determined. The appropriate sample size will give representative data as a result of studying the population. In addition, the larger the sample size, the more accurate the study will be, and the researcher will be able to generalize it.

3.8.2 Sample Types

Choosing the appropriate sampling for the study, which represents the overall characteristics of the population, is not easy, the researcher must identify the different types of sampling to choose the appropriate one (Schreuder et al., 2001). Choosing the wrong sampling will be wasting time, money and at the end will negatively affect the study's results (Sekaran & Bougie, 2016).

There are two basic types Methods for selecting the sampling: the probability sampling and the non-probability sampling (Bell et al., 2018). The probability sampling includes simple random

sampling, stratified sampling, cluster random sample, and systematic sampling (Peregrine, 2019). The non-probability sampling includes convenience sampling, purposive sampling and the snowball sampling (Rahi, 2017).

This study adopted both purposive and convenience sampling techniques. The purpose of selecting this sampling technique was designed to include specific elements relevant to the nature of the study and its objectives (Emerson, 2015). The members of the sample were chosen by the researcher from among university faculty and administrators in order to ensure that they had prior experience working with computers based on the purposive sampling technique. Furthermore, the convenience sample characteristics were chosen because the majority of their members were related to the researcher's location and field, as well as other easily accessible locations. A sample size of 341 people was obtained, and it was distinguished by the fact that its members had to have a higher level of education in order to assess the significance of the study and interact with it by providing data appropriate to their level.

In addition, it is essential for the participants to be computer users and have knowledge to realize its importance in recording, archiving, retrieving and analysing data, and providing accurate results in record time (Rahi, 2017). The justification for conducting a personal interview with ten managers is based on the fact that in interviews, the sample size is justified as being suitable if the data obtained reaches saturation for the purpose of constructing a grounded theory (Creswell, 2017). Thus, according to Charmaz (2006), the exact number of samples for interview during data collection should be limited to no more than two participants if the categories (or themes) have reached saturation level. As a result, the current study used a ten-person sample size, which is judged sufficient for producing credible data up to saturation. Section 6.4.1 contains information about the participants, all of them are males as indicated by their names.

3.9. Pilot Study

A Pilot Test is conducted as a preliminary study to determine the efficiency of what the researcher did before completing his studies (Bonett & Wright, 2015). It is important to discover the shortcomings and problems that were not expected. By this test, the researcher in his study has the opportunity to intervene quickly to make any amendments or cancellations of some hypotheses or the questionnaire, thus he will achieve the objectives using the least time, effort and cost (Nardi, 2018).

In this study, the researcher conducted the pilot test to the questionnaire by distributing it to forty respondents and asked them to give any feedback about the questionnaire importance and

clarity. Because the sample members were selected based on certain characteristics related to the research objectives, such as the level of education and experience in dealing with computers, there were no queries except some administrators who asked about the meaning of artificial intelligence as a concept. Thus, there was an opportunity to remedy that by setting a definition for Artificial Intelligence (AI) introduction of the questionnaire. The justifications for doing a pilot research include the necessity to assess the reliability of the questionnaire in order to identify whether or not there are any issues about the statement's simplicity of comprehension, smooth legibility, and overall clarity of the content, among other things. Its objective is to assist in determining the level of understanding and plausibility of the contents of the questionnaire among those who have completed it.

3.10. Research Validity and Reliability

Researchers always pay attention to the validity and reliability of their research, because both of them affect the efficiency of research results and the ability to generalize them. Validity and reliability are related to the tools which are used in research to measure everything related to the subject matter of the study (Heale & Twycross, 2015).

3.10.1 Validity

Validity is the ability and efficiency of the tools which are used in research to measure the intended measurement (research subject) (Andrade, 2018).

3.10.2 Reliability

Reliability is the degree to which the scale gives consistent results, that is, it yields the same results if it is returned again and under the same conditions (Borgonovo et al., 2016). So that the results are characterized by consistency which means that (results are close when the measurement is repeated despite the passage of time), in addition to achieving internal reliability, which means that the indicators are consistent with each other and with the subject of the research. Also, the reviewers have to gives close ratings to the same instrument.

3.10.3 Researcher Application for Validity and Reliability

In this study, the researcher, to verify the validity and reliability of his study, has done the following:

- To verify the face validity and the structure validity, the questionnaire was handed to two faculty members at the university, one of them specializing in Computers Science and the

other in Human Resources Management, for them to review the questionnaire and ascertain that it covers the concept required for research.

- To ascertain the direct correlation between the questions and their accuracy and clarity, the researcher conducted a pilot study by distributing the questionnaire to a group of 40 respondents.

- To verify the internal reliability of the questionnaire, he uses the Cronbach's alpha measurement to determine how the questionnaire questions relate closely to each other and to the research concept.

- The results of these procedures have indicated a high validity and reliability of the questionnaire, which motivated the researcher to move forward to analyse the data.

3.11. Research Ethics

Moral failure in research can cause great harm to the researcher, individuals and society. Therefore, it is important that the researcher adhere to the rules and ethical research standards, and be aware of what must be done, so he will ensure research integrity with no scientific accountability (Bell et al, 2018). There are many ethical standards associated with the rules of science and the social traditions such as prior consent, non-infringement, confidentiality and privacy.

In this section, the researcher will explain the method that has been applied in his study to achieve research ethics:

• **Informed consent**: In line with recommendations by Bossert, and Strech (2017), the researcher has obtained permission to distribute the questionnaire from the Dean of the Faculty of Business School at University of Jeddah and from the officials of the Department of Personnel Affairs at King Abdul Aziz University (Men /Women) through a media platform to all university employees.

• **Harmless:** The researcher has ensured that he has not caused any harm (physical, psychological, social, legal or economic) as a result of participating in his research by committing to the confidentiality and privacy of the participants (Thompson, 2018).

• **Confidentiality**: The researcher has kept the information confidential by not disclosing it to others and using it only to achieve the research objectives (Knapp et al., 2017).

• **Privacy**: The researcher maintained the privacy of the participants by not revealing their identity or mentioning their names in the questionnaire (Brener et al., 2002).

• **A right of withdrawal**: The researcher explained to the participants that they have the right to withdraw at any time during the research process if they feel uncomfortable (Kaye et al., 2015).

3.12. Data analysis

Data analysis is the processes which uses statistical methods to collect, organize, classify data and give results in order to draw conclusions that help to make decisions on the study subject (Menke, 2018).In the current study, after the researcher has distributed the questionnaire and obtained responses, he has used SPSS program (abbreviated from Statistical Package for Social Sciences)to perform statistical analysis and to reach a better conclusion about the usefulness of artificial intelligence to human resources management, specifically about job descriptions and performance appraisal. Using SPSS program, the researcher has obtained the following applications:

- Knowing the general description of the background of the sample and the percentages of all variable frequencies.
- Measuring the dimensions of the study, by using the 5-points Likert scale.
- Identifying questions which were related to each other by placing them into categories (components).
- Condensing data and items into a smaller number of summary variables that share similarities together into a factor/component by using exploratory factor analysis.
- Simplifying factors, where correlated items/extracts are loaded with a varimax rotation method.
- Sampling adequacy was tested for all factors through Kaiser-Meyer-Olkin Measure to ensure that factor analysis could be performed. The result has to be close to 1 and the result of Bartlett's Test of Sphericity must be significant, $p<0.05$.
- To know whether the questions are clear to the respondents or not, and measure the internal consistency (reliability), Cronbach's alpha has been used. The more the result is closer to 1, the more the question be obvious.
- Using descriptive statistics to show respondents' views on the eight factors extracted to determine their position. Most opinions range from agree to strongly agree.
- Because the descriptive statistics showed that the distribution of main variables' scores for eight variables were normal distributions, the researcher used independent samples t-test to measure differences between two independent groups (Male, Female) and Analysis of

Variance and ANOVA t-test to measure the differences between three groups or more (such as PhD, Master's degree, BA, Diploma, high school).

- The study analysed the relationship between gender differences, nationality, age, type of organization, and the impact of education according to two dimensions under performance appraisal (performance and software benefit, performance aims/objectives) and two under Job description (clarity and importance, knowledge and clarity) while the utilization of artificial intelligence and technology adoption factors both produced one factor each. The results have indicated that there was a positive connection between most analyses factors.

Pearson's correlation coefficient was used to show whether a linear correlation has been found between the various scales. The result showed that all dimensions were positively and significantly correlated with each other, which meant there was a consistency in scores between all scales related to attitudes and views. In addition, the researcher has used the linear regression to examine the impact of technology adoption factors (Artificial Intelligence) on the use of AI and the impact of the use of AI on performance appraisal with its two component factors (benefit and aims/objectives), also the impact of the use of AI on job descriptions with its two component factors (clarity and importance). On the other hand, it has tested the impact of job description clarity on performance appraisal with its two factors (benefit and aims/objectives), and the impact of job description importance on performance appraisal with its two factors (benefit and aims/objectives).

The linear regression analyses results confirmed the nine hypotheses by showing that a significant relationship exists between the independent and the dependent factors of the all hypotheses, which proves the validity of the hypotheses study, which were developed by researcher.

3.13. Predictive Analytics Techniques

A growing number of scientific methods are turning to AI and machine learning to help and develop predictive models that will speed up discovery (Gupta et al., 2021). Predictive analytics incorporates and performs prediction with the highest likelihood of success and the lowest amount of error possible (Zhang, et al., 2020) The goal of incorporating AI into HR management is to increase both the reliability and the speed of decision-making. For this reason, predictive analytical techniques, which include data modelling and machine learning, were used in this study. Predictive analytics has the ability to be applied to any type of unknown

event, to make predictions. Four techniques where adopted for this study, namely: Linear Regression, Genetic Algorithm Regression, Decision Trees, and Neural Networks.

3.13.1 Linear Regression

A simple and widely used kind of predictive analysis is Linear Regression (LR). Two aspects are discussed in the overall idea of regression: (1) does a collection of predictor variables do a decent job of predicting an outcome variable? (2) In particular, are the variables important predictors of the outcome variable and in what way do they affect the outcome variable? The relationship between one dependent variable and one or more independent variables is explained by these regression projections (Ludbrook, 2012).

Variable naming. There are several terms for the dependent variable of a regression: outcome variable, criteria variable, endogenous variable, or. It is possible to call the independent variables exogenous variables, predictor variables, or regressors. Determining the strength of predictors, predicting an outcome, and trend forecasting are three major uses for regression analysis (Vesey et al., 2011). A typical linear regression model prediction is shown in Figure 3.1.

The LR model has the following features:

- First, it is possible to use regression to assess the intensity of the influence of the independent variable(s) on a dependent variable.

- Second, it can be used to predict changes, consequences or impacts. That is, with a shift in one or more independent variables, the regression analysis lets us understand how often the dependent variable changes.

- Third, patterns and future values are expected from regression analysis. It is possible to use regression analysis to get estimates of points.
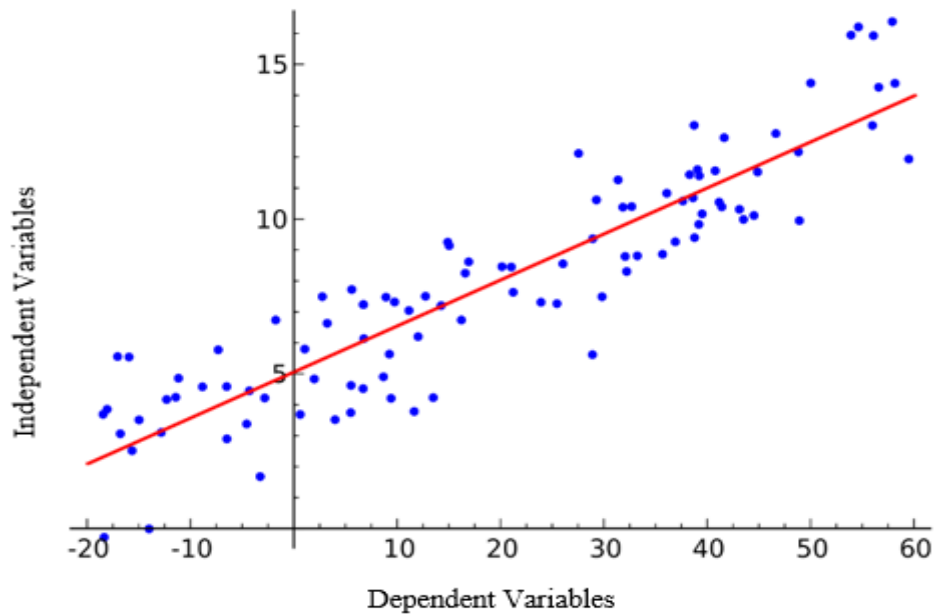
Figure 3.1 **Linear regression.**

A. Linear Regression Advantages

- Linear Regression is easy to implement, and the output parameters are simple to interpret.

- This algorithm is the easiest to use because it is less complex compared to other algorithms since you know the relationship between the independent and dependent variable has a linear relationship.

- Linear regression involves dimensionality reduction techniques, regularization techniques and cross-validation to improve its performance.

B. Linear Regression Limitations

- On the other hand, outliers can have immense effects on regression in the linear regression method, and limits are linear in this technique.

- A continuous relationship between dependent and independent variables is variously suggested by linear regression. That means that it implies that they have a straight-line relationship. It implies the attributes are independent.

- A correlation between the mean of the dependent variables and the independent variables is looked at by linear regression. Much like the mean is not a full description of a single variable, linear regression is not a full description of variables' relationships.

- Linear regression is prone to over-fitting

3.13.2 Genetic Algorithm

A genetic algorithm (GA) is a methodology of search-based optimization based on Genetics and Natural Selection principles. It is also used to find ideal or near-optimal solutions to challenging issues that would take a lifetime to solve otherwise. It is also used to solve problems with optimization, in science and in machine learning (Busetti, 2001).

For all mankind, nature has always been a great source of inspiration. Search-based algorithms based on the notions of natural selection and genetics are a GA. A GA is a subset of a much broader computing branch called Evolutionary Computation. There are a wide variety of concerns in computer science, including NP-Hard. What this basically means is that it takes a very long time (even years!) for even the most efficient computer systems to solve the problem. GAs proved to be an effective instrument in such a scenario to provide functional, near-optimal solutions in a short period of time (Reeves, 2010).

John Holland and his students and colleagues at the University of Michigan, most notably David E. Goldberg, developed GAs and have since been tested with a high degree of success on various optimization issues (Carr, 2014).

If there is a pool or a population of potential alternatives to the given problem in GAs, these solutions will undergo recombination and mutation, creating new kids, and over different generations, the process is repeated. A fitness value is allocated to each individual and a greater chance is given to the fitter individuals to mate and create more fit individuals (Lawrenson, Urli, and Kilby, 2017).

In nature, GAs are sufficiently randomized, but they work far better than random local search, as historical knowledge is often exploited.

A. GA Advantages

- Does not need any details for derivatives (which may not be available for many real-world problems).
- Compared to conventional methods, it is more reliable.
- Has very good capabilities in parallel.
- Optimizes both continuous and discrete functions and multi-objective topics as well.
- Provides a list of solutions that are "good" and not just one solution.
- You still get a solution to the problem, which gets better over time.
- Useful if the space for searching is very large and a large number of parameters are involved.

B.   GA Limitations

- GAs are not suitable for all problems, especially issues that are simple and for which derivative data is available.

- The fitness value is repeatedly determined, which can be computationally costly for some problems.

- Being stochastic, there are no guarantees about the solution's optimality or quality.

- The GA will not converge into the optimal solution if not properly implemented.

3.13.3 Decision Trees

A decision tree is a useful algorithm used for both regression and classification tasks for machine learning. The term "decision tree" comes from the fact that the algorithm proceeds to break the dataset into smaller and smaller parts until the data is split into single instances that are then categorized. If you were to imagine the algorithm's results, a tree and several leaves would mimic the way the groups are divided (Rokach & Maimon, 2005). How do Decision Tree function? They will allow you to know when to use them during your machine learning projects by getting a better understanding of how decision trees work, as well as their use cases (Rokach & Maimon, 2005).

A decision tree resembles a flowchart a lot. You start at the start point, or root, of the chart and then switch to one of the next possible nodes based on how you respond to the filtering criteria of that starting node to use a flowchart. If an end is reached, this process is repeated (Topîrceanu & Grosseck, 2017).

Decision trees function exactly the same way, with some form of test/filtering criteria for any internal node in the tree. The nodes on the outside, the tree endpoints, are the labels for the data point in question and are known as "leaves." Features or conjunctions of features are the branches which lead from the internal nodes to the next node. The paths that run from the root to the leaves are the rules used to define the data points (Topîrceanu & Grosseck, 2017) as shown in Figure 3.2.
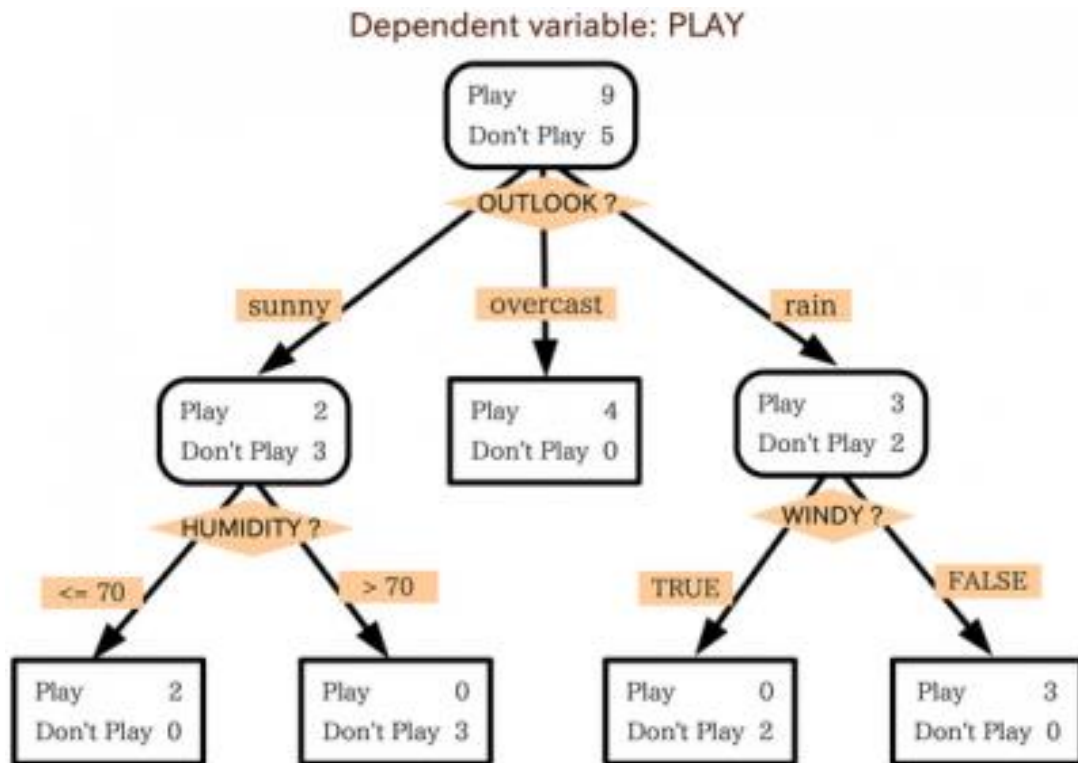
Figure 3.2 **Decision tree structure (Topîrceanu and Grosseck, 2017).**

A. Decision Tree Advantages

- Clear Visualization: As the concept is mainly used in our everyday lives, the algorithm is easy to understand, view and imagine. A Decision Tree's production can be easily interpreted by humans.

- Clear and easy to understand: a Decision Tree is very easy to understand and looks like simple if-then sentences.

- For both classification and regression problems, the Decision Tree may be used.

- The Decision Tree can accommodate both categorical and continuous variables.

- No scaling of features is required for a Decision Tree as it uses a rule-based method instead of distance calculation.

- Effective handling of non-linear parameters: Unlike curve-based algorithms, non-linear parameters do not influence the performance of a decision tree.

- The Decision Tree will process missing values automatically.

- For outliers, the Decision Tree is typically stable and can accommodate them automatically.

- Less Training Period: Training time is less because, unlike the forest of trees in the Random Forest, it produces just one tree.

B. Decision Tree Limits

- Overfitting: This is the primary issue that typically leads to data overfitting, which eventually leads to inaccurate predictions. It keeps creating new nodes in order to suit the data, and eventually the tree becomes too complex to interpret. It loses its generalization capability in this way. On the trained data, it works very well but begins to make a lot of errors on the unseen data.

- High variance: As described in point 1, the Decision Tree typically leads to data overfitting. Because of the overfitting, there are very high chances of high-performance variance, which contributes to many final estimation errors and shows high results inaccuracy. It contributes to high variance in order to achieve zero bias (overfitting).

- Unstable: Adding a new data point will contribute to the overall tree re-generation and it is important to recalculate and rebuild all nodes.

- Noise-affected: A little bit of noise will make it erratic, resulting in wrong predictions.

- Not suitable for large datasets: If the data size is large, complexity can evolve in a single tree and lead to over fitting (see figure 6.3).

3.13.4. Neural Networks

Mathematical models that use learning algorithms inspired by the brain to store knowledge are neural networks. Since neural networks are used in computers, they are called a 'artificial neural network' collectively (Liu et al, 2020).The word machine learning is often used in this field today and is the scientific discipline concerned with the design and creation of algorithms that allow computers, such as sensor data or databases, to learn on the basis of data. A major goal of machine-learning research is to learn to identify complex patterns automatically and make intelligent data-based decisions (Pereira, 2020).Machine learning is also closely linked to fields such as statistics, data processing, identification of patterns, and artificial intelligence. Neural networks are a common machine learning platform, but there are many other techniques for machine learning, such as logistic regression and support for vector machines (Liu et al, 2020). Currently, deep learning isbeing used which gives better accuracy than standard neural networks. However, they can look like black boxes, they strive to do the same thing as every other model deep down, in order to make good predictions (Bae, Kim & Kim, 2021).

A. Neural Network Advantages

- **Data:** One of the factors that enhanced the neural network's success is the vast amount of data accumulated over the last few years and decades. When they collect all the data and knowledge, neural networks offer a better result, while conventional machine learning algorithms reach a stage where more data does not improve performance.

- **Ability to function with incomplete information:** After ANN preparation, the data may produce performance even with incomplete information. Here, the output loss depends on the value of the missing data.

- **Fault Tolerance:** The corruption of one or more ANN cells does not prevent production from being produced. This role makes it fault-tolerant for networks.

- **Dynamic:** Neural networks are good for modelling with a large number of inputs with nonlinear data, such as images. In a strategy of tasks involving several features, it is efficient. It functions by breaking the classification problem into a layered network of simpler components.

- **Parallel processing capability:** There is computational power in ANN that can do more than one task.

- **Computational power:** Now, open computing power helps us to process more knowledge. Computational power is multiplied by a constant factor for each unit of time instead of being incrementally applied, according to Ray Kurzweil, a leading figure in Artificial Intelligence. This implies that there is an increase in computing power exponentially.

B. Neural Network Limitations

- Black box: The "black box" aspect of the neural network is one of the most distinctive drawbacks. That means we do not know how and why a certain performance has been generated by the neural network.

- Amount of data: Neural networks need much more data, as in at least thousands if not millions of labelled samples, than any other conventional machine learning algorithms.

- Computationally costly: Neural networks are more expensive than other conventional algorithms in terms of computation. It takes much less time to train most of the conventional machine learning algorithms, varying from a few minutes to a few hours or days.

- Proper Network Structure Determination: There is no clear rule for deciding the neural network structure. Via practice and trial and error, the required network configuration is achieved.

- The network length is unknown: reducing the network to a certain sampling error value means completing the training. The best results do not give us this benefit.

3.14. Summary

This chapter has described the processes and methods used by the researcher in his study and has clarified his belief in positivistic philosophy, which was the result of the researcher's conviction of importance research philosophy as a method for obtaining knowledge and discovering reality.

To achieve that, the researcher has developed several hypotheses and has tested their validity by collecting quantitative data by using the questionnaire. Also, the researcher's philosophy has influenced the type and size of the selected sample (convenience sampling, purposive sampling). On the other said, this chapter has shown researcher's desire to verify the reliability and ethical considerations. Finally, this chapter has shown that the researcher focused on how to analyse the data using statistical methods that gave numerical results which has helped him to explain the findings logically, so he could verify the research hypotheses. Detailed data on analyses will be extensively discussed in Chapter Four.

Chapter 4 - Data Analysis and Results

4.1. Introduction

This study is concerned with the use of Artificial Intelligence (technology) within Human Resources Management in way to improve the link between Job Descriptions and Roles of employees with the performance appraisal. This study used a questionnaire that looks at participants' views and attitudes towards technology and its usefulness within HRM settings. Overall, such views will enable the researcher to understand ways in which to improve HR relationship with Artificial intelligence for the benefits of employees. This chapter will discuss four main areas of concern to the researcher, mainly Performance Appraisal, Job Description, Utilisation of Artificial Intelligence and finally Factors that led to the adoption of technology i.e. Technology Adoption Factors. These dimensions were measured using a 5-pointLikert scale, each built of a number of items. This chapter will start by providing demographic and background details about the participants, then this is followed by an examination of each the aforementioned dimensions through Exploratory Factor Analysis. This is followed by an examination of the reliability of each of the extracted factors/scales. Extracted factors will then be described individually using general descriptive statistics (e.g., frequency, %) to look at each items and see the level of agreement generated by participants. Following this descriptive part of the analysis, this chapter will seek in-depth analysis of the results by conducting various Inferential Statistics to test group differences using demographic and background details about the participants (e.g., age, gender, education).

The process of analyses will enable the researcher to reach a better conclusion about the usefulness of Artificial Intelligence in HRM setting and specifically in relation to Job Description and Job Appraisal.

4.2. Demographic Variables

This section provides a general description of background and demographic characteristic of the sample used in this study. Overall, 341 took part, 66.3% were males and 33.1% were females. Their education and qualification varied where the slight majority of the participants had PhD level of qualification (34.3%), followed by bachelor's degree (30.2%) and 27.3% stated they have a master's degree. Only 2.9% had a diploma level of qualification and 5.3% explained they have completed high school level of education. As of the organisation they work for, the majority (66.9%) worked in the government sector and 33.1% worked in the private

sector. Finally, participants' nationalities varied where the great majority (83%) were Saudis and 16.4% were non-Saudis. Egyptians (10%) and Tunisians (3.8%) were the two main nationalities represented other than Saudis. Table 4.1 shows the frequencies and the percentages of all variables.

Table 4.1 General demographic and background details of participants.

Age	No	%	Gender	No	%	Nationality	No	%
18-25	10	2.9	Male	226	66.3	Saudi	283	83.0
26-30	22	6.5	Female	113	33.1	Egyptian	34	10.0
31-35	50	14.7	Missing	2	0.6	Jordanian	4	1.2
36-40	66	19.4	**Education**	**No**	**%**	Tunisian	13	3.8
41-45	45	13.2	High School	18	5.3	Sudanese	3	0.9
46-50	60	17.6	Diploma	10	2.9	Palestinian	1	0.3
>50	88	25.8	Bachelor	103	30.2	Lebanese	1	0.3
			Master	93	27.3	Missing	2	0.6
			PhD	117	34.3	**Grouped Nationality**	**No**	**%**
Organisation	**No**	**%**				**Saudi**	**283**	**83.0**
Government	228	66.9				**Non-Saudi**	**56**	**16.4**
Private	113	33.1				Total	339	99.4

Considering that males constituted the vast majority of the 341 respondents to this survey, it is reasonable to conclude that the gender difference in the research outcome reflects the fact that the findings were geared toward the impact of males. That is, the effect has a disproportionately negative impact on females. In a similar vein, the educational backgrounds of those who responded revealed that, because the vast majority were at the PhD level, experts had been engaged and the contribution of the research reflected desirable expert opinions. Another consequence of the demographic feature of this research is the nature of the respondents' places of employment, which was discovered to be primarily in the government sector, which lead to the contribution of the research to dwell on public perceptions of the issue being investigated. In conclusion, working with a majority of males, those with PhDs, and those in public service, all of whom are primarily from Saudi Arabia, suggests that the research is focused on feasible respondents that provide comprehensive and justified views on artificial intelligence in human

resource management. Finally, two missing data entries were discovered in the demographic variables, despite the fact that the problem of missing data is relatively common in almost all research. However, two missing demographic data entries out of 341 cannot have a statistically significant impact on the conclusions that can be drawn from the data. Because of this, the survey results are analysed in order to determine what questions were asked and what information was gathered. Hence the procedure followed after this is analysing the survey in terms of the answers gathered.

4.3. Exploratory Factors Analysis

This part of the analysis chapter is concerned with in-depth examination of the questionnaire's latent variables. The questionnaire was constructed to cover four distinct dimensions, namely Performance Appraisal (11 items), Job Description (13 variable), Utilisation of Artificial intelligence (11 items) and Technology Adoption factors (8 items). The dimensions were constructed in a way to answer the research questions/aims as set in the introduction (Chapter 1) about the role of technology in job appraisal. Each of these dimensions is considered unique and as a result each will go through Exploratory Factor Analysis to test if the items within represent any latent variables. This provides an extra validation procedure to enhance the questionnaire's ability to answer the research questions while unearthing new latent variables if present. By definition, Exploratory Factor Analysis represents a statistical technique used to condense data and items into to a smaller number of summary variables (latent variables) and to further explore and test the theoretical structure of tested subject. In other words, the groups' variables that share similarities are grouped together and then grouped under the name of a factor/component. By following Exploratory Factor Analysis, the data was examined using a method referred to as "Principal Component Factor Analysis"; this is used when there is a need to produce a minimum number of factors to represent a maximum proportion of variances within the data. A Varimax Rotation method is used to simplify factors, where correlated items/extracts are loaded. As an assumption, each factor analysis should be performed with an adequate sample. Sampling adequacy is tested through Kaiser-Meyer-Olkin Measure of Sampling Adequacy (closer to 1 the better) test and Bartlett's Test of Sphericity (has to be significant, $p < 0.05$). Sampling adequacy is an important test to ensure that Factor analysis could be performed.

4.3.1 Performance Appraisal

Performance appraisal, as a dimension within the questionnaire, was explored using 11 items. Principle Component factor analysis with Varimax rotation was conducted to see if these items could be represented by less factors. The sample was considered adequate as KMO was close to 1 (0.844) and the Bartlett's test of Sphericity was found to be significant ($X2 = 1049.9$, $p<0.001$), "df" stand for the degree of freedom, that is the amount of values that are allowed to change and yet accept the result and "Sig" represent the p-value for which it indicate the chance at which the results is significant (see Tables 4.2, 4.3 & 4.4). Overall, factor analysis produced two components/factors, both explaining a total variance of 49.83%. Both factors achieved an Eigenvalue above 1.

Factor 1: this factor had an Eigenvalue of 3.96 and explained a total variance of 36.07% before rotation and 29.91% after rotation. A total of 6 items showed high loading within this component, as represented in Tables 4.3 and 4.4. By carefully these items the factor was called **"Performance software benefit".**

Factor 2: this factor achieved an Eigenvalue of 1.51 and explained 13.75% of the variance before rotation and 19.91% of the variance after rotation. Five items loaded highly under this factor, these items are judged to represent "Performance aims/objectives"

Table 4.2 Sampling adequacy for factor analysis.

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.844
Bartlett's Test of Sphericity	Approx. Chi-Square	1049.992
	df	55
	Sig.	0.000

Table 4.3 Total variance explained by data within performance appraisal and factors extracted.

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	Variance (%)	Cumulative (%)	Total	Variance (%)	Cumulative (%)	Total	Variance (%)	Cumulative (%)
1	3.968	36.075	36.075	3.968	36.075	36.075	3.291	29.916	29.916
2	1.513	13.755	49.830	1.513	13.755	49.830	2.191	19.914	49.830

3	0.924	8.403	58.232							
4	0.867	7.877	66.110							
5	0.786	7.146	73.255							
6	0.679	6.175	79.431							
7	0.562	5.105	84.536							
8	0.498	4.529	89.065							
9	0.487	4.426	93.491							
10	0.414	3.761	97.252							
11	0.302	2.748	100.000							
Extraction Method: Principal Component Analysis.										

Table 4.4 The rotated component matrix including items' loading for Performance 2 factors.

	Component	
	1	2
Modern software with high capabilities for extracting, saving, analysing information and linking it to multiple relevant entities will help to accurately assess employee performance.	0.832	
A modern software will provide a more objective and realistic performance appraisal compared to a manual one	0.811	
Keeping employee-related information in one place, using safe, fast and accurate computer software enables management to draw a realistic picture of the level and skills of staff performance.	0.791	
Performance appraisal should be linked/matched to job description using a software within the Human Resources department	0.669	
The managers' decisions (positive or negative) are helped when an employee is aware of his/her performance appraisal outcome	0.497	0.400
A poor performance appraisal outcome necessitates reviewing job description	0.426	
Performance appraisal should be based on all aspects that impact employees' performance (e.g. ability, skill, behaviour, relationships and commitment)		0.766
Employees have the right to have access to their performance appraisal outcomes		0.692
Performance appraisal should be based on job description/role		0.648

Promotion/benefits must be based on performance evaluation results.		0.473
The main objective of performance appraisal is to assess employees' performance level relevant to their job description.		0.454
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.		
a. Rotation converged in 3 iterations.		

4.3.2 Job Description

Job Description entailed items concerning participants' opinions about their job descriptions as reflected by 13 items. Following Principal Component factor analysis, these 13 items were grouped into two main factors, explaining 57.08% of the variance within the data. The sample was considered adequate as per the KMO test (0.927) and the Bartlett's Test of Sphericity (X^2 = 2114.01, p<0.001) (see Tables 4.5, 4.6 and 4.7).

Factor 1: the first factor had an Eigenvalue of 6.39 and explained 49.18 of the variance within the data before rotation and 30.02% after rotation. By reviewing items with this factor, it was called "**Clarity**" which included 8 items (see Figures4.6 and4.7).

Factor 2: The second factor achieved an Eigenvalue of 1.02 and explained 7.90 of the variance within the data before rotation and 27.08 after rotation. By inspecting items within this factor, it was judged that they reflect "**Importance**" which included 5 items (see Figures 4.6 and 4.7).

Table 4.5. Sampling adequacy for factor analysis of a variable "Job description"

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.927
Bartlett's Test of Sphericity	Approx. Chi-Square	2114.012
	df	78
	Sig.	0.000

Table 4.6. Variance explained by data within job description and factors extracted

	Total Variance Explained								
	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.394	49.186	49.186	6.394	49.186	49.186	3.904	30.028	30.028
2	1.027	7.902	57.087	1.027	7.902	57.087	3.518	27.059	57.087
3	0.996	7.658	64.745						
4	0.669	5.145	69.891						
5	0.619	4.763	74.653						
6	0.544	4.186	78.839						
7	0.514	3.956	82.796						
8	0.490	3.773	86.568						
9	0.448	3.445	90.014						
10	0.364	2.797	92.811						
11	0.338	2.597	95.409						
12	0.320	2.462	97.871						
13	0.277	2.129	100.000						
Extraction Method: Principal Component Analysis.									

Table 4.7. The rotated component matrix including items' loading for the job description's two factors.

	Component	
	1	2
Job description allows and directs employees rather than asking others about the tasks they should perform	0.793	
An accurate job description facilitates employees' selection process	0.742	
Job description provides an employee clarity in his/her daily tasks	0.721	
Matching performance with jobs description ensures the right person in the right position	0.717	
Lack of clarity in job description negatively impacts employees' performance	0.570	0.441
Adherence to job description should be checked in performance appraisal	0.528	
Job description goals/activities must be realistic to be achieved and implemented	0.517	
Lack of clarity in job description leads employees to be dissatisfied and anxious in performing their job tasks	0.473	
Job description should be accessible to all employees as a reminder of their own tasks		0.809
To facilitate better communication and information sharing between different departments, it is necessary to use specialized, modern and appropriate techniques.		0.806
It is important that each job within an organisation has its unique job description		0.746
Lack of clarity in job description negatively impacts the performance evaluation/appraisal process		0.591
The HR department should review job description whenever significant changes occur in the organisation	0.403	0.532
Extraction Method: Principal Component Analysis.		
Rotation Method: Varimax with Kaiser Normalization.		
a. Rotation converged in 3 iterations.		

4.3.3 Utilisation of Artificial Intelligence

Utilisation of Artificial intelligence included 11 items each reflecting an aspect of how artificial intelligence is utilised. Principle Component Factor analysis was performed, and the sample was judged to be adequate based on KMO of 0.919 and Bartlett's Test of Sphericity ($X^2 =$ 1995.7, p<0.001). When inspecting the variances explained in the factor extraction, it was found that all data (11 items) are loaded under one factor only with an Eigenvalue of 5.90. This factor explained 53.67% of the variance before and after rotation. This clearly indicates that all items share similarity and can be explained by one factor only hence the factor here is called "Utilisation of Artificial intelligence" as originally designed as shown in Tables 4.8, 4.9 and 4.10.

Table 4.8 Sampling adequacy for factor analysis.

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.919
Bartlett's Test of Sphericity	Approx. Chi-Square	1995.719
	df	55
	Sig.	0.000

Table 4.9 Variance explained by data within utilisation of artificial intelligence under one factor.

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	Variance (%)	Cumulative (%)	Total	Variance (%)	Cumulative (%)
1	5.905	53.679	53.679	5.905	53.679	53.679
2	0.944	8.582	62.261			
3	0.920	8.368	70.629			
4	0.573	5.211	75.840			
5	0.542	4.931	80.770			
6	0.459	4.171	84.941			
7	0.449	4.079	89.020			
8	0.365	3.316	92.336			
9	0.309	2.809	95.146			
10	0.295	2.680	97.826			
11	0.239	2.174	100.000			
Extraction Method: Principal Component Analysis.						

Table 4.10 The rotated component matrix including items' loadings for Utilisation of Artificial Intelligence.

	Component
	1
To Integrate a variety of different technologies to achieve high quality output in the least time, effort and cost.	0.801
To improve communication and coordination	0.789
To increase business performance and production.	0.780
To connect job description with performance and training options	0.774
To reduce the costs and financial burden	0.742
To provide better decision making and problem's solving scenarios	0.738
To improve the decision-making process within the Human Resources department.	0.728

To obtain information with the possibility to change it and link it to other information in any other location and draw conclusions quickly, accurately and safely.	0.728
To collect, preserve, process and retrieve information better than traditional methods	0.682
To deal with an enormous amount of information to make substantive decisions.	0.643
To reduce human errors	0.632
Extraction Method: Principal Component Analysis.	
a. 1 components extracted.	

4.3.4. Technology Adoption Factors

The fourth dimension within the questionnaire looked at Technology adoption factors, this dimension was made of 8 items. Using Principal Component Factor Analysis all factors were loaded highly under one component which generated an Eigenvalue of 4.19 and explained 61.48% of the variance before and after rotation. The sample was judged to be adequate based on KMO test (0.905) and Bartlett's Test of Sphericity ($X^2 = 1632.6$, p<0.001). This factor reflects technology adoption factors as per the original name (see Tables 4.11, 4.12 and 4.13).

Table 4.11 Sampling adequacy for factor analysis.

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.905
Bartlett's Test of Sphericity	Approx. Chi-Square	1632.667
	df	28
	Sig.	0.000

Total 4.12 Variance explained by data within technology adoption factors under one factor

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	Variance (%)	Cumulative (%)	Total	Variance (%)	Cumulative (%)
1	4.919	61.484	61.484	4.919	61.484	61.484
2	0.877	10.964	72.448			
3	0.589	7.356	79.804			
4	0.445	5.563	85.367			
5	0.348	4.347	89.714			
6	0.319	3.992	93.706			
7	0.285	3.564	97.270			
8	0.218	2.730	100.000			
Extraction Method: Principal Component Analysis.						

Table 4.13 The rotated component matrix including items' loading within technology adoption factors under one factor.

	Component
	1
T5. Based on its ability to perform the tasks for which it was selected	0.841
T6. Based on compatibility with the organisation's financial and organizational human resources	0.841
T4. Based on good and proven qualities	0.813
Based on its ability to facilitate information (collect, organise, analyse and retrieve)	0.812
Based on availability of maintenance & trained staff	0.790
Based on the availability of appropriate regulated environment	0.781
Based on its applicability to job performance	0.741
Based on the ability of staff to use it	0.634
Extraction Method: Principal Component Analysis.	
a. 1 components extracted.	

4.4. Reliability

Following the Exploratory Principal Component Factor analysis this section further tests the reliability of each of the scales. To recap, factor analysis produced two dimensions under Performance Appraisal (*Performance and Software Benefit, Performance Aims/objectives*) and two under Job Description (*Clarity and Importance* while Utilisation of Artificial Intelligence and Technology Adoption Factors both produced one factor each. Cronbach's Alpha test was conducted to measure the consistency in answers across items within each of the dimensions (internal reliability) and each of the factors produced following Factor Analysis. This test enables the research to judge how reliable each of the scales is, i.e. how consistently items measure the same thing. Cronbach's alpha is a coefficient that ranges between 0 and 1 in size, where value close to 0.70 or above are considered acceptable. As can be observed from Table 4.14, all dimensions can be considered reliable. The highest

Table 4.14 Cronbach's alpha as a measure for internal reliability.

Dimension/scale	Items	Cronbach's Alpha
Performance appraisal	11	0.815
Performance and Software Benefit	6	0.793
Performance Aims/objectives	5	0.755
Job Description	13	0.913
Clarity	8	0.869
Importance	5	0.837
Utilisation of Artificial Intelligence	11	0.910
Technology Adoption Factors	8	0.903

Cronbach's alpha values ranged from 0.755 to 0.913 on a scale from one to ten, with 0.913 being the highest and 0.755 the lowest. According to the results of Cronbach's alpha, of the "Job Description" indicator is the highest set, indicating that the construct exhibited the maximum satisfactory level of internal consistency dependability and consistency reliability. All of the values were higher than the required threshold value of 0.70.

4.5. Descriptive Statistics

4.5.1. Performance Appraisal

This section looked at and reflected participants' attitude and opinions about performance appraisal in general. Overall, it includes 11 items and following factor analysis these items were grouped under two main factors Performance and Software Benefit and Performance Aims/objectives.

A. Performance and Software Benefits

Overall, 6 items looked at how employees' performance could be helped by the use of technology and a software specifically. By examining each of the 6 statements in Table 4.15, overall, it could be agreed that there is a positive opinion about the benefits of a software. This is seen by the total agreement (Agree + Strongly Agree). Almost 79% of the participants agreed with all statements. When considering them individually, it could be seen that the most agreement was generated for the statement "The managers' decisions (positive or negative) are helped when an employee is aware of his/her performance appraisal" (90.9% agreement). This illustrates the importance of increasing employees' awareness of his performance appraisal. This was closely followed by a statement reflecting the importance of software in which all information is kept safely in one place. The statement said "Keeping employee-related information in one place, using safe, fast and accurate computer software enables management to draw a realistic picture of the level and skills of staff performance" agreement here was generated for 89.7% of the participants. All other statements further illustrate the benefits of having a software for performance appraisal as shown in Table 4.15.

Table 4.15 Descriptive statistics and distribution of scores within the performance and software benefits.

	SD	D.	N.	A.	S.A.	Agreement
A poor performance appraisal outcome necessitates reviewing job description	3	14	46	152	126	278.0
	0.9	4.1	13.5	44.6	37.0	81.5
The managers' decisions (positive or negative) are helped when an employee is aware of his/her performance appraisal outcome	0	8	23	163	147	310.0
	0	2.3	6.7	47.8	43.1	90.9
	1	12	41	150	137	287.0

Statement						
Performance appraisal should be linked/matched to job description using a software within the Human Resources department	0.3	3.5	12.0	44.0	40.2	84.2
Modern software with high capabilities for extracting, saving, analysing information and linking it to multiple relevant entities will help to accurately assess employee performance.	3	6	36	155	141	296.0
	0.9	1.8	10.6	45.5	41.3	86.8
A modern software will provide a more objective and realistic performance appraisal compared to a manual one	3	7	61	138	132	270.0
	0.9	2.1	17.9	40.5	38.7	79.2
Keeping employee-related information in one place, using safe, fast and accurate computer software enables management to draw a realistic picture of the level and skills of staff performance.	1	10	24	161	145	306.0
	0.3	2.9	7.0	47.2	42.5	89.7

B. Performance Aims/Objectives

This factor reflects employees' attitudes and opinions about performance appraisal generally and what it should entail (i.e., its aims and objectives). By reviewing the five statements here there was an overwhelming agreement about the aims/objective of performance appraisal. The total agreement of each of the items explain much of their opinions. More than 87.7% of the participants showed agreement on all items. The highest agreement was found for the statement illustrating that "Performance appraisal should be based on all aspects that impact employees' performance (e.g. ability, skill, behaviour, relationships and commitment)", which received agreement from 98.5% of the participants. This is closely followed by 96.5% of the participants agreeing that "Employees have the right to have access to their performance appraisal outcomes". Table 4.16 further shows agreement that performance appraisal should be based on job description/role (95.6%) and performance evaluation results (89.7%) and finally there was

an agreement that the main objective of performance appraisal is to assess employees' performance level relevant to their job description (87.7%).

Table 4.16 Descriptive statistics and distribution of scores within the performance aims/objectives.

	SD	D.	N.	A.	S.A.	Agreement
Employees have the right to have access to their performance appraisal outcomes	2	3	7	70	259	329.0
	0.6	0.9	2.1	20.5	76.0	96.5
Performance appraisal should be based on all aspects that impact employees' performance (e.g., ability, skill, behaviour, relationships and commitment)			5	94	242	336.0
			1.5	27.6	71.0	98.5
Performance appraisal should be based on job description/role	1	4	10	134	192	326.0
	0.3	1.2	2.9	39.3	56.3	95.6
Promotion/benefits must be based on performance evaluation results.		8	27	136	170	306.0
		2.3	7.9	39.9	49.9	89.7
The main objective of performance appraisal is to assess employees' performance level relevant to their job description.	3	11	28	168	131	299.0
	0.9	3.2	8.2	49.3	38.4	87.7

4.5.2 Job Description

As explained earlier, job description as a dimension was divided into two factors following Exploratory Factor Analysis. The first was referred to as Job Description *Clarity* and *Job Description Importance*

A. Clarity

Job Description Clarity is explained through 8 items, all of which stress the importance of having job descriptions as it provides employee with clarity about their roles and tasks and how it can be linked to performance appraisal. Table 4.17 illustrates the importance of clarity where all statement provided received at least 92.7% agreement. 97.7% of the participants agreed that "Job description goals/activities must be realistic to be achieved and implemented". The great

majority also agreed on of an accurate job description in facilitating the employee selection process (95.6%), while ensuring the right person for the right job by matching performance appraisal with job descriptions (95%). Other statements further illustrate that clarity in job description is linked to better performance appraisal.

Table 4.17 Descriptive statistics and distribution of scores within the job description clarity factor.

	SD	D.	N.	A.	S.A.	Agreement
An accurate job description facilitates employees' selection process		4	11	151	175	326.0
		1.2	3.2	44.3	51.3	95.6
Job description allows and directs employees rather than asking others about the tasks they should perform	1	8	16	160	156	316.0
	0.3	2.3	4.7	46.9	45.7	92.7
Job description provides an employee clarity in his/her daily tasks	1	4	16	170	150	320.0
	0.3	1.2	4.7	49.9	44.0	93.8
Adherence to job description should be checked in performance appraisal	1	1	16	175	148	323.0
	0.3	0.3	4.7	51.3	43.4	94.7
Matching performance with jobs description ensures the right person in the right position		1	16	159	165	324.0
		0.3	4.7	46.6	48.4	95.0
Lack of clarity in job description negatively impacts employees' performance		3	16	161	161	322.0
		0.9	4.7	47.2	47.2	94.4
Job description goals/activities must be realistic to be achieved and implemented		1	7	145	188	333.0
		0.3	2.1	42.5	55.1	97.7
Lack of clarity in job description leads employees to be dissatisfied and anxious in performing their job tasks		4	18	142	177	319.0
		1.2	5.3	41.6	51.9	93.5

B. Job Description Importance

The second factor under job description reflected its importance. By examining each of the five statements under this factor, it could be said that the job description is viewed with great importance. At least 93.4% of the participants showed agreement on each of the statements. Table 4.18 shows around 97.9% of the participants agreed that in order to improved communication and better exchange of information between different departments, it is necessary to use specialized, modern and appropriate techniques. Also, 97.1% agreed that it is important that each job within an organisation has its unique job description, and 96.8% agreed that job descriptions should be reviewed by HR whenever significant changes occur within an organization. Access to job descriptions was also viewed as important as a reminder for employees about their roles (96.2%). Finally, 93.8% explained that the lack of clarity in job descriptions impacts performance evaluation (see Table 4.18).

Table 4.18 Descriptive statistics and distribution of scores within the job description importance factor

	SD	D.	N.	A.	S.A.	Agreement
The HR department should review job description whenever significant changes occur in the organisation		2	9	136	194	330.0
		0.6	2.6	39.9	56.9	96.8
Lack of clarity in job description negatively impacts the performance evaluation/appraisal process		5	16	143	177	320.0
		1.5	4.7	41.9	51.9	93.8
It is important that each job within an organisation has its unique job description	1	2	7	139	192	331.0
	0.3	0.6	2.1	40.8	56.3	97.1
Job description should be accessible to all employees as a reminder of their own tasks	1	2	10	120	208	328.0
	0.3	0.6	2.9	35.2	61.0	96.2
To facilitate better communication and information sharing between different departments, it is necessary to use specialized, modern and appropriate techniques.	1	1	5	118	216	334.0
	0.3	0.3	1.5	34.6	63.3	97.9

4.5.3. Utilisation of Artificial Intelligence

This dimension was aimed to reflect the reason behind the use of artificial intelligence within human resources. Overall, 11 reasons were listed, and the great majority of participants showed agreement on each of these reasons; this was reflected by at least 88.6% of the participants. By looking at Table 4.19, 97.9% of the participants explained that artificial intelligence helps to "To improve communication and coordination" while it provides the ability to "To Integrate a variety of different technologies to achieve high quality output in the least time, effort and cost" (96.8%). Adding to that 95.6% explained that artificial intelligence allows employers "To collect, preserve, process and retrieve information better than traditional methods". The utilisation of artificial intelligence was found to be useful in a number of other ways as can be viewed from Table 4.19.

It could be clearly concluded that the benefits of artificial intelligence are many and that the majority of participants see these benefits and agree with them (see Table 4.19).

Table 4.19 Descriptive statistics and distribution of scores within utilisation of artificial intelligence.

	SD	D.	N.	A.	S.A.	Agreement
To deal with an enormous amount of information to make substantive decisions.	1	4	27	152	157	309.0
	0.3	1.2	7.9	44.6	46.0	90.6
To obtain information with the possibility to change it and link it to other information in any other location and draw conclusions quickly, accurately and safely.	1	3	15	156	166	322.0
	0.3	0.9	4.4	45.7	48.7	94.4
To collect, preserve, process and retrieve information better than traditional methods	2	4	9	141	185	326.0
	0.6	1.2	2.6	41.3	54.3	95.6
To provide better decision making and problem solving scenarios		2	32	147	160	307.0
		0.6	9.4	43.1	46.9	90.0
To connect job description with performance and training options	1	2	16	169	153	322.0
	0.3	0.6	4.7	49.6	44.9	94.4
	1		10	170	160	330.0

To Integrate a variety of different technologies to achieve high quality output in the least time, effort and cost.	0.3		2.9	49.9	46.9	96.8
To reduce the costs and financial burden	1	6	32	155	147	302.0
	0.3	1.8	9.4	45.5	43.1	88.6
To reduce human errors	2	5	25	149	160	309.0
	0.6	1.5	7.3	43.7	46.9	90.6
To improve communication and coordination			7	169	165	334.0
			2.1	49.6	48.4	97.9
To increase business performance and production.		1	20	153	167	320.0
		0.3	5.9	44.9	49.0	93.8
To improve the decision-making process within the Human Resources department.	1	2	25	163	150	313.0
	0.3	0.6	7.3	47.8	44.0	91.8

4.5.4 Technology Adoption Factors

Reasons and factors behind adopting technology within HR in relation to job description and job performance were assessed using 8 statements. This provides an explanation of how to use technology and what to baseparameters/criteria on. Each item explained a factor. Overall, the results in Table 4.20 show that all 8 provided factors achieved high agreement. 97.7% of the participants agreed that technology adoption should be based on its ability to facilitate information i.e., collect, organise, analyse and retrieve information, while 93.9% explained that it should be used based on its applicability to job performance. The availability of appropriate regulated environment is seen as important (93%). Adoption should also be based on technology's ability to perform the tasks for which it was selected (91.8%), or compatibility with the organisation's financial and organizational human resources (91.8%).

Furthermore, 92.1% explained that the availability of maintenance and trained stuff should be considered in the adoption of technology, while its proven qualities should be considered (90.9%). In addition, staff's ability to use it is considered important (88.3%) as shown in Table 4.20.

Table 4.20 Descriptive statistics and distribution of scores within Technology adoption factors.

	SD	D.	N.	A.	S.A.	Agreement
Based on the ability of staff to use it	4	12	24	144	157	301.0
	1.2	3.5	7.0	42.2	46.0	88.3
Based on its applicability to job performance		3	18	174	146	320.0
		0.9	5.3	51.0	42.8	93.8
Based on its ability to facilitate information (collect, organise, analyse and retrieve)		1	7	167	166	333.0
		0.3	2.1	49.0	48.7	97.7
Based on good and proven qualities		1	30	158	152	310.0
		0.3	8.8	46.3	44.6	90.9
Based on its ability to perform the tasks for which it was selected		2	26	158	155	313.0
		0.6	7.6	46.3	45.5	91.8
Based on compatibility with the organisation's financial and organizational human resources		1	27	173	140	313.0
		0.3	7.9	50.7	41.1	91.8
Based on availability of maintenance & trained staff		4	23	157	157	314.0
		1.2	6.7	46.0	46.0	92.1
Based on the availability of appropriate regulated environment		2	22	143	174	317.0
		0.6	6.5	41.9	51.0	93.0

4.6. Data Type Examination

In this part of the results, data will be examined to determine its type. Generally, data is considered either Parametric or Non-parametric. Its type determines the tests used. For the data to be parametric, it has to justify normal distribution and be considered of an interval nature. If data is considered ordinal or is negatively or positively skewed, then it could be judged as non-parametric in its nature. The descriptive table below shows the distribution of the results after averaging items with each of the scales. Performance appraisal was averaged before and after factor analysis (resulted into two factors) and the same for Job Description.

Utilisation of Artificial intelligence and Technology adoption factors stayed as they were originally designed. In total, this study looks at 8 variables (averages). High average/mean

score indicate higher agreement among participants. As shown in Table 4.21, the minimum and the maximum scores indicate the range while the skewness and the kurtosis statistics show the distribution of the results and possible deviation from normal distribution. Overall, it could be judged that all 8 variables reflected normal distributions where the majority of the scores lie around the mean and score less extreme.

This is confirmed by the Skewness level and Kurtosis statistics (within ±2). As a result, the researcher assumes normal distribution following the assumption that the scores are of an interval nature. After judging that the data is normally distributed, the researcher will use Parametric tests mainly, as well as descriptive statistics to analyse the data further. Mainly this study will use independent samples t-test to measure differences between two independent group and Analysis of Variance to measure the differences between three groups or more. Furthermore, Pearson's Correlation Coefficient will be used to measure the correlation between all variables. More details will be provided later in the analysis as shown in Table 4.21.

Table 4.21 Descriptive statistics and the distribution of main variables' scores.

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Performance Appraisal	341	3.09	5.00	4.35	0.44	-0.23	0.13	-0.57	0.26
Software benefits	341	3.00	5.00	4.50	0.43	-0.64	0.13	0.03	0.26
Performance Aims/objectives	341	1.67	5.00	4.22	0.55	-0.51	0.13	0.46	0.26
Job Description	341	2.69	5.00	4.46	0.43	-0.56	0.13	0.14	0.26
Job descriptions-Clarity	341	3.00	5.00	4.42	0.46	-0.36	0.13	-0.57	0.26
Job descriptions-importance	341	1.40	5.00	4.53	0.47	-1.44	0.13	5.21	0.26

Use of Artificial Intelligence	341	2.64	5.00	4.39	0.48	-0.28	0.13	-0.57	0.26
Technology Adoption Factors	341	2.88	5.00	4.37	0.51	-0.26	0.13	-0.77	0.26

4.7. Inferential Statistics

4.7.1. Gender Differences

This section is concerned with the gender differences within the various scales explained above. Each of the scales/factors was averaged, this section will look at differences between males and females in overall scores of Performance Appraisal, software benefits and performances aims/objectives, Job Description and its perceived Clarity and Importance, Utilisation of Artificial Intelligence and Technology Adoption Factors. This study utilises parametric tests. To test the difference between both groups, Independent Samples t-test was used.This test measures if any difference exists between both groups and whether or not this difference is significant. Significance is determined based on an alpha level of less than 5% (p<0.05) to confirm differences.

The independent samples t-test (Table 4.22)showed that gender differences were found in Performance Appraisal overall (t = 2.46, p = 0.014), showing that male participants had significantly higher mean score (M = 4.38) compared to Female participants (M = 4.26). By observing the two factors extracted from Performance appraisal, a significant difference was found in the performance aims/objective (t = 2.32, p = 0.021) but no significant difference in software benefits. In performance aims/objectives, male participants had higher agreement scores (M = 4.26) compared to females (M = 4.11). Although not significant, males also had higher mean score in the software benefits.

Gender had a significant impact on Utilisation of artificial Intelligence (t = 2.68, p = 0.008); clearly male participants showed higher agreement (M = 4.24) compared to Females (M = 4.28). No significant difference between males and females were found in the rest of the scales (p > 0.05) as can be viewed from Table 4.22. However, it is important to highlight females consistently showed less agreement across all items. Although they have positive agreement

and positive views, male showed slightly more agreement and hence more positive views. This is deposited in Table 4.22.

Table 4.22 Descriptive results and t-test scores as a function gender

	Gender	N	Mean	Std. Deviation	t-test	Sig.
Performance Appraisal	Male	226	4.3854	0.44093	2.467	0.014
	Female	113	4.2623	0.41655		
Software benefits	Male	226	4.5274	0.42295	1.898	0.059
	Female	113	4.4336	0.44070		
Performance Aims/objectives	Male	226	4.2670	0.54864	2.320	0.021
	Female	113	4.1195	0.55789		
Job descriptions	Male	226	4.4918	0.41459	1.876	0.062
	Female	113	4.3982	0.46816		
Job descriptions-Clarity	Male	226	4.4491	0.44741	1.817	0.070
	Female	113	4.3540	0.46798		
Job descriptions-Importance	Male	226	4.5602	0.42709	1.684	0.093
	Female	113	4.4690	0.54561		
Utilisation of Artificial intelligence	Male	226	4.4352	0.45796	2.684	0.008
	Female	113	4.2896	0.49578		
Technology Adoption Factors	Male	226	4.3590	0.51595	-0.311	0.756
	Female	113	4.3772	0.49748		

4.7.2. Nationality

As reflected in the demographic and background section provided earlier, participants were mainly Saudi nationals, however a minority of participants came from different parts of the world. This section looks at Saudis (283) versus the rest of the sample (56). An Independent Samples t-test was performed, and it was shown that Nationality does not have an impact on any of the scales (p>0.05). The results are shown in Table 4.23.

Table 4.23 Descriptive results and t-test scores between Saudi and Non-Saudi participants.

	Nationality	N	Mean	Std. Deviation	t-test	Sig.
Performance Appraisal	Saudi	283	4.3424	0.43520	-0.307	0.759
	Non-Saudi	56	4.3620	0.44112		
Software benefits	Saudi	283	4.4919	0.42714	-0.413	0.680
	Non-Saudi	56	4.5179	0.44604		
Performance Aims/objectives	Saudi	283	4.2179	0.54236	-0.175	0.861
	Non-Saudi	56	4.2321	0.62010		
Job descriptions	Saudi	283	4.4518	0.43997	-0.739	0.461
	Non-Saudi	56	4.4986	0.40172		
Job descriptions-Clarity	Saudi	283	4.4046	0.46217	-1.032	0.303
	Non-Saudi	56	4.4732	0.41335		
Job descriptions-Importance	Saudi	283	4.5272	0.47988	-0.175	0.861
	Non-Saudi	56	4.5393	0.42455		
Utilisation of Artificial intelligence	Saudi	283	4.4028	0.47576	1.147	0.252
	Non-Saudi	56	4.3231	0.47505		
Technology Adoption Factors	Saudi	283	4.3697	0.51536	-0.161	0.872
	Non-Saudi	56	4.3817	0.48466		

4.7.3. Age

Participants' age was divided into 7 age grouped as explained earlier in the chapter. Participants' numbers varied across these categories. Following careful analysis of the differences between all 7 groups, it was obvious that those who are above 40 years have slightly different opinions compared to the younger ones; hence it was important to combine groups into two main categories (18-40 years and 40+ years). Table 4.24 shows the descriptive statistics along with the difference and the significance level using independent samples t-test. Overall, for the performance appraisal, no significant difference was found ($p>0.05$) however when looking at software benefits (extracted from performance appraisal) the results were significant, i.e., there was a significant difference ($t=3.17$, $p<0.03$) where the older group

(M=4.54) had more positive views compared to the younger group (M=4.43). No significant difference in the performance aims/objective factor.

Overall job description scores did not differ between the two groups (p>0.05), however job description clarity the scores were significantly different between both groups (t=2.02, p=0.044). The older group (M=4.46) showed a significantly higher score compared to the younger group (M=3.36).

Age differences were observed in Utilisation of Artificial intelligence (t=2.40, p=0.017), again the older group showed more positive views (M=4.44) compared to the younger group (M=4.32). This pattern was also noticed in the Technology adoption factors (t=2.72, p=0.007) where the older generation showed more positive attitude (M=4.43) compared to the younger group (M=4.28). As could be seen in Table 4.24, other variables were not significantly impacted by age (p>0.05).

<p align="center">Table 4.24 Difference between two age groups using t-test.</p>

	Age recoded	N	Mean	Std. Deviation	t-test	Sig.
Performance Appraisal	18-40	148	4.3047	0.43809	-1.529	0.127
	40+	193	4.3773	0.43235		
Software benefits	18-40	148	4.4392	0.43933	-2.179	0.030
	40+	193	4.5409	0.41787		
Performance Aims/objectives	18-40	148	4.1926	0.53442	-0.798	0.426
	40+	193	4.2409	0.57025		
Job descriptions	18-40	148	4.4194	0.47132	-1.606	0.109
	40+	193	4.4954	0.40138		
Job descriptions-Clarity	18-40	148	4.3623	0.48746	-2.023	0.044
	40+	193	4.4624	0.42472		
Job descriptions-Importance	18-40	148	4.5108	0.53263	-0.726	0.468
	40+	193	4.5482	0.41759		
Utilisation of Artificial intelligence	18-40	148	4.3200	0.50158	-2.404	0.017
	40+	193	4.4442	0.44947		
Technology Adoption Factors	18-40	148	4.2838	0.51952	-2.720	0.007
	40+	193	4.4339	0.49411		

4.7.4. Organisation

All participants worked either in the governmental sector (228) or the in the private sector (113); testing if this has an impact on their scores across the scale is important. Using independent sample t-test it was clear that there was a significant difference between both in all scales apart from one. When looking at the overall performance appraisal scale, a significant difference was observed (t=2.02, p=0.044). A significant difference was found within its performance aims/objectives extracted factor (t=2.44, p=0.015) but no significant difference was found in the software benefits (t=0.732, p=0.465). Those in the government sector showed higher mean scores in the performance appraisal (M=4.37) compared to those in the private sector (M=4.27) and when looking at the performance aims, the same pattern emerged where those in the governmental sector (M=4.27) had higher scores compared to the private sector (M=4.11).

The organisation type showed a significant impact on Job Description overall (t=2.87, p=0.004), on job description clarity (t=2.83, p=0.005) and job description importance (t=2.49, p=0.013). As can be seen in Table 4.25 participants working in the government sector had higher scores compared to the private sector. A similar pattern was shown in utilisation of artificial intelligence (t=2.50, p=0.013) and technology adoption factors (t=2.59, p=0.01). Those from the government sector showed more positive views compared to those from the private sector.

Table 4.25 Differences between participants based on governmental and private sectors.

	Organisation	N	Mean	Std. Deviation	t-test	Sig.
Performance Appraisal	Government	228	4.3792	0.42428	2.021	0.044
	Private	113	4.2784	0.45231		
Software benefits	Government	228	4.5088	0.41056	0.732	0.465
	Private	113	4.4726	0.46680		
Performance Aims/objectives	Government	228	4.2712	0.54140	2.441	0.015
	Private	113	4.1165	0.56908		
Job descriptions	Government	228	4.5094	0.40297	2.870	0.004
	Private	113	4.3676	0.47892		
Job descriptions-Clarity	Government	228	4.4677	0.42269	2.834	0.005
	Private	113	4.3208	0.50191		

Job descriptions-Importance	Government	228	4.5763	0.44182	2.491	0.013
	Private	113	4.4425	0.51440		
Utilisation of Artificial intelligence	Government	228	4.4354	0.45968	2.505	0.013
	Private	113	4.2993	0.49729		
Technology Adoption Factors	Government	228	4.4189	0.49599	2.598	0.010
	Private	113	4.2677	0.52501		

4.7.5. Education Impact

Originally education was divided into five categories, but due to the low number of participants in the high school category, they were grouped with those with diploma only (28) to create a Diploma and under group. This made it a more comparable group for those who have a BSc (103), MSc (93) or PhD (117). To compare differences between these four groups, the researcher utilised Independent Samples One Way Analysis of Variance (ANOVA). This test measures the differences between two groups or more. It also provides the option of a Post-Hoc test (Bonferroni test) to measure differences between any two of the groups; this enables the researcher to locate the difference in a more detailed way.

The ANOVA test presented in Table 4.26 showed a significant effect of education on Performance Appraisal (F=8.13, p<0.001). As can be observed from the table of means, those with a bachelor's degree showed the lowest mean score (M = 4.21) and those with PhD had the highest scores (M = 4.48). Using Bonferroni post-hoc test, a significant difference was found between BSc vs. MSc, BSc vs. PhD and MSc vs. PhD (p < 0.05).

Significant differences were found between levels of education when looking at Performance Appraisal-Factor1 (F = 4.60, p = 0.004). Here it was clear that those with a BSc had the lowest score (M = 3.39) compared to others, whereas those with a PhD had the highest mean score (M = 4.60). Post-hoc test showed significant difference between the BSc vs. PhD only (p < 0.05).

Furthermore, significant differences were found in Performance Appraisal-Factor 2 (F = 7.26, p < 0.05). Again, the bachelor's degree group showed the lowest mean score (M = 4.05) while the PhD group had the highest (M = 4.39). Post-hoc statistics indicated significant difference between BSc vs. PhD and MSc vs. PhD (p < 0.05) as shown in Table 4.26. P < 0.01 means that the Sig" p-value is at 99%, that means there is 99% chance that analysis of the result is significant, whereas p < 0.05 is reflecting 95% chance.

Table 4.26 Descriptive and ANOVA results illustrating differences between education categories within performance appraisal and its factors.

		n	Mean	SD	F	Sig.
Performance Appraisal	Diploma and under	28	4.3084	0.44215	8.135	0.000
	BSc	103	4.2101	0.44464		
	MSc	93	4.3275	0.42622		
	PhD	117	4.4887	0.39423		
Software Benefit	Diploma and under	28	4.4786	0.36652	4.606	0.004
	BSc	103	4.3903	0.46810		
	MSc	93	4.4882	0.41542		
	PhD	117	4.6017	0.39870		
Performance Aims/objectives	Diploma and under	28	4.1667	0.54810	7.262	0.000
	BSc	103	4.0599	0.56536		
	MSc	93	4.1935	0.55998		
	PhD	117	4.3946	0.49741		

The difference according to education was maintained when looking at job description (F = 7.00, $p < 0.05$). Here, participants with a Diploma and under had the lowest mean score (M = 4.29) while the highest was for the PhD group (M = 4.57). Means can be viewed in the table below, and post-hoc Bonferroni test showed a significant difference between those with a diploma vs. PhD and those with BSc vs. PhD ($p < 0.05$).

When looking at job description clarity, the first extracted factor of Job descriptions, education showed a significant impact (F = 6.11, $p < 0.05$). Again, those with diploma or less education had the lowest mean (M = 4.28) compared to the rest, while the PhD group had the highest mean (M = 4.53). Bonferroni showed significant differences between Diploma and under vs. PhD and BSc vs. PhD ($p < 0.05$).

Similarly, education had a significant impact on Job description importance (F = 6.56, $p < 0.05$). Following the same pattern of results as observed in Table 4.27, post-hoc statistics showed significant differences between Diploma and under vs. MSc, PhD and BSc vs. PhD.

Table 4.27 Descriptive and ANOVA results illustrating differences between education categories within job description and its factors.

		n	Mean	SD	F	Sig.
Job descriptions	Diploma and under	28	4.2940	0.60172	7.007	0.000
	BSc	103	4.3473	0.42432		
	MSc	93	4.4996	0.42613		
	PhD	117	4.5746	0.36510		
Job descriptions-Clarity	Diploma and under	28	4.2813	0.59085	6.112	0.000
	BSc	103	4.3010	0.42783		
	MSc	93	4.4435	0.46934		
	PhD	117	4.5363	0.39836		
Job descriptions-Importance	Diploma and under	28	4.3143	0.76095	6.562	0.000
	BSc	103	4.4214	0.47189		
	MSc	93	4.5892	0.41637		
	PhD	117	4.6359	0.38112		

Furthermore, ANOVA showed significant differences between education levels when looking at Technology (Artificial Intelligence) Adoption Factors (F = 6.11, p < 0.05). The highest score was found for those with a BSc (M = 4.23) and highest for those with a PhD (M = 4.34). Significant difference was found only between BSc vs. PhD group (p < 0.05).

As shown in Table 4.28, ANOVA showed significant impact of education on the utilisation of Artificial intelligence (F = 6.19, p < 0.05). Participants with a bachelor's degree again had the lowest score (M = 4.23) and the PhD group had the highest (M = 4.49). A significant difference was found between the BSc vs. MSc group and the BSc vs. PhD group (see Table 4.28).

Table 4.28 Descriptive and ANOVA results illustrating differences between education categories within utilisation of artificial intelligence and technology adoption factors.

		n	Mean	SD	F	Sig.
Use of Artificial intelligence	Diploma and under	28	4.3442	0.58413	6.191	0.000
	BSc	103	4.2374	0.46568		
	MSc	93	4.4389	0.45723		
	PhD	117	4.4973	0.44014		
Technology (Artificial Intelligence) Adoption Factors	Diploma and under	28	4.3125	0.48173	6.117	0.000
	BSc	103	4.2342	0.50599		
	MSc	93	4.3481	0.51236		
	PhD	117	4.5171	0.48549		

4.7.6. Correlations Between the Four Main Variables

Pearson's correlation coefficient was used to show whether or not a linear correlation is found between the various scales used. Pearson's correlation coefficient ranges between -1 and +1, where a negative correlation reflects negative linear association between two variables and a positive coefficient means a positive linear association. The correlation is only meaningful when significant. Non-significant scores are not indicative of a correlation ($p > 0.05$). As can be seen in Table 4.29, all dimensions were found to be positively and significantly correlated with each other. This clearly explains that high agreement in one variable indicates high agreement in another. This further illustrates consistency in scores between all scales, were attitudes and views are somehow maintained.

Table 4.29 Pearson's correlation coefficient between all scales.

	1	2	3	4	5	6	7	8
Performance Appraisal	1	0.802[*]	0.923[*]	0.625[*]	0.635[*]	0.515[*]	0.649[*]	0.554[*]
Software benefits	0.802[*]	1	0.509[*]	0.547[*]	0.543[*]	0.471[*]	0.458[*]	0.410[*]
Performance Aims/objectives	0.923[*]	0.509[*]	1	0.546[*]	0.564[*]	0.438[*]	0.639[*]	0.532[*]

Job Description	0.625*	0.547*	0.546*	1	0.963*	0.909*	0.640*	0.532*
Job descriptions-Clarity	0.635*	0.543*	0.564*	0.963*	1	0.762*	0.605*	0.536*
Job descriptions-importance	0.515*	0.471*	0.438*	0.909*	0.762*	1	0.599*	0.445*
Use of Artificial Intelligence	0.649*	0.458*	0.639*	0.640*	0.605*	0.599*	1	0.670*
Technology Adoption Factors	0.554*	0.410*	0.532*	0.532*	0.536*	0.445*	0.670*	1

*$p < 0.01$: All correlations are significant at $p < 0.01$ (1%)

Pearson's correlation coefficient between all variables indicates the strength of the relationships between all variables, and the p-value indicates how significant the relationship is between those variables. As a consequence, the relationship between "Job descriptions" and "Job descriptions-Clarity" has the greatest Pearson's correlation coefficient (0.963), which is statistically significant at the 99 percent level of significance. These findings imply that the effectiveness of AI in Human Resources Management implementation is dependent on the influence of "Job descriptions" and "Job descriptions-Clarity." The success of artificial intelligence in human resource management will improve if "Job descriptions" are highly clear, and "Job descriptions-Clarity" grows as a result.

4.8. Linear Regression

4.8.1. The impact of the use of Technology (Artificial Intelligence) Adoption Factors on Use of Artificial intelligence

Linear regression was conducted to examine the impact of Technology (Artificial Intelligence) Adoption Factors on use of Artificial intelligence. The results are presented in Table 4.30. Table 4.30 shows that a significant relationship exists between the dependent variable Use of Artificial intelligence and the independent variable Technology (Artificial Intelligence) Adoption, where F = 276.853 and $p < 0.05$ (the coefficient of determination being 45.0%), This Confirms that the hypothesis H1 is true " Technology (Artificial Intelligence) Adoption will positively affect Use of Artificial intelligence"

Table 4.30 The Linear regression between the Dependent Variable (use of Artificial intelligence) and Independent variable (AI Technology Adoption) in study.

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	ANOVA		R^2
	B	**Std. Error**	**Beta**			**F**	**P-value**	
(Constant)	1.656	0.165		10.009	0.000	276.853	<0.001*	0.450
AI Technology Adoption Factors	0.626	0.038	0.670	16.639	0.000			
a. Dependent Variable: Use of Artificial intelligence								

4.8.2 Impact of Use of Artificial intelligence on Performance Appraisal

A. Impact of Use of Artificial intelligence on Performance software benefit (Factor1)

Linear regression was conducted to examine the impact of the use of artificial intelligence on performance software benefit. Table 4.31 shows that a significant relationship exists between the dependent variable Performance software benefit and the independent variable use of Artificial intelligence, where F=90.075and P-value<0.001 (the coefficient of determination being 21.0 %), which proves the Hypothesis H2 is true "Use of Artificial intelligence will positively affect Performance software benefit of Performance Appraisal".

Table 4.31 The Linear regression between the Dependent Variable (performance software benefit) and Independent variable (Use of artificial intelligence) in study.

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	ANOVA		R^2
	B	**Std. Error**	**Beta**			**F**	**P-value**	
(Constant)	2.681	0.192		13.937	.000	90.075	<0.001*	0.210
Use of Artificial intelligence	0.413	0.044	0.458	9.491	.000			
a. Dependent Variable: Performance software benefit (Factor 1)								

B. Impact of the Use of Artificial intelligence on Performance aims/objectives (Factor2)
Linear regression was conducted to examine the impact of the use of Artificial intelligence on Performance aims/objectives. Table 4.32 shows that a significant relationship exists between the dependent variable Performance aims/objectives of determination being 40.9%), which supports that the hypothesis H3 is true "Use of Artificial intelligence will positively affect Performance aims/objectives of Performance Appraisal".

Table 4.32 The Linear regression between the Dependent Variable (Performance aims/objectives) and Independent variable (Use of Artificial intelligence) in study.

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	ANOVA		R^2
	B	**Std. Error**	**Beta**			**F**	**P-value**	
(Constant)	0.950	0.215		4.421	0.000	234.214	<0.001*	0.409
Use of AI	0.745	0.049	0.639	15.304	0.000			
a. Dependent Variable: Performance aims/objectives (Factor2)								

4.8.3 The impact of the Use of Artificial intelligence on Job descriptions

A. The impact of the Use of Artificial intelligence on job description Clarity

Multiple regression was conducted to examine the impact of the Use of Artificial intelligence on job description Clarity. Table 4.33 show that a significant relationship exists between the dependent variable job description Clarity and the independent variable Use of Artificial intelligence, where F = 195.606 and $p < 0.05$ (the coefficient of determination being 36.6%), That Confirms the hypothesis H4 is true "Use of Artificial intelligence will positively affect Clarity of job description".

Table 4.33 Linear regression between the Dependent Variable (job description Clarity) and Independent variable (Use of Artificial intelligence) in study

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	ANOVA		R²
	B	Std. Error	Beta			F	P-value	
(Constant)	1.881	0.183		10.303	0.000			
Use of Artificial intelligence	0.578	0.041	0.605	13.986	0.000	195.606	<0.001*	0.366
a. Dependent Variable: Clarity (Factor 1)								

B. The impact of the Use of Artificial intelligence on job description Importance

Multiple regression was conducted to examine the impact of the use of Artificial intelligence on job description Importance. Table 4.34 shows that a significant relationship exists between the dependent variable job description Importance and the independent variable Use of Artificial intelligence, where F= 189.780 and $p < 0.05$ (the coefficient of determination being 35.9%), which proves that hypothesis H5 is true "Use of Artificial intelligence will positively affect importance of job description".

Table 4.34 The Linear regression between the Dependent Variable (job description Importance) and Independent variable (Use of Artificial intelligence) in study.

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	ANOVA		R^2
	B	Std. Error	Beta			F	P-value	
(Constant)	1.932	0.190		10.178	0.000	189.780	<0.001*	0.359
Use of Artificial intelligence	0.592	0.043	0.599	13.776	.000			
a. Dependent Variable: Importance (Factor 2)								

4.8.4 The impact of Job descriptions on Performance Appraisal

A. The impact of job description Clarity on Performance software benefit

Linear regression was conducted to examine the impact of job description Clarity on Performance software benefit. Table 4.35 shows that a significant relationship exists between the dependent variable Performance software benefit and the independent variable job description Clarity, where F = 142.047and p < 0.05 (the coefficient of determination being 29.5%), That proofs the hypothesis H6 is true" Clarity of job description will positively affect Performance software benefit of Performance".

Table 4.35 The Linear regression between the Dependent Variable (Performance software benefit) and Independent variable (job description Clarity) in study.

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	ANOVA		R^2
	B	Std. Error	Beta			F	P-value	
(Constant)	2.229	0.191		11.658	0.000	142.054	<0.001*	0.295
Clarity	0.513	0.043	0.543	11.919	0.000			
a. Dependent Variable: Performance software benefit								

B. The impact of job description Clarity on Performance Aims/Objectives

Linear regression was conducted to examine the impact of job description Clarity on Performance aims/objectives. Table 4.36 shows that a significant relationship exists between the dependent variable Performance aims/objectives and the independent variable job description Clarity, where F=158.397and P-value<0.001 (the coefficient of determination being 31.8%), which supports that hypothesis H7is true" Clarity of job description will positively affect Performance aims/objectives of Performance Appraisal".

Table 4.36 The Linear regression between the Dependent Variable (Performance aims/objectives) and Independent variable (job description Clarity) in study.

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	ANOVA		R^2
	B	Std. Error	Beta			F	P-value	
(Constant)	1.180	0.243		4.860	0.000	158.397	<0.001*	0.318
Clarity	0.688	0.055	0.564	12.586	0.000			
a. Dependent Variable: Performance aims/objectives								

C. The impact of job description Importance on Performance software benefit

Linear regression was conducted to examine the impact of job description Importance on Performance software benefit. Table 4.37 shows that a significant relationship exists between the dependent variable Performance software benefit and the independent variable job description Importance, where F = 158.397 and p < 0.05 (the coefficient of determination being 31.8%). That Confirms the hypothesis H8 is true "importance of job description will positively affect Performance software benefit of Performance Appraisal".

Table 4.37 The Linear regression between the Dependent Variable (Performance software benefit) and Independent variable (job description Importance) in study.

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	ANOVA		R^2
	B	Std. Error	Beta			F	P-value	
(Constant)	1.180	0.243		4.860	0.000	142.054	<0.001*	0.318
Importance	0.688	0.055	0.564	12.586	0.000			
a. Dependent Variable: Performance software benefit								

D. The impact of job description Importance on Performance aims/objectives

Linear regression was conducted to examine the impact of job description Importance on Performance aims/objectives. Table 4.38 shows that a significant relationship exists between the dependent variable Performance aims/objectives and the independent variable job description Importance, where F = 158.397 and p < 0.05 (the coefficient of determination being 19.1%), which proves that hypothesis H9is true "importance of job description will positively affect Performance aims/objectives of Performance Appraisal". See Table 4.38.

Table 4.38 The Linear regression between the Dependent Variable (Performance aims/objectives) and Independent variable (job description Importance) in study.

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	ANOVA		R^2
	B	Std. Error	Beta			F	P-value	
Constant	1.883	0.262		7.178	0.000	80.272	<0.001*	0.191
Importance	0.516	0.058	0.438	8.959	0.000			
a. Dependent Variable: Performance aims/objectives								

4.9. Research Hypotheses & Research Model

This study tests the following hypotheses presented in Figure 4.1:

H1: Technology (Artificial Intelligence) Adoption will positively affect Use of Artificial intelligence.

H2: Use of Artificial intelligence will positively affect performance appraisal - software benefit Performance software benefit of Performance Appraisal.

H3: Use of Artificial intelligence will positively affect performance appraisal – aims/objectives.

H4: Use of Artificial intelligence will positively affect job description Clarity.

H5: Use of Artificial intelligence will positively affect job description Importance.

H6: Job description Clarity will positively affect Performance software benefit of Performance Appraisal.

H7: Job description Clarity will positively affect Performance aims/objectives of Performance Appraisal.

H8: Job description Importance will positively affect Performance software benefit of Performance Appraisal.

H9: Job description Importance will positively affect Performance aims/objectives of Performance Appraisal.
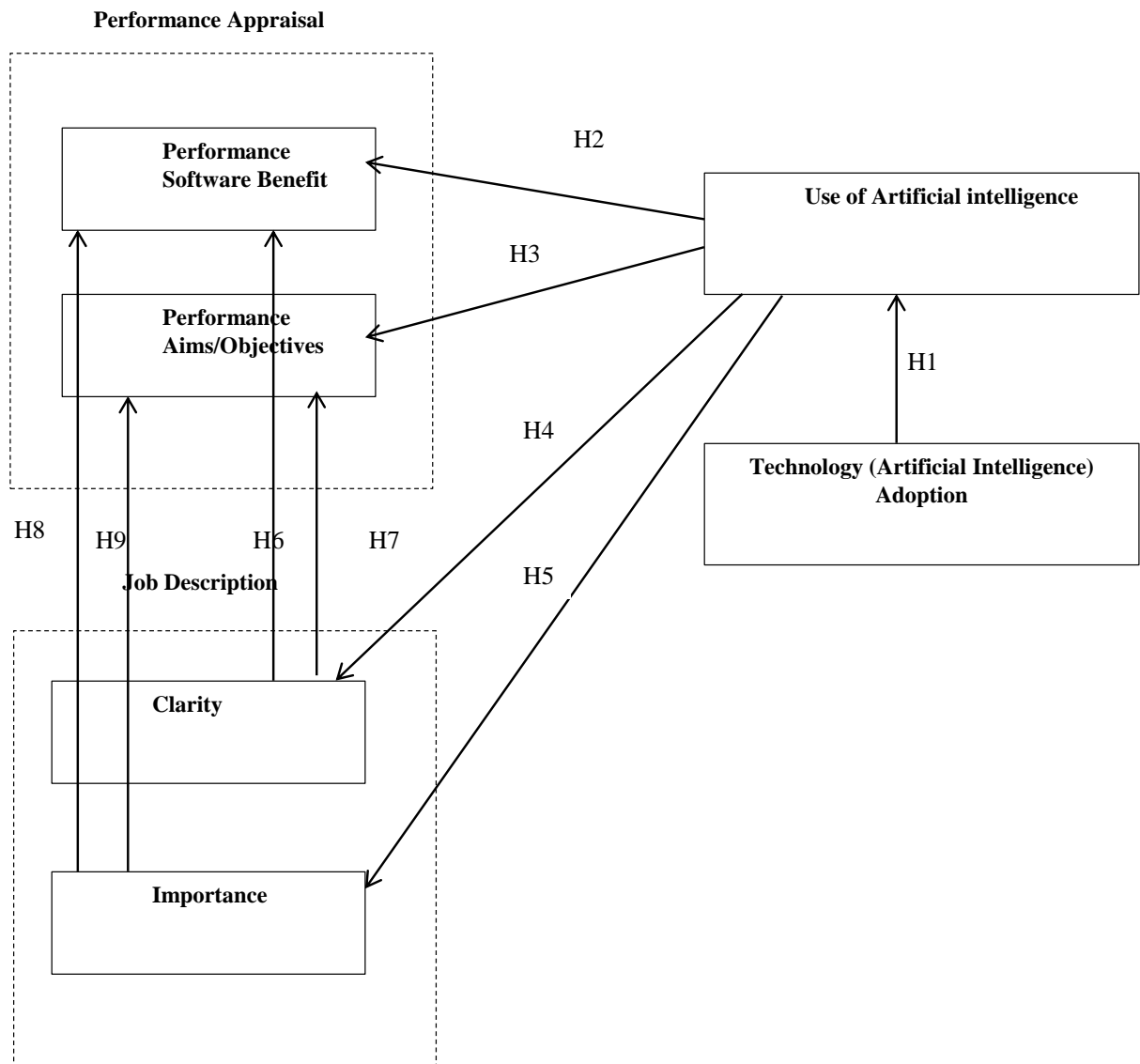
Figure 4.1. Research Hypotheses by using Model Technological Artificial Intelligence Role in raising the efficiency of the Performance of Employees as Human Resources Management Objectives.

As shown in Table 4.39, the results of the linear regression analyses confirmed the nine hypotheses. Use of Artificial intelligence has a high significant effect on Performance software benefit of Performance Appraisal, affects Performance aims/objectives of Performance Appraisal, job description Clarity, and job description Importance. Also, Technology (Artificial Intelligence) Adoption had the strongest impact on Use of Artificial intelligence. Job description Clarity positively affected Performance software benefit of Performance Appraisal and Performance aims/objectives of Performance Appraisal. Also, job description Importance positively affected Performance software benefit of Performance Appraisal and Performance aims/objectives of Performance Appraisal. This study has shown that technological artificial

intelligence has a role in raising the efficiency of the performance of employees as human resources management objectives.

Table 4.39 Summary of hypothesis testing.

Hypothesis	Specification	Results
H1	Technology (Artificial Intelligence) Adoption will positively affect use of artificial intelligence	Supported (β = 0.626, p < 0.01)
H2	Use of Artificial intelligence will positively affect performance software benefit of Performance Appraisal	Supported (β = 0.413, p < 0.01)
H3	Use of Artificial intelligence will positively affect Performance aims/objectives of Performance Appraisal	Supported (β = 0.745, p < 0.01)
H4	Use of Artificial intelligence will positively affect job description Clarity	Supported (β = 0.578, p < 0.01)
H5	Use of Artificial intelligence will positively affect job description Importance	Supported (β = 0.592, p <0.01)
H6	Job description Clarity will positively affect Performance software benefit of Performance Appraisal	Supported (β = 0.513, p < 0.01)
H7	Job description Clarity will positively affect Performance aims/objectives of Performance Appraisal	Supported (β = 0.688, p < 0.01)
H8	Job description Importance will positively affect Performance software benefit of Performance Appraisal	Supported (β = 0.688, p < 0.01)
H9	Job description importance will positively affect Performance aims/objectives of Performance Appraisal	Supported (β = 0.516, p < 0.01)

4.10. Summary

Overall, this study looked at how technology, in the form of artificial intelligence, could be utilised within human resources. Particular interest was focused on job descriptions and performance appraisal. Overall, it was shown that technology is perceived with importance among most participants to facilitate job roles and descriptions and link them with performance appraisal. Participants showed positive opinions about performance appraisal, software benefits to it and its aims/objectives. Furthermore, it was clear that the positive views extend to the clarity and importance of job descriptions. Similar views were expressed for the utilization of artificial intelligence in general and about the technology adoption factors. Items varied descriptively within each of the dimensions. Overall, all the scales were found to correlate positively with each other, indicating that the positive views and opinions (through agreement) were shared across the scales.

The researcher also used linear regression to determine the relationships between the variables to ensure the validity of the hypotheses. This statistical model investigates the impact of use of artificial intelligence on performance appraisal software, effects of performance aims/objectives on performance appraisal, job description clarity, job description importance, and AI technology adoption.

Chapter 5 - Performance Appraisal Program

5.1. Introduction

This chapter focuses on the program which has been designed by the researcher for HRM to assess employees' performance, which aims to take advantage of the most modern technologies and artificial intelligence. The manager can, through the website, obtain comprehensive information about the employees, the work that they perform, how to perform it, previous and current assessments from the previous and current supervisor, available training programs, and employee complaints. This information provides a clear and accurate picture of the employee and how to develop and benefit from them as much as possible. Managers can move between the website pages to collect information in easy way. One session using the program would make the manager know everything related to the employee from his first day in the organization until the present time.

HRM, by using this program, will benefit from the information technology which enables it to record information, save it, and retrieve it in accurate, quick, safe way. It also increases its ability to communicate either with its employees or other Society companies and helps the HRM it in the process of taking the right decision. Also, this program will benefit from the artificial intelligence which has been used, because the artificial intelligence has the ability to simulate human intelligence by machines. It uses the available databases to connect and analyse them , then infers correct solutions with accuracy and speed that exceeds human capacity.

This program will allow the HRM to obtain comprehensive information about their employees regarding their performance levels and determine their capabilities, skills and tasks that they execute and how to achieve them. The administration will also be fully aware of their previous experiences, their level of attendance, the training that has been obtained and how it affects their performance, in addition to knowing the complaints related to them and their validity. Obtaining this information would enable the HRM to draw a complete picture of the employee's performance levels and to use the appropriate training programs to develop its distinguished side and also improve the shortcomings. Accordingly, the HRM would be able to place each employee in the right position, so that it would be capable to achieve the maximum benefit from all its employees.

Also, this program is considered an aid for the employee to know his responsibilities and duties that will be the basis for his evaluation. He would know how to do his job by knowing the work procedures. It also would look at employees previous and present evaluation to see its realistic

level from the administration's point of view, with the possibility of objecting and discussing the evaluation results. This matter would make them satisfied with the organizational decisions. In addition, employees would be able to suggest specific training programs to help them to raise their efficiency and productivity.

From the foregoing, it is clear that this program has many benefits which accrue to HRM, direct managers, senior managers and employees as a whole, which returns to the organization with benefits that enable it to achieve its goals with less time, less effort, less cost, and higher production.

5.2. Human Resources Management System

In this part we will focus on introducing the system which has been used to explain its components and mention the website where the database was registered. It will also point out who will use the system.

- Web-based system: a set of Web Pages that can be accessed through internet browser.
- This system was developed in PHP: Hypertext Pre-processor (PHP), Java Script and html files.
- PHP is a widely-used, open source scripting language.
- PHP files can contain text, HTML, CSS, JavaScript, and PHP code.
- PHP code is executed on the server, and the result is returned to the browser as plain HTML
- PHP scripts are executed on the server [https://www.w3schools.com/php/php_intro.asp]

The goal of incorporating artificial intelligence into human resource management is to increase both dependability and speed. For this reason, when designing the prototype, the versatility of PHP and the fact that it is an independent platform serve as justifications for its use. The fact that it works with all of the major web servers makes it simple to deploy on a variety of different systems and platforms at a low additional expense. It is quick and secure, as it makes use of its own memory and outperforms the challenge of performance. It has a good connection with databases, which is important for our research because it is simple to connect securely with nearly any type of database.

The fact that MySQL provides complete support for practically every requirement related with application development is a significant rationale of using it as your database of choice for this study. It provides support for a wide range of database management as well as other capabilities that are required for managing data within a database. When it comes to integrating it with

other applications, it includes built-in libraries that make it easy to combine it with other apps. Thus, MySQL databases can be used to support any application that requires database integration to function properly. The integration approaches include connectors and drivers, which enable for the connection of MySQL to be used as a database, which can support a wide range of different application types. Since PHP has been selected for usage in this research, the MySQL database's flexibility has been determined to be appropriate for use as the database for this research.

5.2.1 Tools Utilised to Develop the System

1- MySQL: "is an open-source relational database management system (RDBMS). Its name is a combination of "My", the name of co-founder Michael Widenius's daughter, and "SQL", the abbreviation for Structured Query Language." [reference: https://en.wikipedia.org/wiki/MySQL]

2- EasyPHP: "Webserver turns your computer into a ready-to-use personal web hosting server. You can host whatever you want directly on your computer and share it on internet like any website. Your computer acts like a web hosting service and allows you to make your website / application / demo accessible via internet. The server is fully configurable, modular and easy to update and extend" [reference: https://www.easyphp.org/easyphp-webserver.php]

3- Notepad++: "is a text editor and source code editor for use with Microsoft Windows. It supports tabbed editing, which allows working with multiple open files in a single window. The project's name comes from the C increment operator." [reference: https://en.wikipedia.org/wiki/Notepad%2B%2B]

4- Database and files are hosted on a website:(http://www.nashar5207708.ipage.com/mainmenu.php, http://www.hrsysadmin.com/)

5.2.2. Types of Users

An Administrator has full privileges to manage the system including:

1- System settings/ add companies
2- System settings/ add high level users (managers, Administrators)
3- Job description: add new job for any company, add job skills, duties.

Director/manager: add/edit employees, update employees' profiles. Processing the daily proposed changes such as meeting, tasks and complaints

Employees: review their profiles, evaluate themselves, and process their own meetings and tasks.

5.3. System Architecture

This part relates to the factors that make up the system and their relationships to each other. The following main entities take place in this system:

- Companies
- Jobs
- Employees/managers
- Tasks

The main entities in the system and their relationships to each other are shown in Figure 5.1.
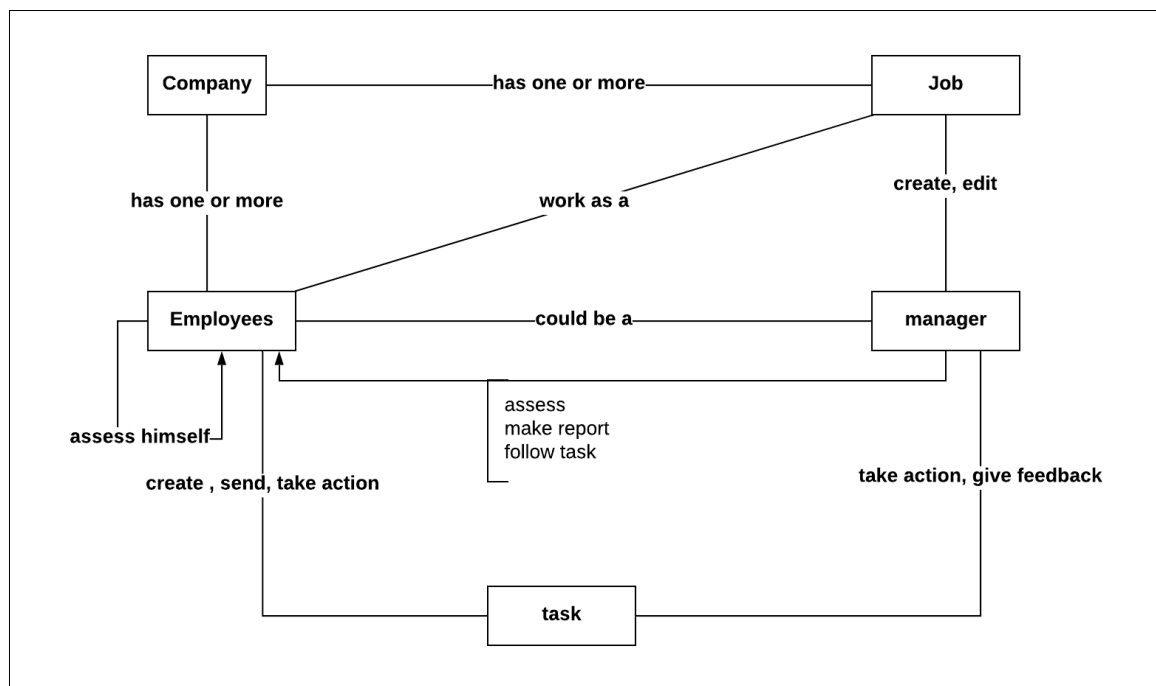
Figure 5.1 Relationships within the system architecture.

5.4. Database Tables

This section is concerned with general information about the program, such as data about the company, job descriptions, responsibilities and skills for each job and how to implement them. It also focuses on everything related to the employee, such as previous experiences, previous training programs attended, and employee-specific assessments to determine his level of performance. It also includes the extent of the employee's commitment to attend and absence

types, and his performance level for all his tasks, in addition to identifying complaints and their causes. Based on previous information, the manager determines the program type that employee needs. The program also includes all reports which has been written about the employee's performance from his previous superiors. Finally, the extent of the employee's agreement with what has been mentioned. The system's features will be described by the following items:

5.4.1 Companies

Creates a new company. This icon is for company identification which contains the following: Company' name / type of activity / grouped companies and its description. Appendix D1 shows the icon.

5.4.2 Job Description

Creates a new job and its description (depending on the company). This section contains a job description for all the organization's functions, with the possibility of amending it when any changes occur in the organization that require modification. Also, in the event of any change in the system or activity, which requires the introduction of new jobs, the job description must be created for employees. The job title / a summary thereof / the experiences and the specialization required for the employee in order to perform their role properly is written. Appendix D2 shows the icon.

5.4.3 Job Responsibilities/ Duties

Outlines the set of duties for each created job. This icon contains the responsibilities and duties of the created jobs and the steps that must be followed to accomplish them. Appendix D3 shows the icon.

5.4.4 Job Skills

Outlines the set of skills for each created job. This icon contains the jobs, and in front of each job its code and the skills the employee who will perform it must have. Appendix D4 shows this icon.

5.4.5 Job Process

Outlines the set of steps to explain the job skills. In this icon, there are sequential steps to perform the function from beginning to end to determine the skills required of the employee. Appendix D5 shows this icon.

5.4.6 Employee Information

Contains all employee information. In this icon we find all the employee information, which includes: job number / name / date of birth / ID number / social status / phone number / level of education / specialization / current position / date of appointment / company name / date of last evaluation / data of the last evaluation / last evaluation for five years / date of last promotion. It also contains the employee evaluation score, the next promotion date, and his overall evaluation. Appendix D6 shows this icon.

5.4.7 Employee Experience

Holds the previous experience for each employee – if it exists. This icon contains the employee's experiences in previous organizations, including the position / department the company in which the city worked / the date of appointment in it / the date he left the job / the reason for leaving the job / and the evaluation of his last year in job work. Appendix D7 shows the icon.

5.4.8 Previous Training

Holds all training courses that employees have attended in their jobs. This icon contains all training courses that employees have attended in their jobs, including information such as the course name / start date, end date, place of presentation / trainer / and skills acquired from training. Appendix D8 shows this icon.

5.4.9 Employee Performance

Holds all issues that have impacted the employee positively and negatively. These codes include information about the employee's accomplishments / strengths / weaknesses that could affect the work / aspects of the employee's failure / and feedback. Appendix D9 shows this icon.

5.4.10 Employee Evaluation

Holds all the evaluations that employees have had in the previous years. This icon displays the employee's performance evaluation (all evaluations in previous years, with the year / date of evaluation / rating writer selected and the scale used for the evaluation). Appendix D10 shows this icon.

5.4.11 Attendance

Tracks employees' attendance. This icon contains information related to the employee's attendance (date of absence / reasons / type of leave / its effect on work). Appendix D11 shows this icon.

5.4.12 Employee Assessment

Holds all assessments conducted. This icon holds all the evaluations of the employee and related information (evaluation date / month / evaluation items / self-measure / boss's evaluation / boss scale. Appendix D12 shows this icon.

5.4.13 Issues Record

Tracks all issues related for each employee. This icon holds issues record to keep track of all tasks performed by an employee. Includes task date / task name / proposed solution / requested move. Appendix D13 shows this icon.

5.4.14. Employees Issues

Involves all the issues expected and respective proposed solutions. This icon includes all expected tasks or problems and the proposed solution for each. Appendix D14 shows this icon.

5.4.15. Complaints Against Employees

Holds all complaints that have been made against each employee. This icon contains all complaints submitted against each employee specifying the subject of the complaint / date of the complaint / complaint / its details / employee justifications / the name of the direct official / the report of the direct official / the name of the direct official / the report of the head / and the final decision. Appendix D15 lists the complaints.

5.4.16. Required Training List

Delineates the training proposed by managers or employees themselves. This icon is for the training list suggested by the managers or the employees themselves and includes the type of training / location / operator and its deadline, as shown in Appendix D16.

5.4.17. Tasks

Lists the tasks performed by employees. These certifications contain the list of tasks performed by the employees and include task name / start date / completion date / employee report / level of success in it / name of the senior manager / manager's report / and flag signature as shown in Appendix D17.

5.4.18. Task Actions

Holds all conversations held and actions performed for a particular task. This icon includes task actions (record number / task number / employee number / level of success, superior name and superior report and flag signature, as shown in Appendix D18.

5.4.19. Reports

Involves the employee reports managed by their managers. This icon includes reports on the employees and contains information about the year of the report, the date of the report with mention of the details of the report and who wrote it / deserves a reward / in case, there are more than one manager who writes a report, every manager wrote his report, and document it by signing. Appendix D19 shows this icon.

5.4.20. Users

Lists and allows management of system users. This icon includes users who administer the system, with registry files. It includes information such as user number / username / password / user type /and company name. Each of which contains many submenus, which enable all managers and employees to perform certain actions permitted by management. Appendix D20 shows this icon.

5.5. System Design

This section explains how to use the program from entry to exit. On the main menu page there are many main icons which are followed by many sub-menus, each of which contains many submenus, which enable all managers and employees to perform certain action, permitted by the administration. These procedures are based on the level of their jobs and the company's systems.

Employees have a right to determine their username and password, to complain against other employees or direct manager, as well to respond to complaints which are submitted against them to provide justifications. They can also follow their issues, attend meetings and write reports. In addition, they can view the past and current evaluations and express their opinions

on these. Also, employees can track their duties with related discussions and corresponding management opinion. Employees also have the right to evaluate themselves or object the evaluation of their boss.

Managers have the right to add, delete or amend any of the daily proposed resolutions and values. They can also write comments on meetings, assignments or complaints. Furthermore, they have the ability to add companies, duties, required skills, and operations.

Login Page allows for users to login to the system using their usernames and passwords. Only administrators have the privilege to give access on our system by creating a new user. Appendix D21 shows the login page. After login, managers and administrators will move directly to main menu.

Main Menu Administrators have access to job descriptions, employees, assessments, proposed changes and system admin for all companies, as shown in Appendix D22 . Managers have access to job descriptions, employees, assessments and proposed changes for their companies. Employees move directly to their profiles; they do not need to go through main menu. Both managers and administrators can access and update job descriptions. Job description includes job summary, knowledge, experience required, skills, duties and process. Appendix D23 shows the job description page. Managers can use the following two screens to add a new job or update an existing job. Appendix D24 and Appendix D25 show the job description windows. These three pop-up windows can be used to add duties, skills and processes for each job created. Appendix D26 shows the job duties additions window. From the main menu, managers can select 'employees' to make any change to their condition. They will get a list of employees in the company. For each employee, managers can click 'view' to review the employee's profile or give access to a particular employee on the HR system by clicking on 'add/update'. Also, managers can add a new employee by clicking on the left-upper icon. Also, a pop-up window can be used to add a new employee. Managers cannot change the company name. As well, managers have to use only the list of available jobs. If they need to add new job, they can do that from the job description. Appendix D27 shows the employee profile. This screen is to give an employee or new user access to the HR system by creating a new username (employee's id) and password. Otherwise, employees cannot access the system. Appendix D28 shows the employee credentials. When managers choose 'view', they will get the following screen in which all the information for an employee will be displayed. Also, any employee will get the same screen but with different privileges. As can be seen, employees can assess themselves by clicking on 'assess yourself', make a complaint or change their password. Also,

employees can read their job description from this screen by clicking on 'job des'. Appendix D29 shows the employee information window. This screen can be used by an employee to make a complaint against another employee or manager. This complaint will be transferred to the direct manager to make a decision. Appendix D30 shows the employee complaint window. Employees can use this screen to assess themselves by clicking on 'assess yourself'. A list of items will be used for assessment that can be generated by managers. For scale, users have a Likert-scale ranging from poor to excellent). Appendix D31 shows the employee evaluation window. Also, employees can see their previous experience. Only managers have privileges to add or update an experience. Appendix D32 shows the employee information update window. Moreover, attendance can be tracked within the following screen. Employees can see their attendance while managers can both see and edit this sheet. The leave types used depend on the company and regulations. Appendix D33 displays the attendance record window. Employees may face some issues during their work journey. These issues can be recorded by using this screen. A list of proposed solutions for each pre-identified issue is available for managers to use. Appendix D34 shows the employee problems record. A list of proposed training courses could be edited by using the following screen 'Required training'. Appendix D35 shows the proposed training courses. Also, employees can see the complaints made against them through the following screen. These complaints might be made by other employees. The complaints must be processed by managers before they can be seen by employees. Appendix D36 shows the complaints window. All previous evaluations can be viewed using this screen. It can be edited and updated by managers when needed, as shown in Appendix D37. Managers can use this screen to track all the issues which affect employee performance. Also, the employee can track their record, as shown in Appendix D38. Employees can submit and report their meetings to their managers using this screen. Only managers have the privileges to delete a reported meeting as shown in Appendix D39.

This screen can be used to report a meeting and submit it to the managers. Managers can confirm, reject and give feedback for these meetings, as shown in Figure 5.2.

Figure 5.2 Report a meeting and submit it.

In the following screen, employees can follow their tasks with their managers. In the upper part, employees can see their closed tasks and view the actions taken, as well as the conversations, as shown in Figure 5.3.

Figure 5.3 Track and see the current and closed tasks.

This screen can be used by employees to start a new by clicking new task in the upper screen, as shown in Figure 5.4.
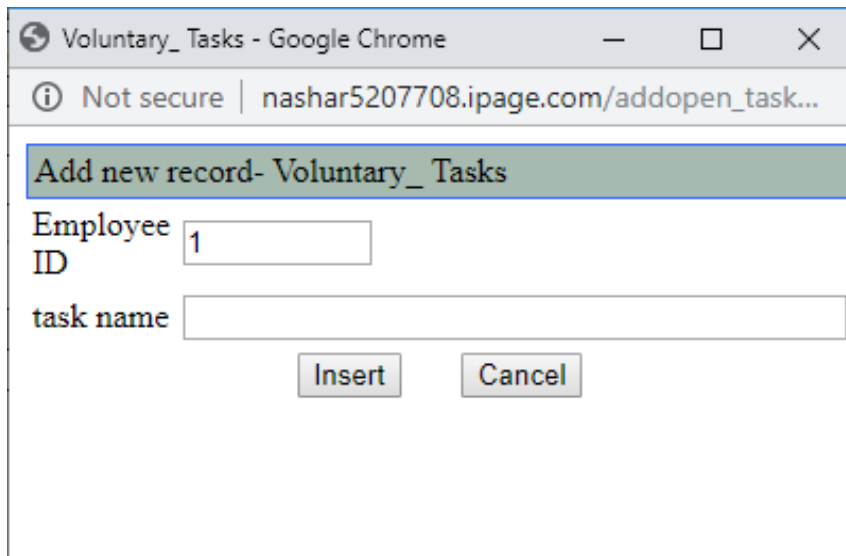
Figure 5.4 New assignments by employees.

When employees click 'view' for a task, they can see all the actions taken on this task in the following screen. They can see who created this task and when, as well as all the corresponding actions arranged by date. In addition, they can take a new action, or close the current task, as shown in Figure 5.5.
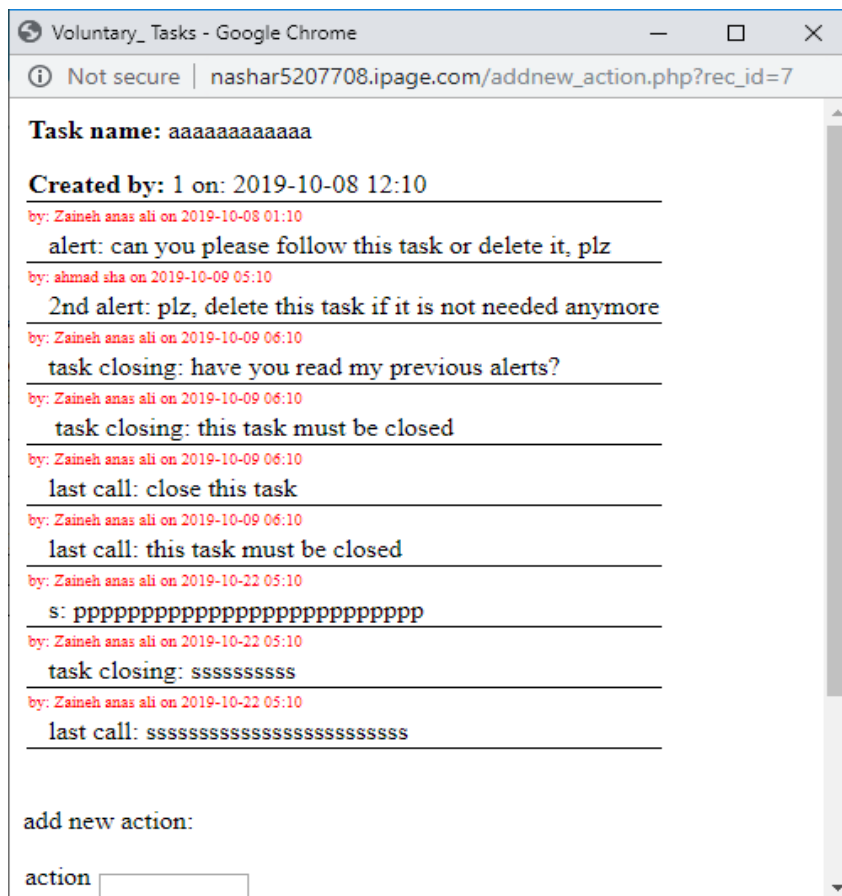
Figure 5.5 Procedures related to the assignment.

By closing the task, a simple report should be entered by the person who closed the task, as shown in Figure 5.6.
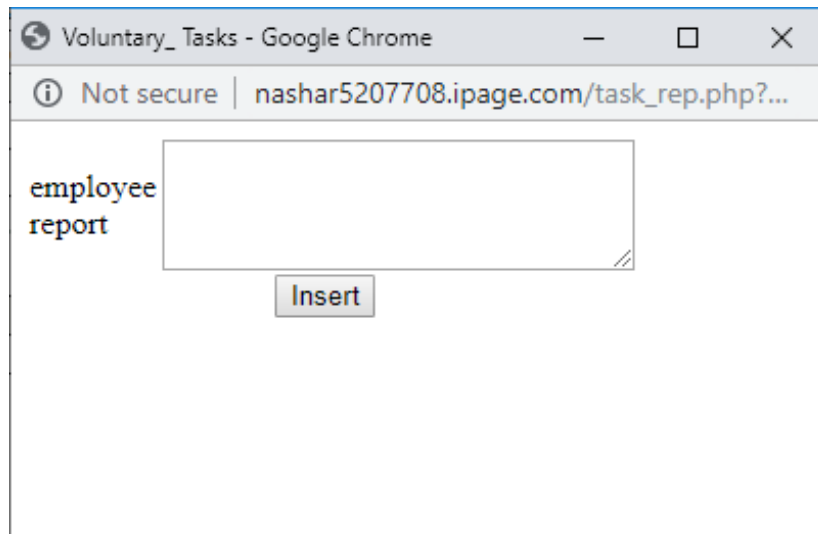
Figure 5.6 Report by the person who closed the task.

Every employee has to have his/her report. This can be done by managers only where employees can access this report and give feedback. Managers can use this screen to do that. Managers can only see a list of employees who assessed themselves. All the information about these assessments is available by clicking on 'view', as shown in Figure 5.7.

Assessment Results (Overall)

employee_name	assessment_year	assessment_month	self_scale	superior_scale	details
Zaineh anas ali	2019	JUN	Very good 80-89	Good 70-79	view
anas ali salameh	2019	JUN	Good 70-79	assess	view
ahmad sha	2019	JUN	Very good 80-89	Very good 80-89	view

Figure 5.7 The employee's evaluation of himself.

Then, managers have to assess the employees by clicking on 'assess'; they will get the following screen. The same list of items used by employees has to be used by managers for the assessment, as shown in Figure 5.8.

Figure 5.8 Director's evaluation of an employee.

When managers try to view the employee's assessment, they will be transferred to the following screen. They can go through the results of the assessment. Also, they can delete the assessment, or confirm the results and send the overall report to the employee's profile, as shown in Figure 5.9.
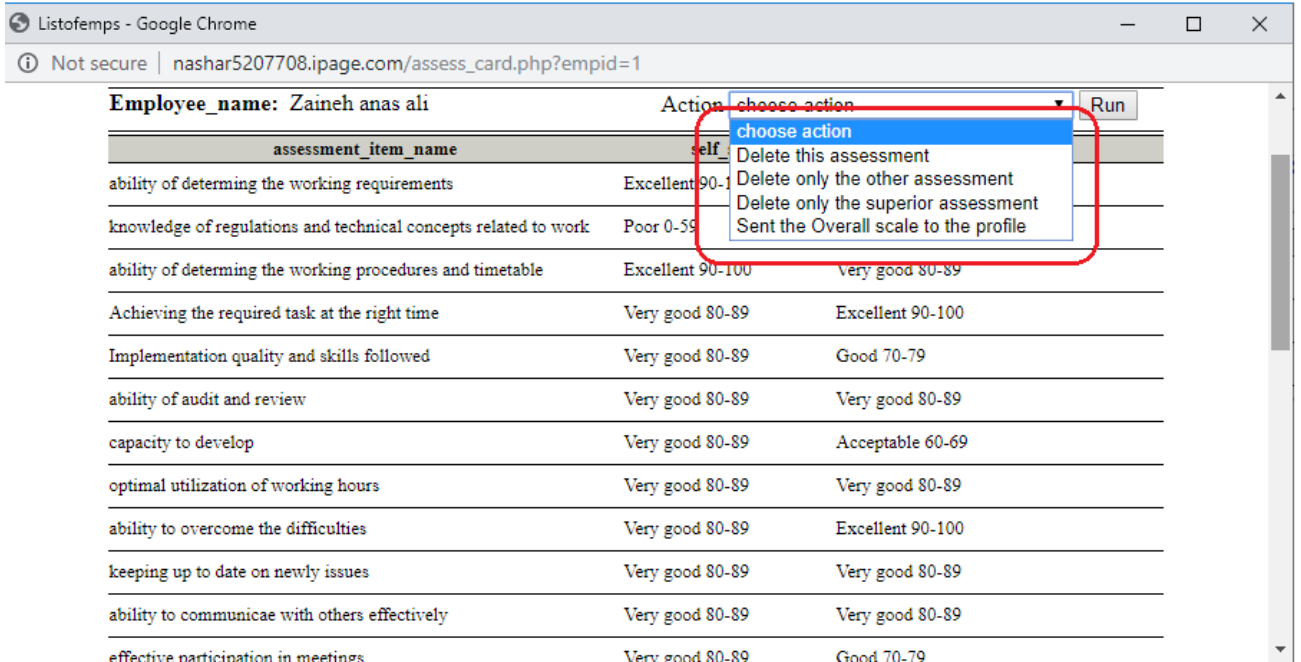
Figure 5.9 The manager's evaluation of an employee.

Manager scan follow the daily proposed changes or processes by clicking on 'proposed changes' in the main menu. They will get access to this page, where they can comment on the meeting, follow the task, or process the complaints, as shown in Figure 5.10.

Figure 5.10 Proposed daily changes.

The following screen could be used to make small report for a particular meeting. Also, the managers can confirm or reject the meeting report proposed by an employee. The 'submitting' choice can be used by an employee when they report a new meeting, as shown in Figure 5.11.

Figure 5.11 Small report for particular meeting.

Managers can review complaints, to find out who made them, and against whom, and for what. Then, directing it to the employee to give his justifications towards it managers can forward the employee to the other employee to give justification as shown in Figure 5.12.

Figure 5.12 Complaints, who they were made by, who they were made against and any justification.

Also, managers can edit this complaint and close it by using the screen shown in Figure 5.13.

Figure 5.13 Editing and closing complaints.

For the system administration, only managers can get access to this page. Two things can be managed in the system admin page (the following screen): companies and users. Admin can create a new company to be used in this system. It is possible to create users as administrators or managers. Remember, usernames for employees can be created from the 'employees' page, as shown in Figures 5.14. and 5.15.

Figure 5.14 The administrator can create a new company / users as officers or directors.

This screen could be used to add a new company, as shown in Figure 5.53.
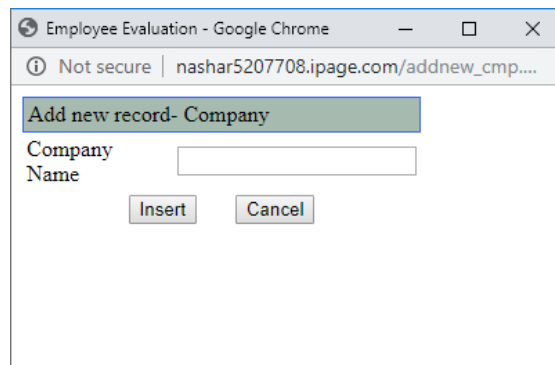
Figure 5.15 Adding a new company.

Users (administrators and managers) can be created from this screen. Users' ID, username and passwords must be entered. For managers, the company name must be identified. Managers can get access to only one company, while companies can be accessed by more than one manager. For administrators, there is no need to identify the company. It can be entered as '******'.

The system was validated by both subjective and practical validations. After development and testing, the system was put through trials. In order to ensure that no faults were identified during a variety of real-world procedures involving the system's operation, which were carried out practically with no errors discovered during a number of real operations involving the system's use. The evidence of such evaluation is presented from Apendix D1 to D9, and Figure 5.1 to 5.15. The subjective evaluation is presented in section 6.4.

5.6. Summary

This chapter talks about the program which has been designed by the researcher and the importance of benefiting from information technology and artificial intelligence.AI will use the available data to come out with correct, fast, accurate decisions that exceed human capacity and help managers in making the right decisions to raise the efficiency of workers and to know ways of developing them. Thus, the productive efficiency of the organization will increase. It will also facilitate companies obtaining comprehensive information about their employees, which would enable them to evaluate their performance and get to know their level accurately, with the possibility of developing them by proposing appropriate training programs.

This chapter also explains the components of the system and how it is used either by employees or their superiors. In addition, it explains how both employees and managers can use the program and which permissions are required to be able to use all its elements to get benefits.

Using this program, the organization will achieve multiple benefits. It will get to know the real level of employees' performance, so it would be able to evaluate their performance to develop them. Finally, the company would be qualified to raise their employees' efficiency and achieve their goals, facing their competitors in the market.

Chapter 6 - AI System Developments

6.1. Introduction

This chapter has discussed the program which the researcher has used to develop the performance appraisal system with the assistance of AI. The discussion was divided into three successive phases. The first talks about the algorithms that the researcher has used as an experiment to develop a performance appraisal program, including discussion of the benefits and disadvantages of each and what is the algorithm that was chosen among them, and the reason for choosing it to develop the performance appraisal program.

The second stage was about the program and how to operate it. The third stage is the personal interview and its results. This study combined both statistics and Neural Network (NN). While statistics provide predictors in order to get insights into the data and their structure, NN aims at efficiently representing the underlying properties of the data with respect to accuracy and development over time, as well as producing good predictions results (Karlaftis & Vlahogianni, 2011). Furthermore, considering that statistics also explain the phenomena investigated through interpretations, NN applications do not target interpretation. They instead show marginal effects and signs more flexibly than statistics so it can be treated as a functional form through learning rather than presupposing it.

The core dimensions used in this study and their items are: "Performance appraisal" with 11 items, "Performance and Software Benefit" with 6 items, "Performance Aims/objectives" with 5 items, "Job Description" with 13 items, "Job description Clarity" with 8 items, "Job description Importance" with 5 items, "Utilisation of Artificial Intelligence" with 11 items, and "Technology Adoption Factors" with 8 items respectively. Statistical methods have shown that all these items are significantly correlated to each other. A validation test on their relationships has shown high significance. In terms of the strength of their impact on predicting the influence of each variable, "Linear regression" has been used. It was found that Technology (Artificial Intelligence) Adoption influenced Use of artificial intelligence by 62% whereas the Use of Artificial intelligence impacted Performance software benefit of Performance Appraisal by 41%, Performance aims/objectives by 74%, Clarity of job description by 57% and importance of job description by 59%. On the other hand, "Clarity of job description" impacted "Performance of software benefit 51% 69% by "Performance aims/objectives it has 68% on "Performance of software benefit and 51% of "Performance aims/objectives. Considering the

success of the statistic approach, Genetic Algorithm, Decision Tree and Neural network are employed.

6.2. Performance Evaluation Modelling

Several algorithms have been used to model the performance of the employees, starting with a linear model, such as regression, decision trees, Genetic Algorithm optimised linear model, and a non-linear model, such as Neural network. In order to select the best model to be utilised in the system, a comparison study is conducted to test the validity of each model.

The researcher relied on obtaining information from 107 employees who worked in 5 different jobs in Mohammed Yousef Naghi Motors Company and Riyadh Bank. The job titles were as follows: Modern Commercial Salesman, Traditional Commercial Salesman, Delivery Driver (Mohamed Yousuf Naghi Motors Company). Cash Register, customs service's employee (Riyad Bank).The collected data characteristics are depicted in Table 6.1.

Table 6.1 Modelling data characteristics.

Var no.	name	min	max	average	variance
1	Knowledge of working and procedures	55.0	95.0	73.3	151.9
2	The ability to determine the working requirements	4.0	94.0	70.8	330.9
3	Knowledge of regulations and technical concepts related to work	51.0	91.0	73.9	138.8
4	The ability to determine the working procedures and timetable.	50.0	94.0	74.0	98.0
5	Achieving the required task at the right time	59.0	91.0	76.3	59.3
6	Implementation quality and skills followed.	70.0	90.0	77.1	43.3
7	The ability of audit and review	70.0	90.0	77.2	52.3
8	Capacity to develop	58.0	88.0	74.3	59.1
9	Optimal utilization of working hours	59.0	88.0	77.1	55.7
10	Ability to overcome the difficulties	50.0	89.0	72.5	132.7
11	keeping up to date on new issues	50.0	89.0	74.9	97.2
12	Ability to communicate with others effectively	50.0	88.0	74.2	62.7
13	Effective participation in meetings	70.0	88.0	74.7	28.6

14	Initiative and able to provide alternative solutions in different tasks	70.0	93.0	76.7	62.6
15	Ability to train others and transfer the knowledge	70.0	88.0	74.2	29.2
16	The ability of discussion and expressing the opinion	70.0	89.0	73.8	27.7
17	The ability to estimate the risk	55.0	88.0	73.2	74.9
18	Addressing the growing challenges transparently	58.0	90.0	72.9	107.0
19	Well-behaved	60.0	90.0	76.4	69.9
20	Dependable	55.0	82.0	71.3	35.8
21	Accepting the instructions and willing to take action	53.0	90.0	74.1	99.0
22	Working skills in a team	50.0	87.0	72.3	60.7
23	Preservation of work property	51.0	80.0	72.6	57.9
24	Keeping work official secrets	50.0	80.0	70.8	56.0
25	Good-looking	55.0	80.0	70.8	51.4
26	Relationship with managers	59.0	91.0	76.2	46.5
27	Relationship with colleagues	59.0	94.0	76.3	46.7
28	Relationship with clients	53.0	89.0	73.1	93.0
output	Overall	65.9	83.8	74.1	32.3

The characteristics of the variables are expressed in terms of the degree of the distributions, which is then compared with the dimensions. The minimum, maximum, mean, and variance of the distribution are used in the analysis of the degree of the distribution. The minimum value of the dimension within the minimum ranges is 4 in the distribution, and it is on the dimension "The ability to determine the working requirements." However, the maximum number of the values within the maximum ranges is 95, and this is on the dimension "Knowledge of working and procedures." This indicates that the data has a distribution ranging from 4 to 95, with the highest average within the distribution being 77.2, and it comes from the dimension "The ability of audit and review." In other words, the data has a distribution that ranges from 4 to 95, with an average of 77.2. The variance measures how far each dimension deviates from the mean in terms of standard deviation. In this way, it is possible to determine which dimension is most appropriate within the entire distribution. A lower variance value indicates that the

dimension is not more appropriate or spread for the distribution, and the lowest variance value is the dimension 27.7. Whereas the highest is 151.9, which falls under the dimension "Knowledge of working and procedures". As a result, it indicates that it is the best dimension to have a spread distribution ranging from 4 to 95, with 4 being the minimum and 95 being the maximum.

6.2.1 Linear Regression Modelling

The collected data is divided into train and testing partitions. The regression model was developed using MATLAB *regress* function with 28 inputs and the output being the employee overall performance. Figure 6.1 shows the trained model predictions against the actual performance. while Figure 6.2 shows the linear model prediction using the polynomials obtained from the training stage. The training and testing model RMS are 2.8285E-14, and 0.3211 respectively. It is noted that the training RMS is smaller than the testing model due to the training model overfitting, as linear regression has no mechanism to avoid this phenomenon. Table 6.2 lists the variables and the associated parameters.
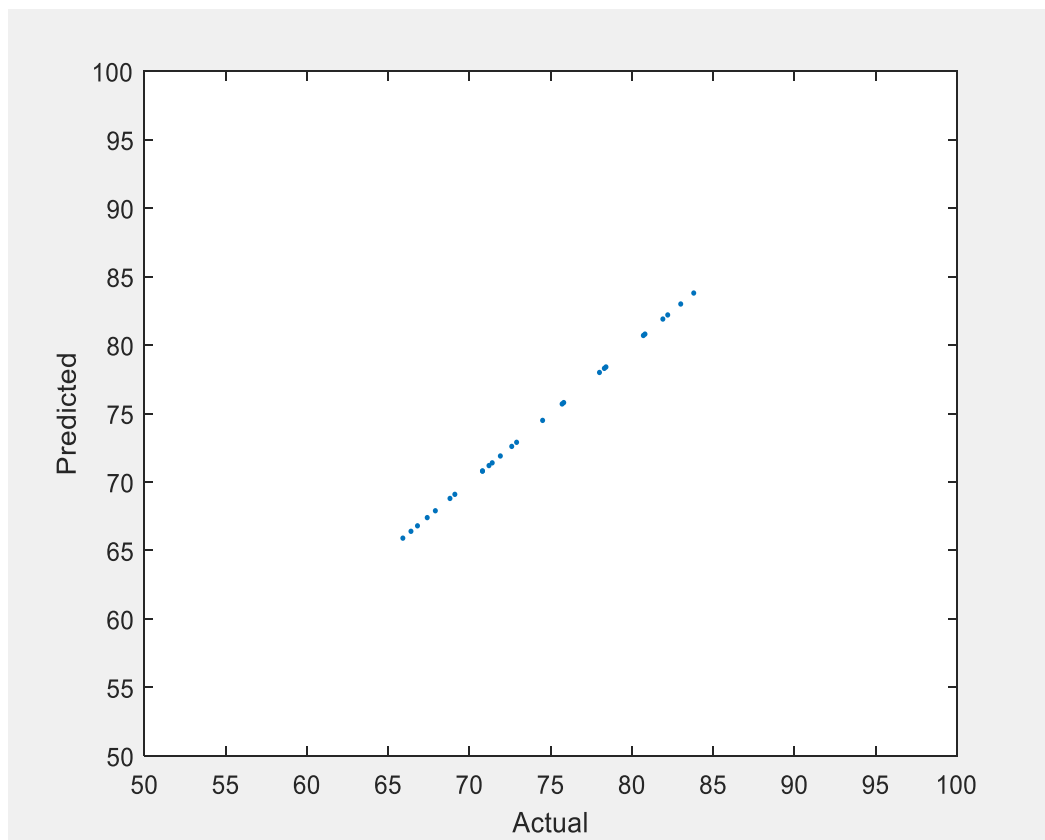
Figure 6.1 Logistic regression training data.
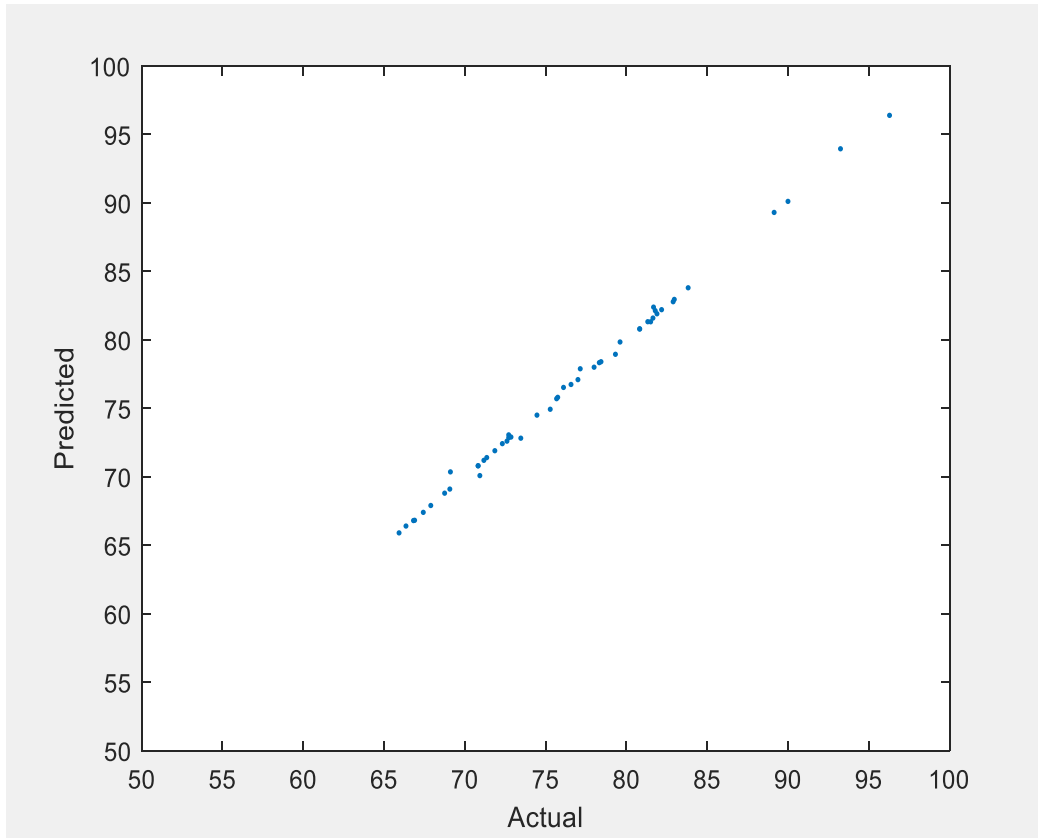
Figure 6.2 Logistic Regression testing data.

The justification for this finding stems from the fact that the prediction study is intended to determine the impact of artificial intelligence in human resource management, and as a result, the dataset from experts in the use of human resource management was used in the training sequence, as previously stated, while loading the input dataset to run both linear model prediction and polynomial model prediction, a model-based approach for error correction was utilized, it has been demonstrated that the maximum output error in both cases follows an appropriate sequence of training sessions (see Table 6.2). By comparing the parameter value to the predicted outcome, the best prediction outcome was determined. The fact that this had no effect on training meant that an independent measure of prediction performance both during and following training was accurate. Predicted results are in accordance with the available data. In conclusion, the evaluation of the effectiveness of AI in relation to human resource management using Logistic Regression functions on the dataset derived from the samples provided by the respondent proved to be an appropriate method of investigation. As a result, because the vast majority of respondents are experts, and because the prediction analysis supported the fact that one of the efficiency criteria is the idea surrounding the use of AI in human resource management to be effective, the research conclusion is appropriate.

Table 6.2 Linear regression model parameters.

Var no.	Name	Para.
1	Knowledge of working and procedures	0.0487
2	The ability to determine the working requirements	0.0351
3	Knowledge of regulations and technical concepts related to work	0.0018
4	The ability to determine the working procedures and timetable.	0.0873
5	Achieving the required task at the right time	-0.0092
6	Implementation quality and skills followed.	0.0658
7	The ability of audit and review	0.0220
8	Capacity to develop	0.0223
9	Optimal utilization of working hours	0.0659
10	Ability to overcome the difficulties	0.0383
11	keeping up to date on new issues	0.0202
12	Ability to communicate with others effectively	0.0224
13	Effective participation in meetings	0.1169
14	Initiative and able to provide alternative solutions in different tasks	0.0449
15	Ability to train others and transfer the knowledge	0.0000
16	The ability of discussion and expressing the opinion	0.0000
17	The ability to estimate the risk	0.0199
18	Addressing the growing challenges transparently	0.0360
19	Well-behaved	0.0123
20	Dependable	0.0609
21	Accepting the instructions and willing to take action	0.0659
22	Working skills in a team	0.0198
23	Preservation of work property	0.0247
24	Keeping work official secrets	0.0773
25	Good-looking	0.0215
26	Relationship with managers	0.0292
27	Relationship with colleagues	0.0278
28	Relationship with clients	0.0235
Training: 2.8285E-14, testing: 0.3211		

6.2.2 Genetic Algorithm Linear Regression Model

Since the linear regression model is based on linear relationship, another algorithm is required to investigate non-linear parameters fitting. GA is used to search for the linear model parameter which is based on the same structure as the linear model. A constant term is added to the equation to offset bias in the data. MATLAB GA toolbox is used to search for the linear equation parameters. The parameters search is constrained within 0 and 3. The default setting of the GA toolbox is used which can be summarised as follows:

Population size: 200

Coding: real number

Selection: Stochastic

Number of iterations: 1000

Cross over probability: 80%

Mutation probability: 5%

The GA linear equation fitting is shown in Figure 6.3 using the training data, while the testing is shown using the fitted equation obtained by the GA algorithm as shown in Figure 6.4. The training and testing model RMS are 0.0363, and 0.2111 respectively. It is noted that the training and testing errors are more balanced in comparison to the linear regression technique. Table 6.3 lists the variables and the associated parameters.
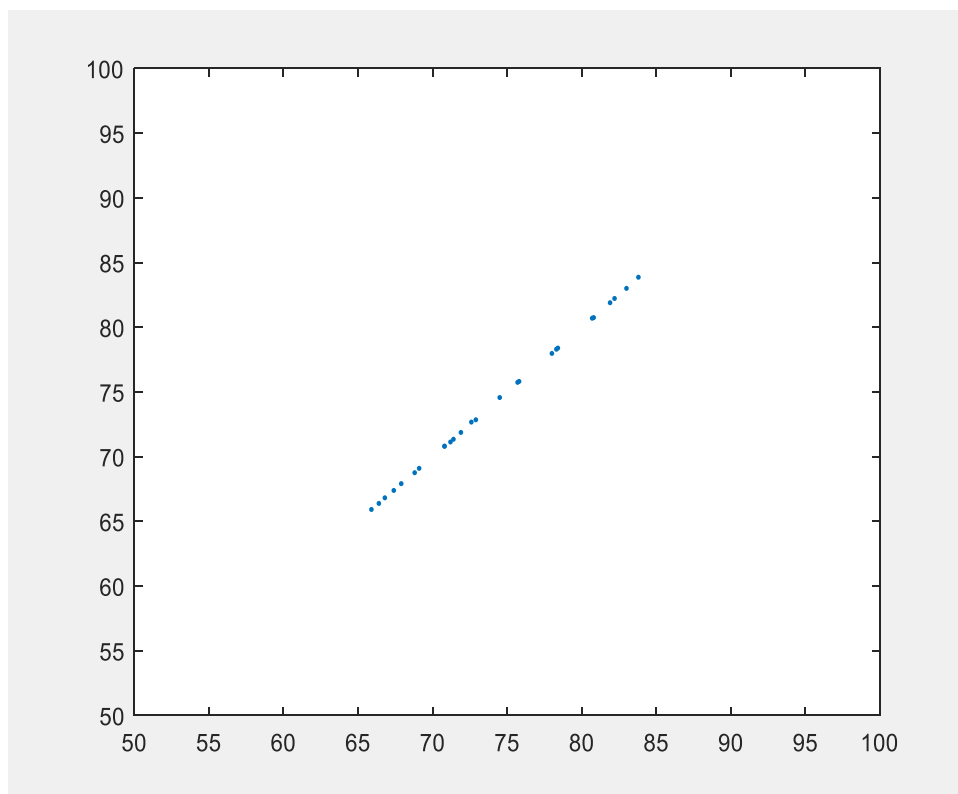
Figure 6.3 Genetic algorithm linear equation using training data.
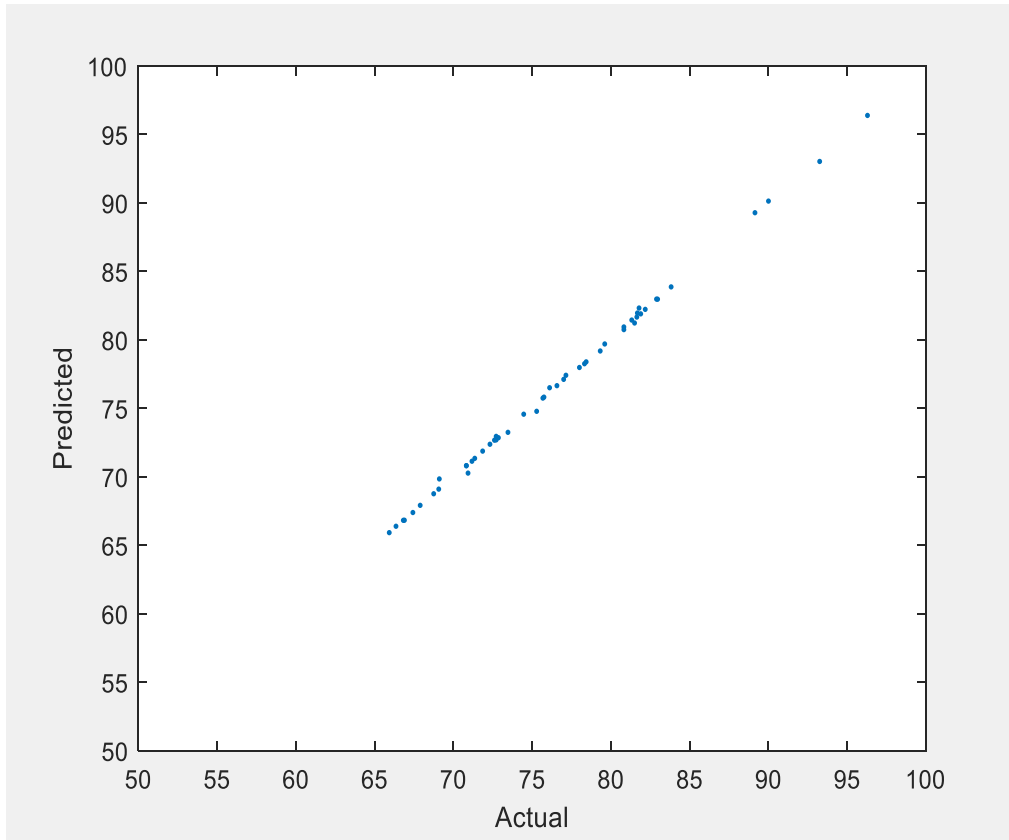
Figure 6.4 Genetic algorithm linear equation using testing data.

Table 6.3 Genetic algorithm linear equation parameters fitting.

Var no.	Name	Para.
1	Knowledge of working and procedures	0.0380
2	The ability to determine the working requirements	0.0365
3	Knowledge of regulations and technical concepts related to work	0.0220
4	The ability to determine the working procedures and timetable.	0.0609
5	Achieving the required task at the right time	0.0247
6	Implementation quality and skills followed.	0.0533
7	The ability of audit and review	0.0142
8	Capacity to develop	0.0303
9	Optimal utilization of working hours	0.0523
10	Ability to overcome the difficulties	0.0314
11	keeping up to date on new issues	0.0325
12	Ability to communicate with others effectively	0.0216
13	Effective participation in meetings	0.0617
14	Initiative and able to provide alternative solutions in different tasks	0.0357
15	Ability to train others and transfer the knowledge	0.0114

16	The ability of discussion and expressing the opinion	0.0462
17	The ability to estimate the risk	0.0109
18	Addressing the growing challenges transparently	0.0398
19	Well-behaved	0.0087
20	Dependable	0.0469
21	Accepting the instructions and willing to take action	0.0715
22	Working skills in a team	0.0173
23	Preservation of work property	0.0290
24	Keeping work official secrets	0.0630
25	Good-looking	0.0313
26	Relationship with managers	0.0231
27	Relationship with colleagues	0.0454
28	Relationship with clients	0.0416
	Offset	0.0363
RMS: Training: 0.0363, testing: 0.2111		

To put it another way, GA analysis is a type of optimization analysis where the variables of AI in human resource management represent a quantity whose value depends on how the independent variable manipulated it, or how the factors that were deemed to influence AI in human resource management actually did so. Because of this, the results obtained from using a GA model-based approach in which it searches for the linear model parameter that is based on the same structure have demonstrated that an appropriate predicted outcome is obtained, and the results obtained are consistent with the data set in question (see Table 6.3).

Based on the evaluation, it can be concluded that the effectiveness of artificial intelligence in relation to human resource management functions has an impact on the training dataset that has been obtained for the system. Conclusively, since the quality of GA fitness is constantly dependent on the problem, the findings of this study measured AI's impact on HRM, which found that the elements actually impacted AI in HRM. A GA model-based method can find a linear model parameter with the same structure as the data.

6.2.3 Decision Trees Model Developments

The same data used for training the linear models are used for generating the decision tree. Using MATLAB *fitctree* function, the tree was generated and displayed, as shown in Figure 6.5. One of the disadvantages of the decision tree is the dependence on one of the variables to start the root. If such information is not available for a particular employee, or the score is low, this will affect the final results. Figure 6.6 shows the importance of each independent variable

in the decision. It is shown that the knowledge of work and ability to determine the work procedure are the top factors which differ from the linear model.
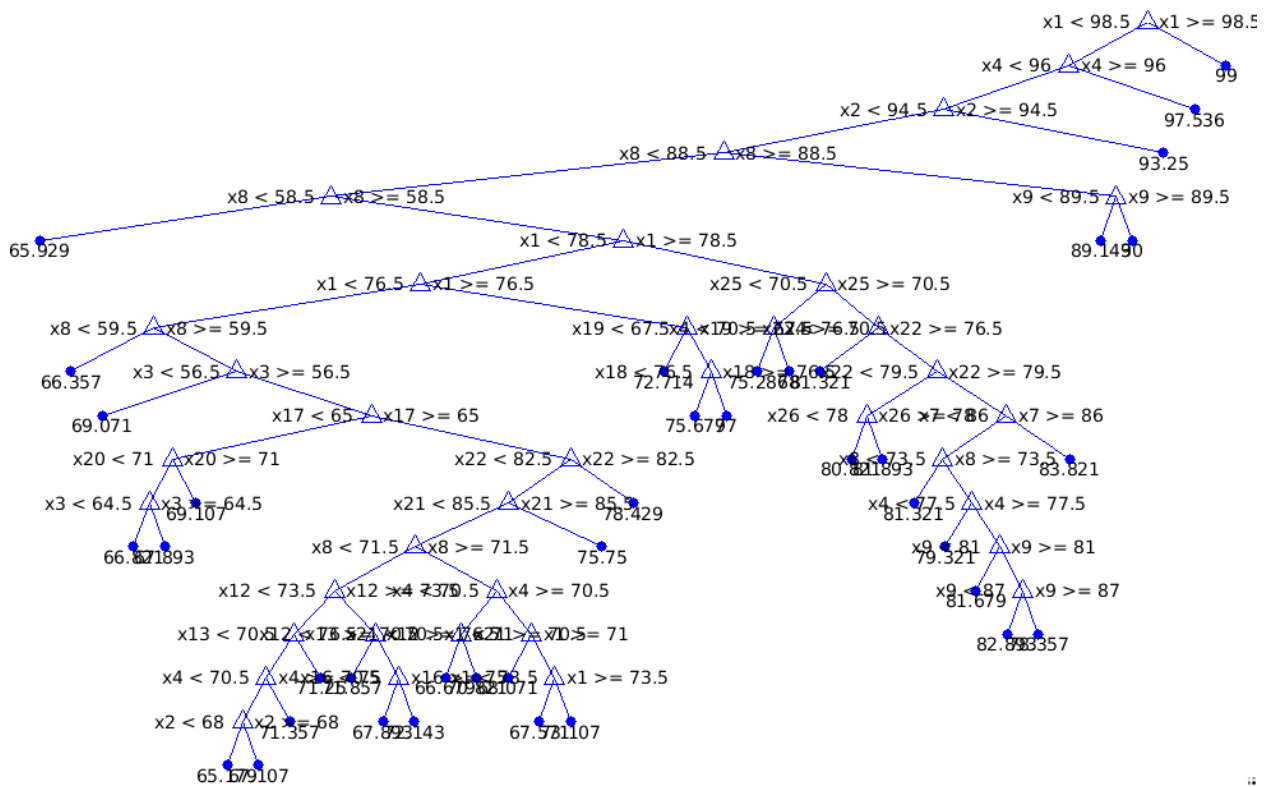
Figure 6.5 Decision tree given by the training data.
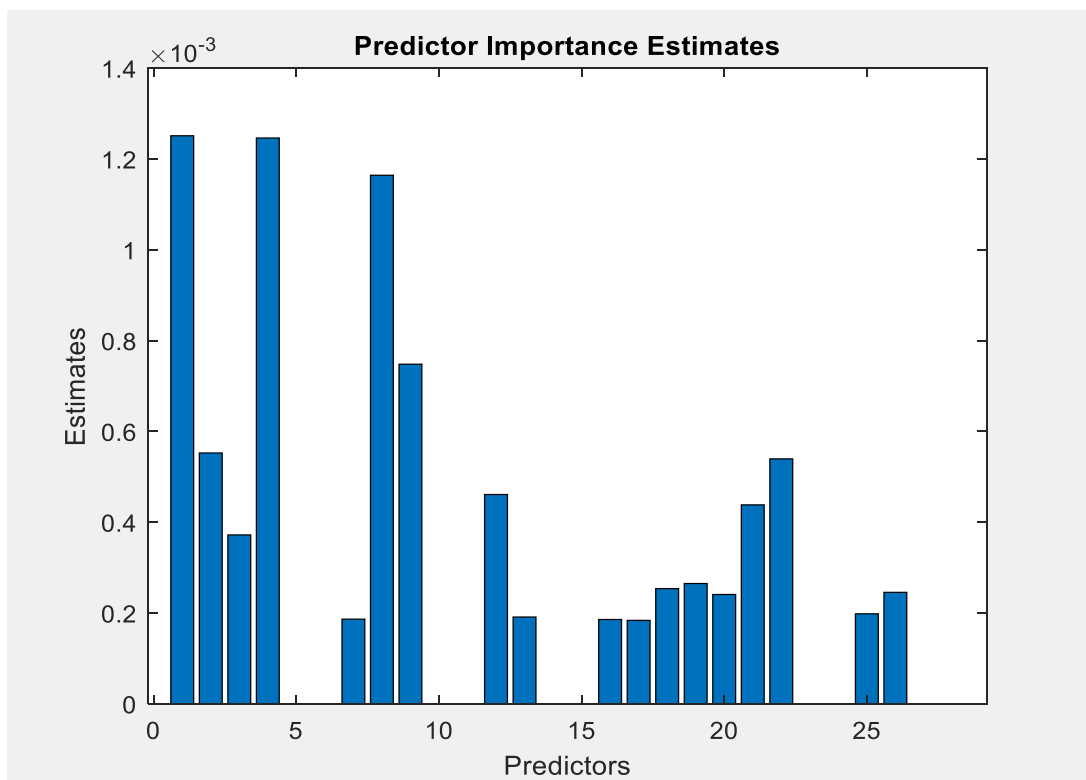
Figure 6.6 Decision tree variables importance.

This finding on the decision support, decision tree tool is critical since the quality of the decision support fitness function is always dependent on the problem being dealt with by the model. The decisions, as well as their potential implications, are used to measure AI's impact on human resource management are predicted well. The impact of artificial intelligence in human resource management has been demonstrated through the use of decision trees that are dependent on one of the factors associated with the start root of the decision tree. The impact of artificial intelligence in human resource management information that is available for a start is critical to the quantity's values. The decision tree assists by segmenting each feature in the training data that has an impact on AI in human resource management. According to the findings, the mean of results from the training data inputs of AI in HRM is characterised the predictor influence of AI in HRM on the organisation. All data points that are subjected to the GA supported that to, and the cost of each candidate split is determined for each candidate split. Because of this, it is efficient in predicting AI in human resource management while having a lower splitting cost.

6.2.4. Neural Networks Model Training

The training and testing data are used to develop a model using neural networks. The model is developed using MATLAB neural networks tools box (*fitnet*). Different topologies were tested in order to determine the best network structure. The best performance can be obtained using a single hidden layer with 10 neuron, sigmoid activation function for the hidden layer, and linear activation functions for the output layer. The default setting of the toolbox is used as shown in Figure 6.7, where the extracted features obtained for AI in HR management data was partitioned into three groups. Despite the fact that there was no fixed ideal framework for the data partitioning ratio, the data was partitioned by default MATLAB tool box partitioning into of 70%, 15% and 15%, which represent training, validation, and testing datasets, respectively. This partition ratio is also supported by Zhang et al. (1998) that was established using Bootstrap resampling.

The network was trained using the default settings. Figure 6.8 shows the training performance of the network which took 784 epochs to reach the best fitting. Figure 6.9 shows the training gradient and the learning rate.
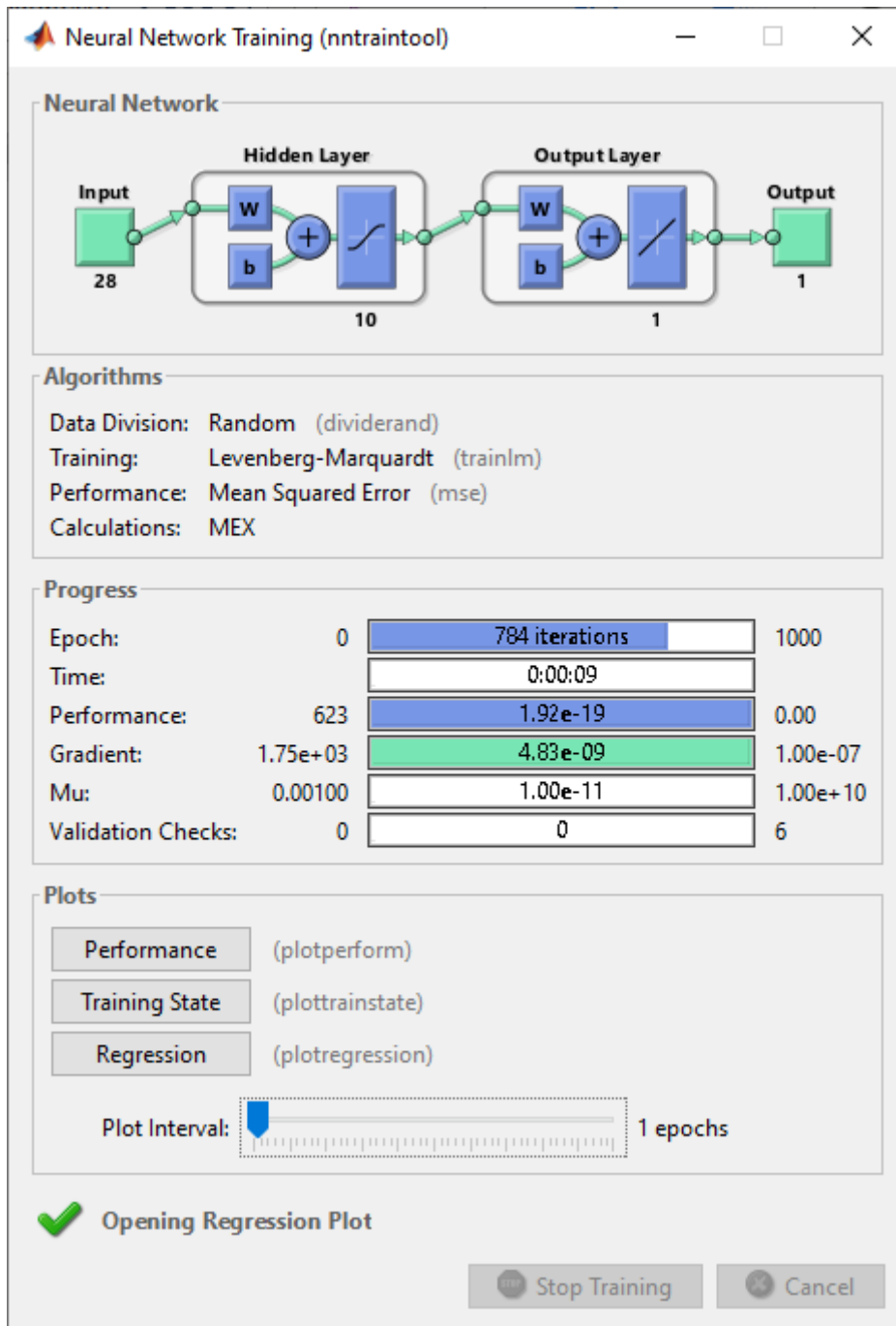
Figure 6.7 Neural Network settings.

Figure 6.10 shows the model fitting (predicted against actual) for the training, validation, and all data). It is noted that the training and testing model RMS are 9.8114E-4, and 0.0970 respectively. This is much better accuracy in comparison to other models.
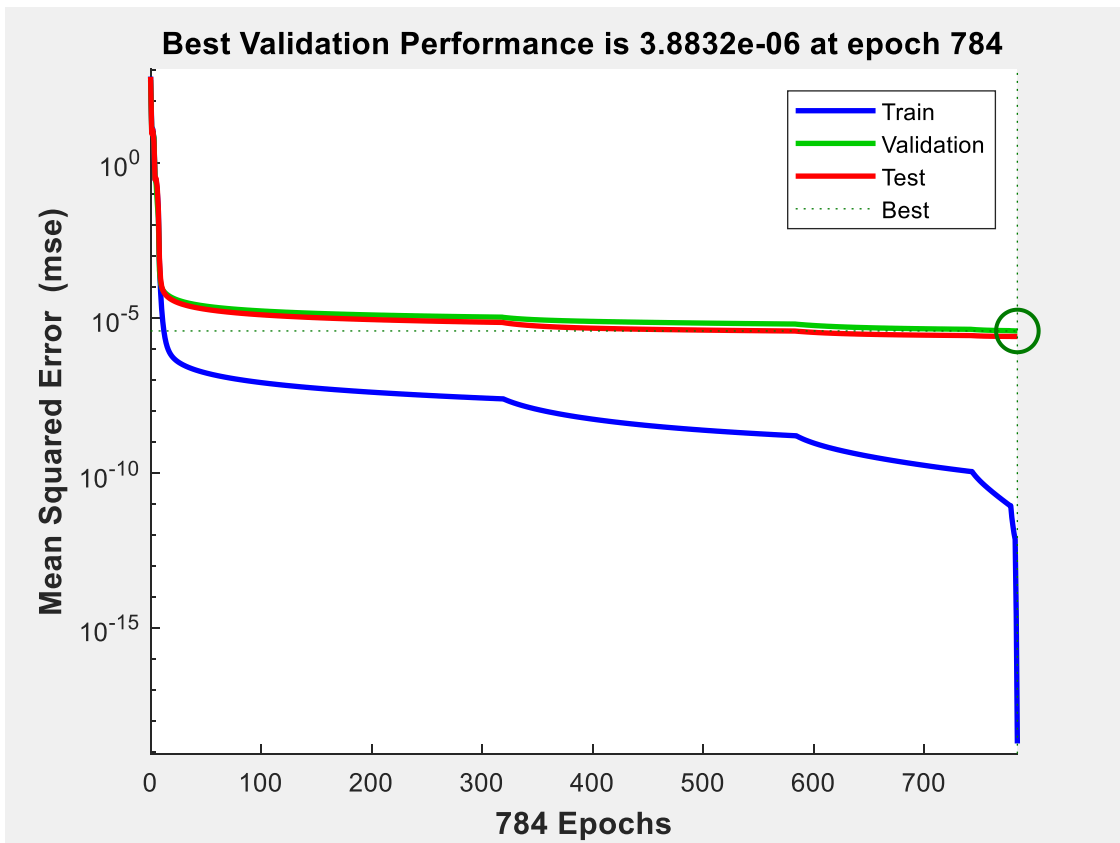
Figure 6.8 Neural Network training performance.
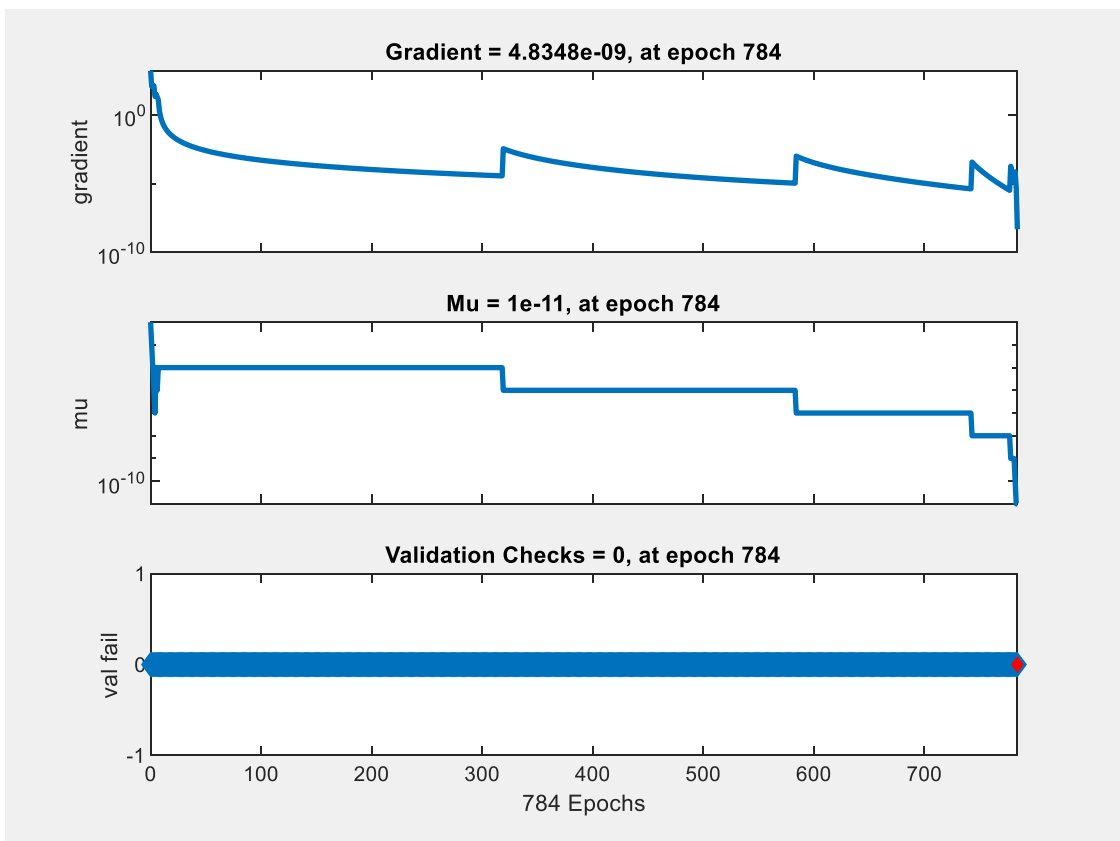
Figure 6.9 Neural Network learning gradient and rate.
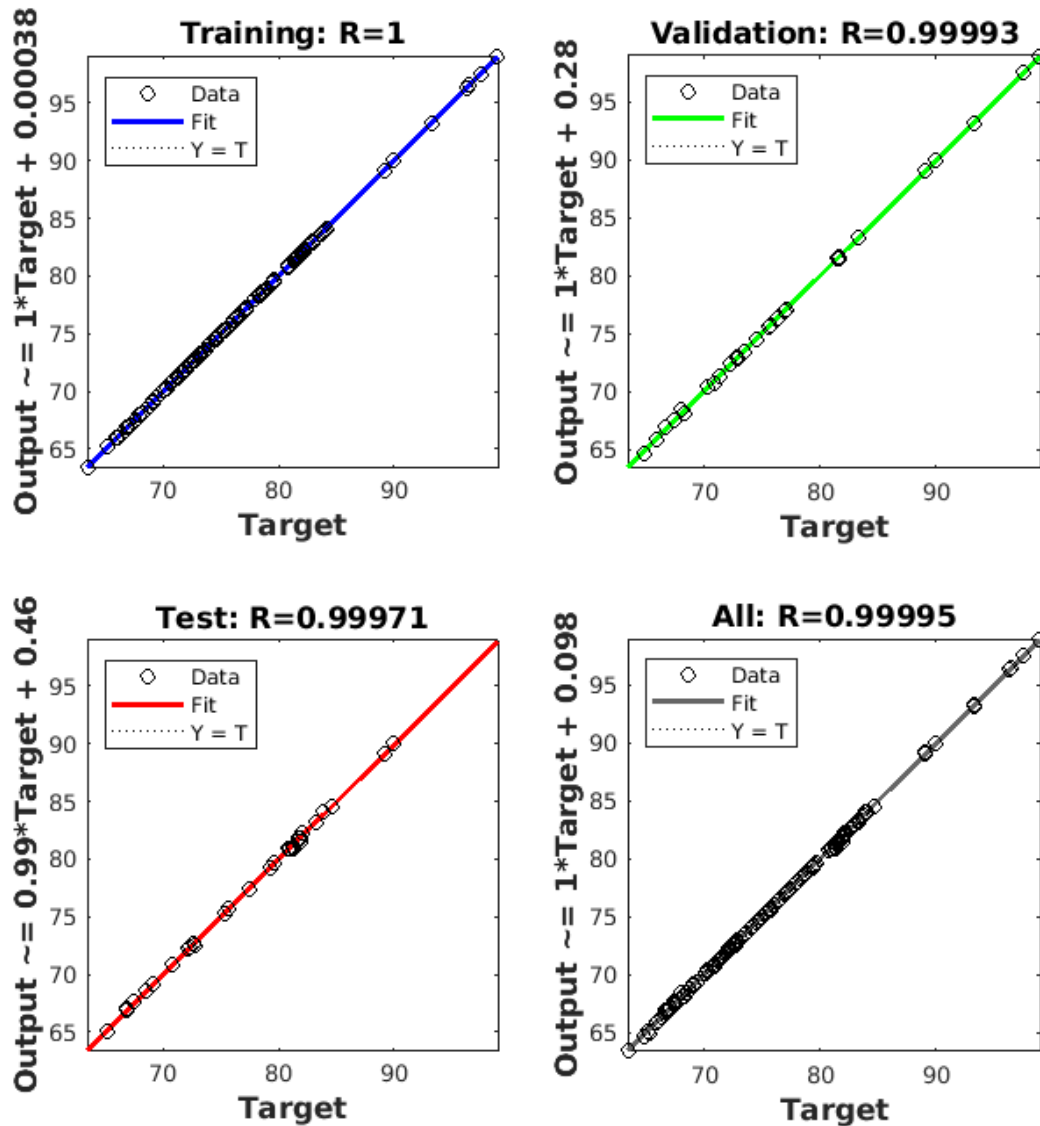
Figure 6.10 Neural Network model predictions.

The evidence demonstrating the impact of Neural Networks on the prediction of AI in human resource management adds credence to the viewpoint that sought to determine if AI will have a substantial impact on human resource management. Because neural networks are capable of making accurate predictions, this study trained a neural network using a dataset of human resource management specialists from a variety of sectors, a technique that is becoming more prevalent in prediction analysis. Prior to making a remedy to rectify an error in accordance with the model, a prediction must be made, and this prediction must be followed by action. Due to the fact that the default neural network prediction models gave the best prediction outcome, which also happened to be the most accurate prediction outcome imaginable, they were chosen as the best tools for the predictive models. The conclusions of this study

established that AI has an impact on human resource management. That example, when neural networks are used to investigate the influence of AI on human resource management, it was established which factors had an effect. As a result of the high quality of neural network prediction fitness, this research is feasible.

6.2.5 Comparison between Artificial neural network, Genetic Algorithm, Decision Tree and Linear regression.

A comparison table is made to evaluate the advantages and disadvantages of the different algorithms that have been utilised to create an AI model for evaluating the performance of the employees. Table 6.4 depicts the key features of each algorithm and their accuracy.

Table 6.4 Comparison of the four algorithms.

Artificial Neural Network (ANN)	Genetic Algorithm (GA)	Decision Tree (DT)	Linear Regression (LR)
ANNs are more complex in computing terms than traditional algorithms.	A GA has a higher computational power than linear regression.	DT training is relatively expensive as it is more complex and takes more time.	LR has considerably lower computational power when compared to some of the other machine learning algorithms.
ANNs require normalization and scaling of data. Also, missing values in the data cause low accuracy.	GAs require normalization and scaling of data. Also, missing values in the data cause low accuracy.	A DT does not require normalization or scaling of data. Missing values in the data also do NOT affect the process of building a DT to any considerable extent.	LR fits linearly separable datasets almost perfectly and is often used to find the nature of the relationship between variables.
ANNs are biologically inspired computational networks. ANN are designed to simulate the way the human brain analyses and processes information.	GAs solve both constrained and unconstrained optimization problems based on a natural selection process that mimics biological evolution.	A DT is a commonly used data mining method for establishing classification systems based on multiple covariates or for developing prediction algorithms for a target variable.	LR attempts to model the relationship between two variables by fitting a linear equation to observed data. One variable is considered to be an explanatory variable, and the other is considered to be a dependent variable.

Train RMS = 9.8114E-4	Train RMS=0.0363	Train RMS=4.1282e-04	Train RMS =2.8285E-14
Test RMS = 0.0970	Test RMS = 0.2111		Test RMS = 0.3211

Out of the four developed models used in the performance appraisal program, it was found that the ANN has the best results due to the nonlinear modelling technique in addition to other advantageous features that are not available in other algorithms.

6.3. System Integration

6.3.1 ANN Model integration

The developed artificial neural network model is integrated into the appraisal system. The model accepts28 inputs which represent the assessment items used to evaluate the employees. A testing procedure was implemented to validate the system appraisal and compare it an appraisal performed by the manager. Figure 6.11 shows a comparison of the performance of an employee on 4 scales, namely self-scale, superior scale, ANN scale and manager's scale. The employee self-assessment is scaled at 99.14 while the line manager is 82.96 as shown in Figure 6.11.

assessment_item_name	self_scale	superior_scale	Department ANN Ranking	Company ANN Ranking
Knowledge of working system and procedures	100	92	77.17	76.65
ability of determing the working requirements	100	92	77.87	76.51
knowledge of regulations and technical concepts related to work	100	90	77.16	75.96
ability of determing the working procedures and timetable	100	94	77.86	78.27
Achieving the required task at the right time	100	91	75.44	77.49
Implementation quality and skills followed	100	90	76.21	77.03
ability of audit and review	100	90	75.43	76.92
capacity to develop	100	83	74.56	75.96
optimal utilization of working hours	100	84	77.19	76.43
accepting the instructions and willing to take action	90	70	76.48	77.86
working skills in a team	90	71	75.89	75.63
preservation of work property	90	77	77.46	76.86
keeping work official secrets	100	70	75.31	73.02
Good-looking	100	73	75.35	74.42
relationship with managers	100	91	78.68	77.33
relationship with colleagues	100	94	77.02	77.64
relationship with clients	100	85	77.74	76.26
ANN Ranking	99.14	82.96		

Figure 6.11 Assessment scales made by the employee and assessment scales by the superior.

6.3.2 System Assessment and Recommendation

The system outcome is the employee assessment based on the ANN model. Figure 6.12 shows another employee evaluation and the recommended action based on the ANN predictions. The system checks the performance for each category and recommends training for any weakly identified qualification.

assessment_item_name	self_scale	superior_scale	Department ANN Ranking	Company ANN Ranking	ANN_Recommendation	Training suggested
Knowledge of working system and procedures	80	55	76.11	74.98	training needed ⬇	Job-specific work procedures
ability of determing the working requirements	80	53	74.67	74.80	training needed ⬇	working regulations and concepts
knowledge of regulations and technical concepts related to work	80	51	75.63	74.87	training needed ⬇	The importance of adhering to work schedules
ability of determing the working procedures and timetable	80	50	75.53	73.71	training needed ⬇	Time management
Achieving the required task at the right time	80	72	78.40	76.88		
Implementation quality and skills followed	80	74	76.78	79.15		
ability of audit and review	80	77	77.96	78.18		
capacity to develop	80	58	74.54	75.68	training needed ⬇	time importance
optimal utilization of working hours	80	88	76.43	78.66		
ability to overcome the difficulties	80	58	74.05	74.61	training needed ⬇	Dealing with variables
keeping up to date on newly issues	80	59	72.72	75.61	training needed ⬇	Effective communication skills
ability to communicae with others effectively	80	70	75.03	75.33		

Figure 6.12 Compare the item's employee measure to the rank at which it was created.

As can be noticed from Figure 6.12, two values are generated, Department ANN ranking and company ANN ranking. Department ANN ranking is generated from ANN that takes 30 scales for each assessment item randomly from the same employee's department. Company ANN ranking is generated from ANN that takes 30 scales for each assessment item randomly from the same employee's company. For example, for item number 1 (Knowledge of working system and procedures), we select 30 employees from each department were randomly selected for item 1. The output was 76.11. The same procedure was followed for company ANN and the output was 74.98.

Now, we use these follow these values to train our ANN to make decisions on whether the employee needs training in that item or not. The following rules are followed:

- In the database, the minimum scale is 50 and the maximum was 99. There are five groups ranging from excellent to poor. This means the difference between an employee's scale and the generated values (Department ANN ranking and company ANN ranking) shouldn't be more than 9.8 according to the following formula:

    (Maximum scale – minimum scale) / number of scales

    For example

    99-50/5 = 9.8

    Number of scales in our system is 5 which are:

- o Excellent
- o Very good
- o Good
- o Acceptable
- o Poor
- If the difference is more than 9, the ANN will recommend that the employee needs a training as can be seen in Figure 6.12. Based on that decision, the ANN will choose a corresponding training from a suggested list as shown in Table 6.5.
- Based on the employee's evaluation scale, the system will determine the type of training and the appropriate procedure for the evaluation variable as follows:
  - Employee with a Poor score (0-59):the system will suggest training courses that fit the evaluation variable with the possibility of dismissing the employee if he does not improve.
  - Employees who got accepted score (60–69): the system will choose the appropriate courses for them to improve the evaluation variable. The manager will warn them that if they do not improve, they will be transferred to another department or laid off.
  - Employees who got a good score (70 – 79) in the database: the system will choose the appropriate courses for them to improve the evaluation variable, and they will be under observation to ensure that they improve to the required degree.
  - Employees who got very good score (80 – 89): these employees will receive a thank you letter from management to encourage them to improve and develop.
  - Finally, those who got excellent (90 – 99) must be rewarded with a bonus or a promotion.
- Determining the training program is dependent on the score level obtained by the employee in the evaluation system. Also, the levels of penalty or rewards depend on the number of training programs that the employee will receive.

Table 6.5 Evaluation of assessment item and recommended training.

	Assessment item	Suggested training or action
1	Knowledge of working system and procedures	Job-specific work procedures
2	ability of determining the working requirements	working regulations and concepts
3	knowledge of regulations and technical concepts related to work	The importance of adhering to work schedules
4	ability of determining the working procedures and timetable	Time management
5	Achieving the required task at the right time	Effective performance skills
6	Implementation quality and skills followed	Performance development requirements
7	ability of audit and review	Performance development
8	capacity to develop	time importance
9	optimal utilization of working hours	Confrontational skills and good behaviour
10	ability to overcome the difficulties	Dealing with variables
11	keeping up to date on newly issues	Effective communication skills
12	ability to communicate with others effectively	Improved ways in meetings participate Improving communication skills between employees.
13	effective participation in meetings	Develop the ability to face problems and make appropriate decisions
14	initiative and able to provide alternative solutions in different tasks	Training skills
15	ability to train other and transfer the knowledge	Improve participation skills and give an opinion effectively
16	ability of discussion and expressing opinion	Developing follow-up skills and risk identification
17	ability of estimating the risk	How to face work challenges

18	addressing the growing challenges transparently	Behaviour skills
19	Well-behaved	Qualities of an effective leader
20	dependable	Adherence to procedures rules and their implementation
21	accepting the instructions and willing to take action	Teamwork skills
22	working skills in a team	Dealing with business property
23	preservation of work property	Preserving work secrets
24	keeping work official secrets	How to be attractive
25	Good-looking	Development of communication skills with superiors
26	relationship with managers	Improving the communication skills and cooperation between colleagues
27	relationship with colleagues	Improving customer relationship
28	relationship with clients	communication skills

Finally, for each employee assessed by his superior, we summarise the number of trainings suggested in the assessment list. This aims at helping managers to take quick actions if the employee has to attend a training or another action is needed, as can be seen in Figure 6.13.

Assessment Results (Overall)

employee_name	assessment_year	assessment_month	self_scale	superior_scale	Training suggested	details
name1	2019	JUN	98.93	82.96	0	view
name2	2019	JUN	82.04	75.75	0	view
name3	2019	JUN	81.93	71.18	6	view
name4	2019	JUN	80	65.93	11	view
name5	2019	JUN	86.43	71.36	3	view
name6	2019	JUN	82.96	69.07	9	view
name7	2019	JUN	100	80.82	2	view
name8	2019	JUN	87.07	72.86	0	view
name9	2019	JUN	84.14	70.82	5	view
name10	2019	JUN	91.54	78	2	view
name11	2019	JUN	88.07	71.86	0	view
name12	2019	JUN	84.61	66.82	9	view
name13	2019	JUN	91.64	81.32	0	view
name14	2019	JUN	87.61	81.89	0	view

Figure 6.13 The proposed training number in the evaluation list for each employee.

6.4. System Validation

The developed appraisal system has been tested and validated at the University of Jeddah in the Kingdom of Saudi Arabia and Al-Naghi Motors Company. Personal interviews with the managers who applied the program were conducted to find out their opinions on its importance and the benefits resulting from using the neural network algorithm.

Analysis of Respondents' Answers to the Personal Interview of the artificial intelligence performance appraisal system.

6.4.1 Performance Appraisal System

A personal interview was conducted with ten of the managers and supervisors in the College of Business Administration, and they are as follows:

Eight directors for the following departments (Public Relations, Administrative Development, Human Resources, Planning and Budgeting, Communications unit, Quality Management, Measurement and Evaluation Unit, Dean of the Business College), in addition to two managers in Al-Naghi Motors Company (Director of Warehouse and Storage Management, and director of personnel affairs).

The same questions and the same evaluation method were used to generate the data. The respondent's answers were written separately, and then the answer to each question was summarized, to know everyone's opinions about it. Tables 6.6 to 6.15 list the question used in the personal interviews.

Table 6.6 Question's 1 Analysis and findings.

Question1	Do you see that using artificial intelligence in performance appraisal systems has covered all aspects that required knowledge about employee performance?
Analysis	From the analysis of the respondent's answers in the personal interview, it was found that eight of the managers believed that using artificial intelligence in the performance appraisal system helped them a lot in obtaining comprehensive and accurate information related to all employees, which shows their work performance level. On the other hand, we find that two managers see that the old traditional method has given the same results, so there is no need to use artificial intelligence. They get what they want from the information and data the old way.

Conclusion	Most managers saw the benefit of using artificial intelligence in the performance appraisal system. The two managers' rejection is due to their resistance to change, not a weakness in the program.

Table 6.7 Question's 2 Analysis and its findings.

Question 2	Do you believe that artificial intelligence performance appraisal system information was comprehensive, accurate and clear about the employees' performance?
Analysis	From the second question analysis, eight of the managers were sure that the evaluation system's information was not affected by personal factors, as it was preserved and could not be tampered with by others. However, two people were not convinced of the relevance and accuracy of the information and believed that they can obtain it through direct contact with employees and records.
Conclusion	Most managers trust the accuracy and clarity of the artificial intelligence performance appraisal system data.

Table 6.8 Question's 3 Analysis and its findings.

Question 3	Can we prove that the artificial intelligence performance appraisal system's data could be proven and compared with the available information and reports on the employee's performance?
Analysis	From the analysis of the answers to the third question, it was found that seven managers were confident that it is possible to verify the data and information used in the artificial intelligence performance appraisal system, in addition to proving it by comparing it with all the information in the employee's reports and records. However, three managers doubted the possibility of proving its validity. This suspicion is due to the employees who developed the information base and not to the system's efficiency.
Conclusion	A high percentage of employees trust the system's data and confirm those by comparing what was used in the system and the information available to them from the employee's reports.

Table 6.9 Question's 4 Analysis and its findings.

Question 4	Can we say that the artificial intelligence performance appraisal system. has helped build a clear picture of employee performance?
Analysis	By analysing the interview answers, it was found that eight of the managers saw that the artificial intelligence performance appraisal system, which includes all the information gathered located easily in one place, was able to help give a clear picture of the employees' performance level. On the other hand, some managers see that the traditional evaluation they are accustomed to gives the same clarity to know the employee's performance level.
Conclusion	The vast majority of the managers believed that the artificial intelligence performance appraisal system has helped give a clear and accurate picture of the employees' performance level.

Table 6.10 Question's 5 Analysis and its findings.

Question 5	Can we say that the results of using artificial intelligence Performance Appraisal System have been objective and reduced personal opinions?
Analysis	From the analysis of the interview questions, it was found that eight of the managers have complete confidence in the objectivity of the program results. Individual intervention is almost non-existent in all the system steps, which leads to no personal interference in the results. It was also found that there was one manager who was neutral and did not have a negative or positive opinion. This may be due to his inability to refuse because he knew that his opinion was not correct, so he was satisfied with neutrality. Moreover, he is apparently one of the managers who are resisting the idea of change. One manager rejected the idea completely, explaining that he always distanced himself from his personal opinions and that the manager could be objective with his subordinates.
Conclusion	The vast majority strongly agrees that the artificial intelligence performance appraisal System results were objective and minimize personal opinions interference.

Table 6.11 Question's 6 Analysis and its findings.

Question 6	Is it possible that the artificial intelligence performance appraisal System Performance Appraisal System will discuss performance appraisal results with subordinates easier for use? Is it easier to discuss the results of a performance appraisal system developed using artificial intelligence than the previous system?
Analysis	From the analysis of the managers responses, it was found that eight of them were believed that discussing the results of the Artificial intelligence performance appraisal system would be easier for them than discussing the results of the previous system. because the data is collected and analysed automatically, and then the results are objective without interfering with the personal opinions of officials. On the other hand, two neutral managers did not have a specific opinion, as they believed that the new and old system would give the same results.
Conclusion	The vast majority were sure of the objective results of the program, which would facilitate the process of responding to employees who object or question them.

Table 6.12 Question's 7 Analysis and its findings.

Question 7	Do you see that using artificial intelligence performance appraisal system has enabled me to define employees' performance levels more accurately than before?
Analysis	From the interview analysis results, eight managers showed that the new system is better than the previous traditional system. They were able to define and know their employees' performance level more accurately and clearly from the above. On the other hand, two managers strongly object that they do not see the new system as more accurate than the previous one in determining the level of employees.

Conclusion	The majority of the personal interview managers believe that the fingerprint intelligence evaluation system accurately determines the employees' performance level.

Table 6.13 Question's 8 Analysis and its findings.

Question 8	Do you really believe that the job performance appraisal system using the new artificial intelligence performance appraisal system is more specific and accurate?
Analysis	From an analysis of the interview results, it was found that eight managers support that the artificial intelligence Performance Appraisal System is now more specific and accurate than the traditional precedent. However, two managers do not agree or believe so. Rather, they see that that there is no change between the two systems. So there is no need to change the methods without reason.
Conclusion	The vast majority support using the new system over the old because of its ability to accurately determine employee performance.

Table 6.14 Question's 9 Analysis and its findings.

Question 9	Do you believe that artificial intelligence performance appraisal system contains everything related to the employee's performance in the past and present ?
Analysis	From the analysis of the personal interview results, it was found that eight managers believe that the artificial intelligence performanceappraisal system contains all the information related to employees, whether in the past or present, which means that the knowledge includes everything related to the employee in one place. This enables them to obtain a clear picture of the performance of the employee for the entire currency period and not for a specified period. On the other hand, it has found neutral managers who have no opinion. This is because it is impossible to deny the existence of this information in the system. After all, it is something that can be proven by reviewing the data.
Conclusion	Most managers confirm that the artificial intelligence appraisal system contains all information related to employees in the past and present, which gives a clear picture of the employee's performance from the start period of their work to present time.

Table 6.15 Question's 10 Analysis and its findings.

Question10	Do you hope the organization uses artificial intelligence performance appraisal system instead of the previous job performance appraisal method?
Analysis	From the tenth question analysis, seven managers have been asking the organization to use the artificial Intelligence Performance Appraisal system instead of the previous system. This is characterized by its inclusion of all the specific, accurate and objective information proven and verified. That has given a clear picture of the employee's performance in past and present. On the other side, three of the managers objected. Here, we have found that the number of opponents increased by one manager. Seemingly, he had not denied the benefits that accrue from using the AI appraisal system, but he is conservative in using it continuously instead of the tradition method alone.
Conclusion	Most managers hope that the organization will replace the artificial intelligence Performance Appraisal System instead of the previous traditional system.

6.4.2 Results Analysis

Results of the personal interviews was 80% in favour. On the other hand, the 20% was subjective because it was due to the fact that managers feared change and wanted to use the old performance evaluation that they are accustomed to. Based on the managers' preference for using the developed program and their desire to benefit from the advantages of using artificial intelligence, the researcher saw the importance of popularizing and disseminating its use on a wider scale for the users of the performance appraisal system.

In summary the following observations are made:

- Most managers saw the benefit of using AI in the performance appraisal system. The two managers' rejection is due to their resistance to change, not a weakness in the program.
- Most managers trust the accuracy and clarity of the artificial intelligence performance appraisal classification system data.
- A high percentage of employees trust the system's data and confirm this by comparing what was used in the system and the information available to them from the employee's reports.

- The vast majority of the employees believed that the artificial intelligence appraisal system has helped give a clear and accurate picture of the employees' performance level.

- The vast majority strongly agrees that the artificial intelligence Performance Appraisal System results were objective and minimize personal opinions interference.

- The vast majority were sure about the program's objective results, which would facilitate the process of responding to employees who object or question them.

- The majority of the personal interview managers believe that the fingerprint intelligence evaluation system accurately determines the employees' performance level.

- Most managers confirm that the artificial intelligence appraisal system contains all information related to employees in the past and present, which gives a clear picture of the employee's performance from the start period of their work to present time.

- Most managers hope that the organization will replace the artificial intelligence performance appraisal system.

- Artificial intelligence performance appraisal system instead of the previous traditional system.

6.5. Summary

This chapter has talked about the performance appraisal program which has been developed by using a Neural network algorithm. The discussion depended on the sequence to use the program, and it was divided into three stages as follows:

- **Stage 1** Has examined the algorithms (Genetic Algorithm, Decision Tree, and Linear Regression, Neural Networks) that have been tested on the program to see which ones give better results. The Neural network algorithms has been chosen because it was the best and most advantageous for the program.

- **Stage 2** Is for the program and its operation method. Work has started with 28 items for evaluation. Each employee's performance was assessed for each component using the measure. The employee's performance was compared to other employees in the department and the company. After that, the employees' performance was measured based on the maximum and the minimum on the scale, which ranged between Poor, Acceptable, Good, Very Good, and Excellent. Finally, the program determines the employees who need training and suggests the type of training that may benefit them.

- **Stage 3** Has analysed managers' responses in the personal interview exploring the AI appraisal system they used.

After its completion, the researcher conducted personal interviews with the ten managers to find out their views on the new advanced performance evaluation. The researcher analysed the personal interviews results, which showed a large percentage of managers 80% has saw the importance of the program and wanted to use it again. Even 20% of respondents believed that the reasons for their refusal cantered on fear and unwillingness to change, not for the inefficiency of the program. Based on this result, the researcher is certain that the developed program has achieved the goal of its design and recommends that it be circulated and published as widely as possible.

Chapter 7 - Conclusion and Future Work

7.1. Implication of the Study on Artificial Intelligence, Job Description and Performance Appraisal

It is noticeable that there will be keen interest in using artificial intelligence in developing all activities of the organization by creating an appropriate work environment that believes in modern technical developments and continuous work to benefit from them. It will also increase the need for continuous training for employees to use AI programs to keep up with these developments. In addition, the development and improvement of the specialized departments in the field of technology in the organization will be noted to work on developing concepts about the importance of artificial intelligence. They will also need to use appropriate programs with a good reputation that were previously tested, evaluated and know their usefulness for the activities of the organization, with an increased interest in conducting continuous maintenance work on all devices within the organization, to ensure efficiency and continuity.

As a result of knowing the importance of job descriptions for the organization, managers and employees will notice an increase in interest in providing job descriptions for all the jobs in the organization. Also, there will be an emphasis on continuous follow-up to compare the employee's performance with the job description of his work in order to ensure a minimum level of performance. In addition, there will be great attention paid to the necessity of providing work procedures in the performance appraisal program next to each of the employee's job tasks to identify the departments and employees who are involved in the completion of the job, in order to give an integrated picture of the participants in the performance of all work steps. Also, the organizations will work on linking job descriptions with training programs in the performance appraisal program to determine the appropriate ones for each job or behaviour that needs development or improvement with the precise identification of the place of training, the trainers and the time of each program.

Based on the results of the study and the emergence of all the benefits from using the performance evaluation program developed with artificial intelligence, will increase interest in artificial intelligence and reliance on its use in performance appraisal programs. In addition to using it in various fields to get the benefits from its use. Based on the results of the study and the emergence of all benefits from using the performance appraisal program with artificial intelligence, will increase interest in artificial intelligence and reliance on its use in performance appraisal programmes. In addition to using it in various fields to get the benefits

from its use. We will notice the interest increase for the performance appraisal system to contain job descriptions for the employees' work and work procedures which relate to each job with all training programs that cover all work needs, specifying both place / time / and trainers to link them with deficiencies in the employee's performance and work on developing it to raise his efficiency. Also, there will be interest in the database that supports the performance appraisal system, in order to use it for accurate and objective evaluations based on facts and data on employees. Adding to that, employees will complain less about the lack of objectivity within their evaluations, as they are managed with high accuracy.

In addition, the feeling of satisfaction will increase anxiety will reduce for new managers, as each manager will know all the information about the employees in their new departments and when the employees need to be evaluated. It will be easy for them to know the opinions of the previous manager for this work. In addition, it will be easy to link the current performance evaluation with previous employee evaluations to find out the employee's performance level based on changing circumstances and previous years. In addition, it will become easy for managers to build an integrated image of any employee because of the availability of comprehensive information about him, which will facilitate making decisions related to him, whether positive or negative. Furthermore, we'll notice that the interest in training for those in charge of evaluation will increase to make decisions that mix theoretical data with human feelings so that the work does not lose the human spirit.

Finally, and in general, comprehensive developments will take place in the field of work as a whole. Any development in one aspect will accompany other developments in all aspects related to it, whether directly or indirectly.

7.2. Conclusion

The results of the study show the importance of paying attention to the performance appraisal system as a determinant of employees' performance levels, with clarity of the importance of job descriptions for both the organization and employees and managers alike. This demonstrates that the objective of obtaining an accurate and defined job description for all organisational roles was met. Additionally, it established that employees have access to basic company information and the sequential steps in required work procedures while carrying out their job obligations. Similarly, it denotes an objective and fair performance review that incorporates all facts pertaining to employees' competencies, skills, and general behaviour. In addition, the finding also shows the importance of the availability of work procedures for all activities and work of the organization, so that the employee knows the methods of performing

his work currency in an official way specified by the organization. This part details the great achievement of the stated study objectives, which include giving information on all training programmes that address all employee needs and aid in performance development. as well as identifying areas of employee performance deficiency and striving to improve and develop them through the selection of relevant training programmes.

Finally, the results provide clarity on the importance of using artificial intelligence to develop a performance appraisal system to facilitate the process of determining employee levels in each department or section within the organization. This is consistent with the purpose of identifying potential bottlenecks to maximising the effectiveness of the planned human resource management programme and working to resolve them. as well as to aid human resource management in implementing the suggested programme and maximising its benefits.

After the researcher completes his procedures study and determines the importance of the availability of job descriptions within the performance appraisal system, in addition to the importance of evaluating the performance of employees periodically to know the level of their performance and try to improve it to raise the efficiency of work performance, And after applying the developed performance appraisal system by using artificial intelligence and knowing the opinions of managers about the benefits of its application, the researcher was able to anticipate some reactions or positions that could be taken by the responsible company owners and those interested in evaluating the performance of their employees towards both the use of artificial intelligence, job description, and performance evaluation. Consequently, the research was successful in reaching its final objective, which was to clarify the significance and benefits of employing a performance appraisal system, as well as to work toward expanding its use among organisations and businesses.

7.3. Future Work

- The developed program of the performance appraisal system has been characterized by the existence of a job description for each employee with the existence of work procedures that explain the sequential steps to perform each task of the employees' responsibilities. In addition, the availability of all information and data related to the employees' performance and their behaviour in all that they worked out previously, whether in the present or in the past. As well as that the possibility of determining the appropriate training programs for each employee to improve his performance. All these advantages available in the performance appraisal system would obtain many achievements for the organization in the

future when implementing the program. These achievements can be summarized in the following: The program is considered as a bank of comprehensive information about employees, which will help in making objective decisions that satisfy employees.

- Knowing the employees' levels accurately and identifying highly qualified people enables the organization to benefit from them to increase its production.

- The accurate and sequential identification of employee levels gives a clear picture to decision-makers about the use of positive or negative incentives.

- Helping managers discuss negative decisions against employees because all the information is in one place and can be proven immediately, which reduces the level of problems around the evaluation.

- The set standards for all lead to justice and equality among employees, which makes them feel satisfied.

- The existence of a job description and a guide to work procedures that benefit both employees and managers to know the jobs and their sequential performance steps and the departments involved in their implementation.

- The program, with its ability to determine the appropriate training programs for each employee, will help the administration to plan for the development of its employees.

Bibliography

Ab Wahid, R., Corner, J. & Tan, P.L. (2011). ISO 9000 maintenance in service organisations: tales from two companies. *International Journal of Quality & Reliability Management*, 28(7), 735-757.

Abdeldayem, M. M., & Aldulaimi, S. H. (2020). Trends and opportunities of artificial intelligence in human resource management: Aspirations for public sector in Bahrain. International Journal of Scientific and Technology Research, 9(1), 3867-3871.

Abid, A.S. (1990). *Job satisfaction and job performance of warehouse employees in Iraqi industry* (Doctoral dissertation, University of Glasgow).

Abu Tayeh, B. (2012). The Effect of Organizational Justice on Organizational Citizenship Behavior in Government Ministries Centers in Jordan. *Islamic University Economic and Administrative Studies Journal*. *20*, 145-186.

Abualoush, S.H., Obeidat, A.M., Tarhini, A. & Al-Badi, A. (2018). The role of employees' empowerment as an intermediary variable between knowledge management and information systems on employees' performance. VINE Journal of Information and Knowledge Management Systems. *48*(2), 217-237.

AbuAl-Rub, R.F. (2004). Job stress, job performance, and social support among hospital among nurses. *Journal of nursing scholarship*, *36*(1), 73-78

Adeyoyin, S.O., Agbeze-Unazi, F., Oyewunmi, O.O., Adegun, A.I. & Ayodele, R.O. (2015). Effects of job specialization and departmentalization on job satisfaction among the staff of a Nigerian University Library.

Adeyoyin, S.O., Ajiboye, B.A., Adegun, A.I. & Tomomowo-Adeyinka, S. (2013). Division of Labour and Job Specialization as Catalysts for Better Job Performance among the Staff of a Nigerian University Library. In *Information and Knowledge Management*. *3*, 12.

Ahituv, N., Neumann, S., & Zviran, M. (2002). A system development methodology for ERP systems. Journal of Computer Information Systems. 42(3), 56–67.

Ahmad, I., Danish, R.Q., Ali, S.A., Ali, H.F. & Humayon, A.A. (2019). A comparative study of banking industry based on appraisal system, rewards and employee performance. *SEISENSE Journal of Management*. *2*(1), 1-11.

Ahmad, J., Ather, M.R. & Hussain, M., (2014). Impact of Big Five personality traits on job performance (Organizational commitment as a mediator). In *Management, knowledge and learning international conference* (25-27).

Ajang, P.E. (2007). Assessing the role of work Motivation on Employee Performance.

Al Hosani, A.I., Ahmed, M.A., Arbab, & Ahmed A.E. (2017). Does Information Technology Affect Improvement of Human Resources Directorate's Performance in a Selected Organization in the Kingdom of Bahrain?. *International Business and Management.15*(1), 8-14.

Albu, A., Precup, R.E. & Teban, T.A., (2019). Results and challenges of artificial neural networks used for decision-making and control in medical applications. *Facta Universitatis, Series: Mechanical Engineering*, *17*(3), 285-308.

Alharbi, S. (2018). Criteria for Performance Appraisal in Saudi Arabia, and Employees Interpretation of These Criteria. *International Journal of Business and Management*, *13*(9).

Al-Mahasneh, M.A (2015). The impact of Organizational Citizenship Behavior on JobPerformance at Greater Amman Municipality. *European Journal of Business and Management* 7(36). Available from: http://www.iiste.org/Journals/index.php/EJBM/article/viewFile/27528/28243.

Al-Mahasneh, M.A. (2015). The impact of Organizational Citizenship Behavior on Job Performance at Greater Amman Municipality. *European Journal of Business and Management*. *7*(36), 108-118.

Almulla, A., (2012). The Impact of Culture in Performance Evaluation Procedure in the UAE Public Sector (Doctoral dissertation, University of Gloucestershire).

Al-Nsour, M. (2011). Relationship between incentives and organizational performance for employees in the Jordanian Universities. *International journal of business and management*, *7*(1), p.78

Aloysius, M., & Shanthakumary M.C. (2012). Self Motivation for achievement and its impact on the employees' Performance and Satisfaction. Available at SSRN 2186389.

Al-Qudah, H.S.S. (2016). Impact of Moral & Material Incentives on Employee's Performance; An Empirical Study in Private Hospitals at Capital Amman. *International Business Research*. *9*(11), 222.

Alter, S. (2002). The work system method for understanding information systems and information systems research. *Communications of the Association for Information Systems. 9*(1), p.6.

Aminudin, N., Sundari, E., Shankar, K., Deepalakshmi, P., Fauzi, R.I. & Maseleno, A., (2018).Weighted Product and its application to measure employee performance. *International Journal of Engineering & Technology. 7*(26), 102-108.

Amiri, A.M., Sadri, A., Nadimi, N. & Shams, M. (2020). A comparison between artificial neural network and hybrid intelligent genetic algorithm in predicting the severity of fixed object crashes among elderly drivers. *Accident Analysis & Prevention. 138*, 105468.

Andrade, C. (2018). Internal, external, and ecological validity in research design, conduct, and evaluation. Indian journal of psychological medicine. *40*(5), 498-499.

Andreeva, T., Vanhala, M., Sergeeva, A., Ritala, P. & Kianto, A. (2017). When the fit between HR practices backfires: Exploring the interaction effects between rewards for and appraisal of knowledge behaviours on innovation. *Human Resource Management Journal*, *27*(2), 209-227.

Anthony-McMann, P.E., Ellinger, A.D., Astakhova, M. & Halbesleben, J.R. (2017). Exploring different operationalizations of employee engagement and their relationships with workplace stress and burnout. *Human Resource Development Quarterly. 28*(2), 163-195.

Antonsen S, Almklov P and Fenstad J (2008). Reducing the gap between procedures and practice lessons from a successful safety intervention. Safety Science Monitor. *12*(1), 1–16.

Antonucci, Y.L., Lordi, F.C. & Tucker III, J.J. (1998). The pros and cons of IT outsourcing. *Journal of Accountancy.185*(6), 26.

Argyle, M. (1989). Do happy workers work harder? The effect of job satisfaction on work performance. *How harmful is happiness*. 94-105.

Asfaw, A.M., Argaw, M.D. & Bayissa, L. (2015). The impact of training and development on employee performance and effectiveness: A case study of District Five Administration Office, Bole Sub-City, Addis Ababa, Ethiopia. *Journal of Human Resource and Sustainability Studies. 3*(04), 188.

Ashkanasy, N.M. & Daus, C.S. (2002). Emotion in the workplace: The new challenge for managers. *The Academy of Management Executive. 16*(1), 76-86.

Ashoi, K.A.A., Impact of Extra incentives on the employee's performance" (Doctoral dissertation, Jazan University).

Atambo, W.N. & Momanyi, D.K. (2016). Effects of Internal Communication on Employee Performance: A Case Study of Kenya Power and Lighting Company, South Nyanza.

Avey, J.B., Wernsing, T.S. & Luthans, F. (2008). Can positive employees help positive organizational change? Impact of psychological capital and emotions on relevant attitudes and behaviors. *The journal of applied behavioral science. 44*(1), 48-70.

Avison, D. & Malaurent, J. (2013). Qualitative Research in Three IS Journals: Unequal emphasis but common rigour, depth and richness. *Systemes d'information management. 18*(4), 75-123.

Avolio, B.J., Waldman, D.A. & McDaniel, M.A. (1990). Age and work performance in nonmanagerial jobs: The effects of experience and occupational type. *Academy of Management Journal. 33*(2), 407-422.

Awadh, A.M. & Alyahya, M.S. (2013). Impact of organizational culture on employee performance. *International Review of Management and Business Research*, *2*(1), p.168

Babatunde, O. & Emem, I., (2015). The impact of leadership style on employee's performance in an organization. *Public Policy and Administration Research*, *5*(1), 193-206.

Bae, H., Kim, S.J. and Kim, C.E. (2021). Lessons From Deep Neural Networks for Studying the Coding Principles of Biological Neural Networks. *Frontiers in systems neuroscience*, *14*, 103.

Bae, H., Kim, S.J. and Kim, C.E. (2021). Lessons from Deep Neural Networks for Studying the Coding Principles of Biological Neural Networks. Frontiers in systems neuroscience, 14, p.103.

Bahraini, N.H., Monteith, L.L., Gerber, H.R., Forster, J.E., Hostetter, T.A. & Brenner, L.A., (2018). The association between posttraumatic stress disorder and perceptions of deployment-related injury in veterans with and without mild traumatic brain injury. *The Journal of head trauma rehabilitation. 33*(2), E7-E15.

Bakker, A.B. and Demerouti, E., 2018. Multiple levels in job demands-resources theory: Implications for employee well-being and performance. *Handbook of well-being*.

Bamberger, P., & Meshoulam, I. (2000). *Human resource strategy: Formulation, implementation, and impact*. Thousand Oaks, CA: Sage.

Banerjee, S., Practices and challenges of Human Resource Training and Development: A study of a few selected IT companies in the city of Pune, India.

Barbalet, J. M. (1999). Boredom and social meaning. *The British Journal of Sociology. 50*(4), 631–646. http://dx.doi.org/10.1111/j.1468-4446.1999.00631.x.

Barrick, M.R. and Mount, M.K., 1991. The big five personality dimensions and job performance: a meta-analysis. *Personnel Psychology. 44*(1), 1-26.

Batistič, S. (2018). Looking beyond-socialization tactics: The role of human resource systems in the socialization process. *Human Resource Management Review. 28*(2), 220-233.

Bell, E., Bryman, A. & Harley, B. (2018). Business research methods. Oxford university press.

Bell, E., Bryman, A. & Harley, B. (2018). Business research methods. Oxford university press.

Bello, S.M. (2012). Impact of ethical leadership on employee job performance. *International Journal of Business and Social Science. 3*(11).

Bhardwaj, G., Singh, S. V., & Kumar, V. (2020, January). An empirical study of artificial intelligence and its impact on human resource functions. In 2020 International Conference on Computation, Automation and Knowledge Management (ICCAKM) (pp. 47-51). IEEE.

Boachie-Mensah, F.O. & Seidu, P.A. (2012). Employees' perception of performance appraisal system: A case study. *International journal of business and management*, 7(2), 73.

Boice, D.F. & Kleiner, B.H. (1997). Designing effective performance appraisal systems. *Work study*.

Bonett, D.G. & Wright, T.A. (2015). Cronbach's alpha reliability: Interval estimation, hypothesis testing, and sample size planning. *Journal of organizational behavior, 36*(1), 3-15.

Borgonovo, E., Aliee, H., Glaß, M. & Teich, J. (2016). A new time-independent reliability importance measure. *European Journal of Operational Research. 254*(2), 427-442.

Bossert, S. & Strech, D. (2017). An integrated conceptual framework for evaluating and improving 'understanding' in informed consent. *Trials. 18*(1), 1-8.

Boxall, P., & Purcell, J. (2003). Strategy and human resource management. Hampshire, UK: Palgrave-Macmillan.

Bozeman, B. & Corley, E. (2004). Scientists' collaboration strategies: implications for scientific and technical human capital. *Research policy*, *33*(4), 599-616.

Brace, I. (2018). Questionnaire design: How to plan, structure and write survey material for effective market research. Kogan Page Publishers.

Brenner, S.W. (2002). Privacy privilege: Law enforcement, technology, and the constitution. J. Tech. L. & Pol'y. 7, 123.

Brill, M., Margulis, S. & Konar, E. (1985). Using office design to increase productivity, Buffalo.

Briner, R.B. (1999). The neglect and importance of emotion at work. *European journal of work and organizational Psychology*. *8*(3), 323-346

Brodbeck, P.W. (2002). Complexity theory and organization procedure design. *Business Process Management Journal. 8*(4), 377–402.

Brynjolfsson, E. & Hitt, L.M. (2000). Beyond computation: Information technology, organizational transformation and business performance. Journal of Economic Perspectives, 14(4), 23-48.

Bryson, A., Forth, J. & Stokes, L. (2017). Does employees' subjective well-being affect workplace performance? *Human Relations*. *70*(8), 1017-1037.

Buhter, P. (1997). Scanning the environment, environmental trends affecting the workplace.

Busetti, F. (2001). *Genetic Algorithms Overview*.

Busetti, F. (2007). Genetic algorithms overview. Retrieved on December 1.

Camelia, B. & Oana, N., 2018. Considerations on the Importance of Human Resources in the Development of Modern Companies. *Ovidius University Annals, Economic Sciences Series*. *18*(2), 378-382.

Cardon, M.S. (2008). Is passion contagious? The transference of entrepreneurial passion to employees. *Human resource management review*. *18*(2), 77-86.

Carr, J. (2014). An introduction to genetic algorithms. *Senior Project. 1*(40), 7.

Castillo, C.N., France, K.D., Faith, T.G., Louie A.L., Shaira, M.P., Nika, T., Lanndo, O., Leahlizbet, S. & Christine O.O. (2017). Appropriate criteria set for personnel promotion across organizational levels using analytic hierarchy process (AHP). *International Journal of Production Management and Engineering*.5(1), 11-22

Cesário, F. & Chambel, M.J. (2017). Linking organizational commitment and work engagement to employee performance. *Knowledge and Process Management*. *24*(2), 152-158.

Chan, E.W. (2017). Promotion, relative *performance* information, and the Peter Principle. *The Accounting Review*.

Chandrasekar, K. (2011). Workplace environment and its impact on organisational performance in public sector organisations. *International Journal of Enterprise Computing and Business Systems*, *1*(1), 1-19.

Charmaz, K. (2006). Constructing grounded theory: A practical guide through qualitative analysis. sage.

Choi, S.Y., Lee, H. & Yoo, Y. (2010). The impact of information technology and transactive memory systems on knowledge sharing, application, and team performance: a field study. *MIS quarterly*, 855-870.

Chung-Chieh, L. & Chen, C.J., 2013. The relationship between employee commitment and job attitude and its effect on service quality in the tourism industry. *American Journal of Industrial and Business Management*. *3*(2), p.196.

Churchill, G. A., & Iacobucci, D. (2002). Marketing research: methodological foundations (8th edn.). Orlando, FL7 Harcourt College Publishers

Collins, D. (2010). Designing Ethical Organizations for Spiritual Growth and Superior Performance: An Organization Systems Approach. *Journal of Management, Spirituality & Religion*. *7*(2), 95-117

Cooke, A.M., (2010). Effects of competition on performance, and the underlying psychophysiological mechanisms (Doctoral dissertation, University of Birmingham).

Coser, L. (1970). Continuities in the study of social conflict. New York: Free Press.

Creswell, J. W., & Creswell, J. D. (2017). Research design: Qualitative, quantitative, and mixed methods approaches. Sage publications.

Dasborough, M.T. (2006). Cognitive asymmetry in employee emotional reactions to leadership behaviors. *The Leadership Quarterly*, *17*(2), 163-178.

Davis, T.R. (1984). The influence of the physical environment in offices. *Academy of management review*. *9*(2), 271-283.

De Vaus, D. (2001). Research design in social research. Sage.

Decoteau, C.L. (2017). The AART of ethnography: a critical realist explanatory research model. *Journal for the Theory of Social Behaviour. 47*(1), 58-82

Demirci, M.K. & Erbaş, A. (2010). Employee empowerment and its effect on organizational performance.

DeNisi, A.S. & Murphy, K.R. (2017). Performance appraisal and performance management: 100 years of progress?. *Journal of applied psychology. 102*(3), 421

Denys B., Matthew D., Florence D.D.R & T. (2020). Examining the effects of feedback accuracy and timing on skill acquisition. *Journal of Organizational Behavior Management. 40*(1-2), 3-18.

Deutsch, M. (1969). Conflicts: Productive and destructive. Journal of Social Issues, 25, 7-41.

Diener, E. & Chan, M. (2011). Happy people live longer: Subjective well-being contributes to health and longevity. Applied Psychology: Health and Well-being. 3, 1-43.

Dokko, G., Wilk, S.L. & Rothbard, N.P. (2009). Unpacking prior experience: How career history affects job performance. *Organization Science*. *20*(1), 51-68.

Dolden, M. & Ward, R. (1986). The impact of the work environment on productivity: Proceedings of a workshop. *Washington, DC: National Science Foundation and Architectural Research Centers Consortium*.

Dugguh, S.I., & Dennis, A. (2014). Job satisfaction theories: Traceability to employee performance in organizations. *IOSR Journal of Business and Management. 16*(5), 11–18.

Durham, C.C., Knight, D. Locke, E.A. (1997). Effects Of Leader Role, Team-Set Gool Difficulty,Efficacy and Tactics on Team Effectiveness. Organizational*Behavior and Human Decision Processes. 72*, 203-31.

Easterby-Smith, M., R. Thorpe, & A. Lowe. (2002). Management Research an Introduction. Thousand Oaks: Sage Publications.

Elliot, A.J., McGregor, H.A. and Gable, S.(1999). Achievement goals, study strategies, and exam performance: A mediational analysis. *Journal of educational psychology. 91*(3), 549.

Elnaga, A. & Imran, A. (2013). The effect of training on employee performance. *European Journal of Business and Management. 5*(4), 137-147.

Emerson, R.W. (2015). Convenience sampling, random sampling, and snowball sampling: How does sampling affect the validity of research?. *Journal of Visual Impairment & Blindness. 109*(2), 164-168.

Ennis, M.C., Gong, T. & Okpozo, A.Z., 2018. Examining the mediating roles of affective and normative commitment in the relationship between transformational leadership practices and turnover intention of government employees. International Journal of Public Administration. 41(3), 203-215.

Erdheim, J., Wang, M. & Zickar, M.J. (2006). Linking the Big Five personality constructs to organizational commitment. *Personality and individual differences. 41*(5), 959-970.

Fellows, R. F., & Liu, A. M. (2008). Research Methods for Construction (3rd ed.). West Sussex, United Kingdom: Wiley-Blackwell.

Femi, A.F., 2014. The Impact of Communication on Workers' Performance in Selected Organisations in Lagos State, Nigeria. IOSR Journal of Humanities and Social Science, 19(8), 75-82.

Fine, B.J. & Kobrick, J.L. (1978). Effects of altitude and heat on complex cognitive tasks. *Human Factors. 20*(1), 115-122.

Fonseca-Pedrero, E., Debbané, M., Ortuño-Sierra, J., Chan, R.C.K., Cicero, D.C., Zhang, L.C., Brenner, C., Barkus, E., Linscott, R.J., Kwapil, T. & Barrantes-Vidal, N. (20180. The structure of schizotypal personality traits: a cross-national study. *Psychological medicine. 48*(3), 451-462.

Frost S. (2019) Updated January 25, 2019 Meaning of Job Description. Available from: https://work.chron.com/meaning-job-description-6819.html >.[Jan 25, 2019]

Fulbright, W.P. (2020). *The Impact of Industry Expertise, Collaborative Experience, Job Description, Merit Compensation and Recognition on Professor's Job Satisfaction regarding Collaborative Projects with Industry Partners* (Doctoral dissertation, Trident University International).

Game, A. M. (2007). Workplace boredom coping: Health, safety, and HR implications. *Personnel Review. 36*(5), 701–721. http://dx.doi.org/10.1108/00483480710774007.

George, J.M. (2009). The illusion of will in organizational behavior research: Nonconscious processes and job design. Journal of Management, 35(6), 1318–1339. http://dx.doi.org/10.1177/0149206309346337.

Gerhart, B. (1999). Human resource management and firm performance: Measurement issues and their effect on causal and policy inferences. In P. Wright, L. Dyer, J. Boudreau, & G. Milkovich (Eds.), Strategic human resources management in the 21st century (Supplement 4, 31–51). Stamford, CT: JAI Press.

Gerhart, J. B., & Fang, M. (2005). National culture and human resource management: Assumptions and evidence. International Journal of Human Resource Management, 16, 971–986.

Gitahi, S.N. (2014). *Effect of workplace environment on the performance of commercial banks employees in Nakuru town* (Doctoral dissertation).

Golafshani, N., (2003). Understanding reliability and validity in qualitative research. *The qualitative report. 8*(4), 597-607.

Goldberg, L.R. (1990). An alternative" description of personality": the big-five factor structure. *Journal of personality and social psychology. 59*(6), 1216.

Goodhue, D.L. & Thompson, R.L. (1995). Task-technology fit and individual performance. MIS quarterly, 213-236.

Gray, R. (2004). Why is social accounting so difficult?–Part I. *Social and Environmental Accountability Journal. 24*(1), 12-17.

Grbich,C. (2007).QualitativeDataAnalysis:AnIntroduction.London:SagePublications

Grund, C. and Westergård-Nielsen, N. (2008). Age structure of the workforce and firm performance. *International Journal of Manpower. 29*(5), 410-422.

Guba, E.G. & Lincoln, Y.S. (2005). Paradigmatic controversies, contradictions, and emerging confluences.

Gupta, V., Choudhary, K., Tavazza, F., Campbell, C., Liao, W. K., Choudhary, A., & Agrawal, A. (2021). Cross-property deep transfer learning framework for enhanced predictive analytics on small materials data. Nature communications, 12(1), 1-10.

Harju, L.K., Hakanen, J.J. & Schaufeli, W.B. (2016). Can job crafting reduce job boredom and increase work engagement? A three-year cross-lagged panel study. *Journal of Vocational Behavior. 95*, 11-20.

Hasham, E.S. (2004). *The extent to which* satisfaction *is a prerequisite for employee motivation to enhance productivity/performance in Lebanese institutions of higher education: a case study of Notre Dame University* (Doctoral dissertation, School of Education)

Heale, R. & Twycross, A. (2015). Validity and reliability in quantitative studies. Evidence-based nursing, 18(3), 66-67.

Hofstede, G. & Bond, M.H. (1988). The Confucius connection: From cultural roots to economic growth. *Organizational Dynamics. 16*(4), 5-21.

Hofstede, G. (1980a). Culture's *consequences: international differences in work-related values*. Beverly Hills, CA: Sage.

Hough, L. M., Eaton, N. K., Dunnette, M. D., Kamp, J, D., & McCloy, R. A. (1990). Criterion-related validities of personality constructs and the effects of response distortion on those validities. *Journal of Applied Psychology, 75*. 581-595.

Hough, L.M. (1992). The Big Five personality variables--construct confusion: Description versus prediction. *Human Performance. 5*(1-2), 139-155.

Hsieh, A.T. & Chao, H.Y. (2004). A reassessment of the relationship between job specialization, job rotation and job burnout: example of Taiwan's high-technology industry. *The International Journal of Human Resource Management. 15*(6), 1108-1123.

Hughes, C. J. M. (2002). HRM and universalism: Is there one best way? International

Hui, N. & Zhang, W. (2019). Research On Countermeasures Of Human Resource Management Performance Appraisal In Small And Medium-Sized Enterprises--Taking Z Company As An Example.

Hunter, J. E., & Gerbing, D. W. (1983). Unidimensional measurement, second-order factor analysis, and causal models. In B. M. Staw, &L. L. Cummings (Eds.), *Research in organizational behavior*(Vol. 4, 267-320). Connecticut: JAI Press.

Hunter, J.E. (1982). Unidimensional measurement, second-order factor analysis, and causal models. *Research in organizational behavior. 4*, 267-299.

Hunter, J.E. (1983). A causal analysis of cognitive ability, job knowledge, job performance, and supervisor ratings. *Performance measurement and theory*, *257*, 266.

Huselid, M. A., & Becker, B. E. (1996). Methodological issues in cross-sectional and panel estimates of the human resource-firm performance link. Industrial Relations, 35, 400–422.

Idowu, A. (2017). Effectiveness of performance appraisal system and its effect on employee motivation. *Nile Journal of Business and Economics*, *3*(5), 15-39.

Iqbal, N., Ahmad, N., Haider, Z. & Batool, Y. (2013). Impact of performance appraisal on employee's performance involving the Moderating Role of Motivation. *Arabian Journal of Business and Management Review (OMAN Chapter)*, *3*(1), p.37.

Irefin, P. & Mechanic, M.A., 2014. Effect of employee commitment on organizational performance in Coca Cola Nigeria Limited Maiduguri, Borno state. *Journal of Humanities and Social Science*, 33-41.

Ismail, H.N. & Rishani, M. (2018). The relationships among performance appraisal satisfaction, career development and creative behavior. *The Journal of Developing Areas*, *52*(3), 109-124.

Jachimowicz, J., Wihler, A. & Galinsky, A.D. (2018). When the Passionate Succeed: Passion for Work Increases Job Performance Only When Their Supervisors Attain Desired Levels of Passion.

Jacobson N, Trojanowski L. & Dewa C. (2012). What do peer support workers do? A job description. *BMC Health Serv Res. 12*, 205.

Jain, M.S. (2002). Artificial Intelligence – The Engine Driving the Next Wave of Transformation in Business. Information systems. Prentice Hall, New Jersey.

Jain, M.S., Artificial Intelligence – The Engine Driving the Next Wave of Transformation in Business.

Jain, S., White, M. & Radivojac, P. (2017). Recovering true classifier performance in positive-unlabeled learning. In Proceedings of the AAAI Conference on Artificial Intelligence (Vol. 31, No. 1).

Jayaweera, T., (2015). Impact of work environmental factors on job performance, mediating role of work motivation: A study of hotel sector in England. *International journal of business and management*. *10*(3), p.271.

Jeffery, H. & Farooq, H., (2015). The Impact of Structural Empowerment on Organizational Citizenship Behavior-Organization and Job Performance: A Mediating Role of Burnout. *Journal of Management Sciences*. *2*(2), 273-288.

Jehn, K. (1997). A qualitative analysis of conflict types and dimensions in organizational groups. *Administrative Science Quarterly*. 42, 530-557.

Jehn, K.A. & Mannix, E.A. (2001). The dynamic nature of conflict: A longitudinal study of intragroup conflict and group performance. *Academy of management journal*. *44*(2), 238-251

Jia, Q., Guo, Y., Li, R., Li, Y., & Chen, Y. (2018, June). A conceptual artificial intelligence application framework in human resource management. In Proceedings of the International Conference on Electronic Business (pp. 106-114).

Johnson, S.M. (1986). Incentives for teachers: What motivates, what matters. *Educational Administration Quarterly*. *22*(3), 54-79.

Kafi, M.Y. (2014). Human resources management from an administrative- development- technology- global perspective. Arab Community Bookstore for Publishing and Distribution, Amman, Jordan.

Kahn, W.A. (1990). Psychological conditions of personal engagement and disengagement at work. *Academy of management journal*. *33*(4), 692-724.

Karlaftis, M.G. & Vlahogianni, E.I. (2011). Statistical methods versus neural networks in transportation research: Differences, similarities and some insights. Transportation Research Part C: Emerging Technologies, 19(3), 387-399.

Kasemsap, K., 2012. Factors affecting organizational citizenship behavior of passenger car plant employees in Thailand. *Silpakorn University Journal of Social Sciences, Humanities, and Arts*. *12*(2), 129-160.

Katou, A.A. & Budhwar, P.S. (2007). The effect of human resource management policies on organizational performance in Greek manufacturing firms. *Thunderbird international business review*. *49*(1), 1-35

Kay, F. M., & Gorman, E. H. (2012). Developmental practices, organisational culture and minority representation in organisational leadership: The case of partners in large US firms. *The Annals of American Academy of Political and Social Science*. *639*(1), 91–113.

Kaye, J., Whitley, E.A., Lund, D., Morrison, M., Teare, H. & Melham, K. (2015).Dynamic consent: a patient interface for twenty-first century research networks. *European journal of human genetics. 23*(2), 141-146.

Khan, M.F.U. (2013). Role of performance appraisal system on employee's motivation. *IOSR Journal of Business and Management. 8*(4), 66-83.

Khan, M.R., Ziauddin, J.F. & Ramay, M.I., (2010). The impacts of organizational commitment on employee job performance. *European Journal of Social Sciences. 15*(3), 292-298.

Kim, J. & Park, K.T., (2018). EE6: Can artificial intelligence replace my job? The dawn of a new IC industry with AI. In Solid-State Circuits Conference-(ISSCC), 2018 IEEE International, 531-533. IEEE.

Knapp, S. J., Vande Creek, L. D., & Fingerhut, R. (2017). Practical ethics for psychologists: A positive approach (3rd ed.). Washington, DC: American Psy

Knowledge.wharton. (2007), managing-emotions-in-the-workplace-do-positive-and-negative-attitudes-drive-performance. Available from: < knowledge.wharton.upenn.edu>.[Apr 18, 2007]

Kolbjørnsrud, V., Amico, R., & Thomas, R. J. (2016, November 2). How Artificial Intelligence Will Redefine Management. *Harvard Business Review*. Retrieved from https://hbr.org/2016/11/how-artificial-intelligence-will-redefine-management.

Kotter, J. P., & Heskett, J. L. (1992). *Corporate* Culture *and Performance*. New York: Free Press.

Kück, M. & Scholz-Reiter, B. (2013, December). A genetic algorithm to optimize lazy learning parameters for the prediction of customer demands. In *2013 12th International Conference on Machine Learning and Applications* (Vol. 2, 160-165). IEEE.

Kumar, A., Pandey, A. & Kaushik, S. (2017). Machine Learning Methods for Solving Complex Ranking and Sorting Issues in Human Resourcing. In *Advance Computing Conference (IACC), 2017 IEEE 7th International* (43-47). IEEE.

Lado, M. & Alonso, P., 2017. The Five-Factor model and job performance in low complexity jobs: A quantitative synthesis. *Revista de Psicología Del Trabajo y de las Organizaciones. 33*(3), 175-182.

Lai, P.C. (2018). Research methodology for novelty technology. *JISTEM-Journal of Information Systems and Technology Management*, *15*.

Laudon, K. C. & Laudon, J. P. (2006). Management information systems: managing the digital firm. New Jersey: Person Prentice Hall.

Lawrenson, M., Urli, T. & Kilby, P. (2017, July). A model-based genetic algorithm framework for constrained optimisation problems. In Proceedings of the Genetic and Evolutionary Computation Conference Companion (111-112).

Lazarus, R. S. (1991). Emotion and adaptation. New York: Oxford University Press.

Leach, D., & Fulton C.R. (2008). Faculty perceptions of shared decision making. *Education* 128(4) 630-644.

Leedy, P.D. & Ormrod, J.E., (2005). Practical research (Vol. 108). Saddle River, NJ: Pearson Custom.

Leon Rohr, S. (2016). Harnessing the power of the job description. *Human Resource Management International Digest. 24*(6), 8-11.

Lio, R., & Ode, M. (2005). Decision Trees. *The Data Mining and Knowledge Discovery Handbook. 6,* 165-192.

Litian, L., Ami, S., Salman S. & Murie, M. (2020). Neural Network Coding. Research Lab of Electronics.

Love, P.E., Holt, G.D. & Li, H. (2002). Triangulation in construction management research. Engineering, Construction and Architectural Management.

Ludbrook, J. (2012). A primer for biomedical scientists on how to execute model II linear regression analysis. *Clinical and Experimental Pharmacology and Physiology*, *39*(4), 329-335.

Madhakomala, R., Gunawan, K. & Susilo, A.K. (2020). Developments of Performance Appraisal Model for Logistic Staff Personnel with the Key Performance Indicator (KPI) and Analytical Hierarchy Process (AHP). *Journal of Defense Resources Management*, *11*(2).

Maduka, C.E. & Okafor, O. (2014). Effect of motivation on employee productivity: A study of manufacturing companies in Nnewi. *International Journal of Managerial Studies and Research*, *2*(7), 127-137.

Magee, K. C. (2002). *The impact of organizational* culture *on the implementation of performance management.* Doctoral dissertation.

Mahenthiran Aloysius, S. (2012). Self Motivation for Achievement and Its Impact on the Employees' Performance and Satisfaction.

Mallick, S.K. (2015). Right to Information. Governance and Citizenship, 337-353.

Masum, A.K., Beh, L.S., Azad, A.K. & Hoque, K. (2018). Intelligent Human Resource Information System (i-HRIS): A Holistic Decision Support Framework for HR Excellence. *International Arab Journal of Information and Technology. 15*(1), 121-130.

McGill, M. & Perona, P. (2017, July). Deciding how to decide: Dynamic routing in artificial neural networks. In *International Conference on Machine Learning* (2363-2372). PMLR.

McGuigan, C.J. (2015). *Examining factors affecting the job satisfaction-job performance link among Irish retail employees during the current economic downturn* (Doctoral dissertation, Ulster University).

Mehraj, T., & Baba, A. M. (2019). Scrutinizing Artificial Intelligence based Career Guidance and Counselling Systems: An Appraisal. International Journal of Interdisciplinary Research and Innovations, 7(1), 402-411.

Melnikovas, A. (2018). Towards an explicit research methodology: Adapting research onion model for futures studies. *Journal of Futures Studies*, *23*(2), 29-44.

Melville, N., Kraemer, K. & Gurbaxani, V. (2004). Information technology and organizational performance: An integrative model of IT business value. MIS quarterly, 28(2), 283-322.

Meyer, P. J., Paunonen, V. S., Gellatly, R. I., Goffin, D. R., & Jackson, N. D. (1989). Organizational Commitment and job performance: It's the nature of commitment that counts. Journal of *Applied Psychology. 74*, 152-156.

Mishra, S. (2010). Internal marketing-A tool to harness employees' power in service organizations in India. *International Journal of Business and Management. 5*(1), p.185.

Mohapatra, B.K. & Srivastava, A.K. (2003). A study of the relationship of perceived work environment with job attitude, performance and health. *Unpublished PhD. Dissertation, Department of Psychology, Banaras Hindu University*.

Mokaya, S. & Gitari, J.W. (2012). Effects of workplace recreation on employee performance: The case of Kenya Utalii College. *International journal of humanities and social science*, *2*(3), 176-183.

Montano, D., Reeske, A., Franke, F. & Hüffmeier, J., (2017). Leadership, followers' mental health and job performance in organizations: A comprehensive meta-analysis from an occupational health perspective. *Journal of Organizational Behavior*, *38*(3), 327-350.

Murayama, K. & Elliot, A.J. (2012). The competition–performance relation: A meta-analytic review and test of the opposing processes model of competition and performance. *Psychological bulletin. 138*(6), 1035.

Murphy, R.A., Register, T.C., Shively, C.A., Carr, J.J., Ge, Y., Heilbrun, M.E., Cummings, S.R., Koster, A., Nevitt, M.C., Satterfield, S. & Tylvasky, F.A. (2013). Adipose tissue density, a novel biomarker predicting mortality risk in older adults. *Journals of Gerontology Series A: Biomedical Sciences and Medical Sciences. 69*(1), 109-117.

Mustapha, N. & Zakaria, Z.C. (2013). The effect of promotion opportunity in influencing job satisfaction among academics in higher public institutions in Malaysia. *International Journal of Academic Research in Business and Social Sciences. 3*(3), 20.

Myers, B. & Kwon, W.S. (2013). A model of antecedents of consumers' post brand attitude upon exposure to a cause–brand alliance. *International Journal of Nonprofit and Voluntary Sector Marketing, 18*(2), 73-89.

Nabi, M.N., Islam, M., Dip, T.M. and Hussain, A.A. (2017). The Impact of Motivation on Employee Performance: A Case Study of Karmasangsthan Bank Limited, Bangladesh. *International Journal of Business and Management*, *5*(4), 57-78.

Nadeem, M., Arif, S. & Naeem, M. (2020). The Role of Principals and Administrators in Performance Appraisal of School Teachers in Punjab. *Sjesr. 3*(2), 132-142.

Naharuddin, N.M. & Sadegi, M. (2013). Factors of workplace environment that affect employees' performance: A case study of Miyazu Malaysia.

Naranjo-Valencia, J.C., Jiménez-Jiménez, D. & Sanz-Valle, R. (2016). Studying the, links between organizational culture, innovation, and performance in Spanish companies. *RevistaLatinoamericana de Psicología. 48*(1), 30-41.

Nardi, P.M. (2018). Doing survey research: A guide to quantitative methods. Routledge.

Narimisa, M. (2014). The Role of Key Factors of Training Transfer on Employee's Job Performance. *A Review, European Scientific Journal. 2*, 178-184.

Nassaji, H. (2015). Qualitative and descriptive research: Data type versus data analysis.

Nassaji, H. (2015). Qualitative and descriptive research: Data type versus data analysis.

Nassazi, A. (2013). Effects of Training on Employee Performance: Evidence from Uganda.

Nawaz, A. & Ansari, N., (2017). Impact of Job Stress on Job Performance With Perceived Organizational Support as A Moderator. *Management Review*. *1*(2).

Ng, T.W. and Feldman, D.C., 2008. The relationship of age to ten dimensions of job performance. *Journal of Applied Psychology*. *93*(2), p.392.

Nguah, J.A. & Asare, S.S. (2017). Assessment of the Impact of Training and Development on Employee Performance and Productivity.

Nguyen, T.T., Mia, L., Winata, L. & Chong, V.K. (2017). Effect of transformational-leadership style and management control system on managerial performance. *Journal of Business Research*. *70*, 202-213.

Nikpeyma, N., Abed_Saeedi, Z., Azargashb, E. & Alavi_Majd, H. (2014). Problems of clinical nurse performance appraisal system: A qualitative study. *Asian Nursing Research*. *8*(1), 15-22.

Obisi, C. (2011). Employee performance appraisal and its implication for individual and organizational growth. *Australian Journal of Business and Management Research*. *1*(9), p.92.

Ochoti, G.N., Maronga, E., Muathe, S., Nyabwanga, R.N. & Ronoh, P.K. (2012). Factors influencing employee performance appraisal system: a case of the ministry of state for provincial administration & internal security, Kenya. *International Journal of Business and Social Science*. *3*(20).

Ogbonna, E. & Harris, L.C. (2000). Leadership style, organizational culture and performance: empirical evidence from UK companies. *International Journal of Human Resource Management*, *11*(4), 766-788.

 Olden, J.D., Joy, M.K. & Death, R.G. (2004). An accurate comparison of methods for quantifying variable importance in artificial neural networks using simulated data. *Ecological modelling*, *178*(3-4), 389-397.

Oswald, A. (2012). The effect of working environment on workers performance: the case of reproductive and child health care providers in Tarime district (Doctoral dissertation, Muhimbili University of Health and Allied Sciences).

Oswald, A. J., Proto, E. & Sgroi, D. (2015). Happiness and Productivity. *Journal of LaborEconomics*. *33*(4) 789-822.

Ouchi, W. G. (1981). *Theory Z, Reading*. MA: Addison-Wesley.

Paine, J.B. & Organ, D.W. (2000). The cultural matrix of organizational citizenship behavior: Some preliminary conceptual and empirical observations. *Human resource management review*. *10*(1), 45-59.

Pandey, M., Zakwan, M., Sharma, P.K. & Ahmad, Z. (2020). Multiple linear regression and genetic algorithm approaches to predict temporal scour depth near circular pier in non-cohesive sediment. *ISH Journal of Hydraulic Engineering*, *26*(1), 96-103.

Parahoo, K. (2006). Nursing Research: Principles, Process and Issues. 2nd edn. Palgrave Macmillan, Houndmills Basingstoke

Park, S. (2017). Motivating raters through work design: Applying the job characteristics model to the performance appraisal context. *Cogent Psychology*. *4*(1), p.1287320.

Parry, et al. (2007). The human resources and technology: Impacts and benefits. Journal of Information Technology, 8(4).

Pasban, M. & Nojedeh, S.H. (2016). A Review of the Role of Human Capital in the Organization. *Procedia-social and behavioral sciences. 230*, 249-253.

Pató, B.S.G. (2013). The 7 Most Important Criterions of Job Descriptions. *International Journal of Business Insights & Transformation.* 7(1).

Pelegrin, N., Mesquita, D.O., Albinati, P., Caldas, F.L.S., de Queiroga Cavalcanti, L.B., Costa, T.B., Falico, D.A., Galdino, J.Y.A., Tucker, D.B. & Garda, A.A. (2017). Extreme specialization to rocky habitats in Tropidurus lizards from Brazil: Trade-offs between a fitted ecomorph and autoecology in a harsh environment. *Austral Ecology*. *42*(6), 677-689.

Pereira, V. (2020). Data Science-Neural Networks-03-Recurrent Neural Network. Research Gate.

Peter, C.G. (2014). *Impact of* promotion t*o employee's performance At Dar es Salaam city council* (Doctoral dissertation, Mzumbe University).

Peterson, R.S. & Behfar, K.J. (2003). The dynamic relationship between performance feedback, trust, and conflict in groups: A longitudinal study. *Organizational behavior and human decision processes*. *92*(1-2), 102-112.

Picciano, A., (2004). Educational research primer. A&C Black.

Podsakoff, N.P., Whiting, S.W., Podsakoff, P.M. & Blume, B.D. (2009). Individual-and organizational-level consequences of organizational citizenship behaviors: A meta-analysis. *Journal of applied Psychology*. *94*(1),122.

Podsakoff, P.M., Ahearne, M. & MacKenzie, S.B. (1997). Organizational citizenship behavior and the quantity and quality of workgroup performance. *Journal of applied psychology*. *82*(2), 262.

Podsakoff, P.M., MacKenzie, S.B., Paine, J.B. & Bachrach, D.G. (2000). Organizational citizenship behaviors: A critical review of the theoretical and empirical literature and suggestions for future research. *Journal of management*. *26*(3), 513-563.

Poorsafaei, M. & Amiri, M. (2014). Factors Affecting Employee Empowerment (Case Study Education Arak City).

Price, L. L., Arnould, E. J., & Curasi, C. F. (2000). Older consumers' disposition of special possessions. *Journal of Consumer Research. 27*(2), 179-201.

PriceWaterhouseCoopers, L.L.P., (2008). Building the case for wellness. London: Department for Work and Pensions.

Propst, E.J., Amin, R., Talwar, N., Zaman, M., Zweerink, A., Blaser, S., Zaarour, C., Luginbuehl, I., Karsli, C., Aziza, A. & Forrest, C. (2017). Midline posterior glossectomy and lingual tonsillectomy in obese and nonobese children with Down syndrome: biomarkers for success. The Laryngoscope. *127*(3), 757-763.

Qamar, Y., Agrawal, R. K., Samad, T. A., & Jabbour, C. J. C. (2021). When technology meets people: the interplay of artificial intelligence and human resource management. Journal of Enterprise Information Management.

Rabideau, S.T. (2005). Effects of achievement motivation on behavior. Retrieved from Personality Research: http://www. Personality research. Org/papers/Rabideau. him.

Rafaeli, A. and Sutton, R.I. (1987). Expression of emotion as part of the work role. *Academy of management review*. *12*(1), 23-37.

Rahi, S. (2017). Research design and methods: A systematic review of research paradigms, sampling issues and instruments development. International Journal of Economics & Management Sciences. 6(2), 1-5.

Rajhans, K. (2012). Effective organizational communication: A key to employee motivation and performance. *Interscience Management Review*. 2(2), 81-85.

Raju, K.K. & Banerjee, S. (2017). A study on job description and its effect on employee performance: case of some selected manufacturing organizations in the city of pune, India. *Int. J. Latest Tech. Eng. Manag. Appl. Sci.(IJLTEMAS). 6*(2), 2278-2540.

Reddy, V.S. (2020). Impact of Compensation on Employee Performance. IOSR Journal of Humanities and Social Science (IOSRJHSS), 25(9), 17-22.

Reeves, C. R. (2010). Genetic Algorithms. *Research Gate*.109-139.

Rich, B.L., Lepine, J.A. & Crawford, E.R. (2010). Job engagement: Antecedents and effects on job performance. *Academy of management journal. 53*(3), 617-635.

Ritchie, M. (2000). Organizational culture: An examination of its effect on the internalization process and member performance. *Southern Business Review. 25*(2), p.1.

Roberts, G.E. (2003). Employee performance appraisal system participation: A technique that works. *Public personnel management. 32*(1), 89-98.

Rodríguez, D., Hermosillo, J. & Lara, B. (2012). Meaning in artificial agents: The symbol grounding problem revisited. *Minds and machines. 22*(1), 25-34.

Rogers, E.M. (2003). Diffusion of Innovations (5th edn). New York, NY: Free Press.

Rokach, L. & Maimon, O. (2005). Decision trees. In *Data mining and knowledge discovery handbook* (165-192). Springer, Boston, MA.

Roney, C.J. & O'Connor, M.C.(2008). The interplay between achievement goals and specific target goals in determining performance. *Journal of Research in Personality. 42*(2), 482-489.

Rook, C. (2013). Exploring the Concept of Individual Workplace Well-Being: What does it mean to have Workplace Well-being and What is the Role of Identity-Related Resources in Achieving it?

Rynes, S.L., Orlitzky, M.O. and Bretz, R.D.(1997). Experienced hiring versus college recruiting: Practices and emerging trends. *Personnel Psychology. 50*(2), 309-339.

Ryu, G. & Hong, S.W. (2020). The mediating effect of trust in supervisors in the relationship between constructive performance feedback and perceived fairness of performance appraisal. *Public Performance & Management Review. 43*(4), 871-888.

Sahoo, C.K. & Mishra, S. (2012). Performance management benefits organizations and their employees. *Human Resource Management International Digest*.

Salgado, J.F., 1997. The five-factor model of personality and job performance in the European community. *Journal of Applied psychology*. *82*(1), 30.

Samson, G. N., Waiganjo, M., & Koima, J. (2015). Effect of Workplace Environment on the Performance of Commercial Banks Employees in Nakuru Town. *International Journal of Managerial Studies and Research,* 76-89.

Samwel, J.O. (2018). Impact of employee training on organizational performance: Case study of drilling companies in Geita, Shinyanga& Mara Regions of Tanzania. *International Journal of Managerial Studies and Research*, *6*(1), 36-41.

Sayer, P., 2010. Using the linguistic landscape as a pedagogical resource. ELT journal. 64(2), 143-154.

Schlager, E. (2005). Getting the relationships right in water property rights. In B. R. Bruns, C. Ringler, & R. S. Meinzen-Dick (Eds.), *Water rights reform: Lessons for institutional design* (27). Washington, DC: International Food Policy Research Institute.

Schmidt, F.L., Hunter, J.E. and Outerbridge, A.N.(1986). Impact of job experience and ability on job knowledge, work sample performance, and supervisory ratings of job performance. *Journal of applied psychology*. *71*(3), p.432.

Schramowski, P., Stammer, W., Teso, S., Brugger, A., Herbert, F., Shao, X., Luigs, H.G., Mahlein, A.K. & Kersting, K. (2020). Making deep neural networks right for the right scientific reasons by interacting with their explanations. *Nature Machine Intelligence*, *2*(8), 476-486.

Schreuder, H.T., Gregoire, T.G. & Weyer, J.P. (2001). For what applications can probability and non-probability sampling be used?. Environmental Monitoring and Assessment, 66(3), 281-291.

Schreuder, H.T., Gregoire, T.G. and Weyer, J.P., 2001. For what applications can probability and non-probability sampling be used?. Environmental Monitoring and Assessment. *66*(3), 281-291.

Schreuder, H.T., Timothy G.G. & Johann P.W (2001). For what applications can probability and non-probability sampling be used?. Environmental Monitoring and Assessment 66, no. 3 (2001): 281-291.

Schwartz-Shea, P. & Yanow, D. (2013). Interpretive research design: Concepts and processes. Routledge.

Sekaran, U. & Bougie, R. (2016). Research methods for business: A skill building approach. John Wiley & Sons.

Shchepotiev, O., Zhiltsov, A. & Vasjuk, V. (2013). Methods OF Rrliaty Research. *Техніка та енергетика/Machinery & Energetics. (184).*

Shin, D. & Konrad, A.M. (2017). Causality between high-performance work systems and organizational performance. *Journal of Management. 43*(4), 973-997.

Shively, R.L. (2013). Learning to be funny in Spanish during study abroad: L2 humor development. *The Modern Language Journal. 97*(4), 930-946.

Simmons, A.B. & Chappell, S.G., (1988). Artificial intelligence-definition and practice. IEEE Journal of Oceanic Engineering, 13(2), 14-42.

Skinner-Thompson, S., (2018). Privacy's Double Standards. Wash. L. Rev., 93, p.2051.

Skirbekk, V. (2004). Age and individual productivity: A literature survey. *Vienna yearbook of population research,* 133-153.

Somers, M. & Birnbaum, D. (2000). Exploring the relationship between commitment profiles and work attitudes, employee withdrawal, and job performance. *Public Personnel Management. 29*(3), 353-366

Sparrow, P.R., Chadrakumara, A. & Perera, N.(2010). Impact of work values and ethics on citizenship and task performance in local and foreign invested firms: A test in a developing country context.

Spector, P.E. (1997). Job Satisfaction: Application, Assessment, Causes, and Consequences. Thousand Oaks, CA: Sage.

Staw, B.M., Sutton, R.I. and Pelled, L.H., 1994. Employee positive emotion and favorable outcomes at the workplace. *Organization Science. 5*(1), 51-71

Stone, C.B., Neely, A.R. & Lengnick-Hall, M.L. (2018). Human Resource Management in the Digital Age: Big Data, HR Analytics and Artificial Intelligence. In *Management and Technological Challenges in the Digital Age.* 13-42. CRC Press.

Strohmeier, S. & Piazza, F. (2015). Artificial Intelligence Techniques in Human Resource Management—A Conceptual Exploration. In *Intelligent Techniques in Engineering Management* (149-172). Springer, Cham

Strohmeier, S. (2018). Smart HRM–a Delphi study on the application and consequences of the Internet of Things in Human Resource Management. *The International Journal of Human Resource Management.* 1-30.

Strohmeier, S., & Piazza, F. (2015). Artificial intelligence techniques in human resource management—a conceptual exploration. In Intelligent techniques in engineering management (pp. 149-172). Springer, Cham.

Swedberg, R., (2020). Exploratory research. The production of knowledge: Enhancing progress in social science, 17-41.

Tambe, P., Cappelli, P., & Yakubovich, V. (2019). Artificial intelligence in human resources management: Challenges and a path forward. California Management Review, 61(4), 15-42.

Tett, R. P., Jackson, D. N., & Rothstein, M. (1991). Personality measures as predictors of job performance: A meta-analytic review. *Personnel Psychology. 44*, 703-742.

Tickner, L. (2010). Empowerment *and performance in local government: the impact of empowerment strategies on service improvement* (Doctoral dissertation, Northumbria University).

Tolentino, R.C., 2013. Organizational commitment and job performance of the academic and administrative personnel. *International Journal of Information technology and Business Management*, *15*(1), 51-59.

Topîrceanu, A. & Grosseck, G. (2017). Decision tree learning used for the classification of student archetypes in online courses. *Procedia Computer Science. 112*, 51-60.

Topîrceanu, A. & Grosseck, G. (2017). Decision tree learning used for the classification of student archetypes in online courses. *Procedia Computer Science. 112*, 51-60.

Torrington, D. & Hall, S. (1998). *Human resource management and the personnel function.* london: Routledge.

Trevino, L.K. & Brown, M.E., (2004). Managing to be Ethical: Debunking five Business Ethics Myths. *Academy of Management Executive. 18*(2), 69-81

Tuytens, M. & Devos, G. (2012). Importance of system and leadership in performance appraisal. *Personnel Review*.

Uddin, M.J., Luva, R.H. & Hossain, S.M.M. (2012). Impact of organizational culture on employee performance and productivity: A case study of telecommunication sector in Bangladesh. *International Journal of Business and Management*. 8(2), p.63.

Upadhyay Y. & Singh S.K. (2010). In Favour of Ethics in Business: The Linkage between Ethical Behaviour and Performance. *Journal of Human Value. 16*(1), 9-19

van Cranenburgh, S. & Alwosheel, A. (2019). An artificial neural network based approach to investigate travellers' decision rules. *Transportation Research Part C: Emerging Technologies. 98*, 152-166.

Vesey, W.B., Vesey, J.T., Stroter, A.D. & Middleton, K.V. (2011). Multiple linear regression: A return to basics in educational research. *Multiple Linear Regression Viewpoints. 37*(2), 14-22.

Vesey, W.B., Vesey, J.T., Stroter, A.D. and Middleton, K.V., 2011. Multiple linear regression: A return to basics in educational research. *Multiple Linear Regression Viewpoints. 37*(2), 14-22.

Vischer, J.C. (2008). Towards an environmental psychology of workspace: how people are affected by environments for work. *Architectural science review*, *51*(2), 97-108.

Walliman, N. (2017). Qualitative Data Analysis. In Research Methods (148-166). Routledge.

Waqas, Z. & Saleem, S. (2014). The effect of monetary and non-monetary rewards on employee engagement and firm performance. *European Journal of Business and Management*. *6*(31), 73-83.

Wellins, R.S., Bernthal, P. & Phelps, M. (2005). Employee Engagement: The Key to Realizing Competitive Advantage, Development Dimensions International/DDI, 1-30. *Diaksesdari www.Google.com tanggal*, *27*.

Westwood, R. & Clegg, S. (2003). The discourse of organization studies: Dissensus, politics, and paradigms. Debating organization: Point-counterpoint in organization studies, 1-42.

Westwood, R. & Clegg, S. (2003). The discourse of organization studies: Dissensus, politics, and paradigms. Debating organization: Point-counterpoint in organization studies, 1-42.

Whitfield, M. & Cachia, M. (2018). How does workplace stress affect job performance? An employee's perspective. *New Vistas*. *3*(2), 28-33.

Wright, K.B., 2005. Researching Internet-based populations: Advantages and disadvantages of online survey research, online questionnaire authoring software packages, and web survey services. *Journal of computer-mediated communication. 10*(3), JCMC1034.

Wrzesniewski, A. & Dutton, J. E. (2001). Crafting a job: Revisioning employees as active crafters of their work. *Academy of Management Review, 26*(2), 179–201. http://dx.doi.org/10.5465/AMR.2001.4378011.

Yee, C.C. & Chen, Y.Y. (2009). Performance appraisal system using multifactorial evaluation model. *World Academy of Science, Engineering and Technology. 53*(2009), 231-235

Yee, L.C. (2018). An Analysis on the Relationship between Job Satisfaction and Work Performance among Academic Staff in Malaysian Private Universities. *Journal of Arts & Social Sciences. 1*(2), 64-73.

Yip, J.A., Schweitzer, M.E. & Nurmohamed, S. (2018). Trash-talking: Competitive incivility motivates rivalry, performance, and unethical behavior. *Organizational Behavior and Human Decision Processes. 144*, 125-144.

Yip, J.A., Schweitzer, M.E. & Nurmohamed, S. (2018). Trash-talking: Competitive incivility motivates rivalry, performance, and unethical behavior. *Organizational Behavior and Human Decision Processes. 144*, 125-144.

Zaaba, N.A. (2014). *Assessing the Role of Work Motivation on Employee Performance* (Doctoral dissertation, UMP).

Zhang, G., Patuwo, B. E., & Hu, M. Y. (1998). Forecasting with artificial neural networks:: The state of the art. International journal of forecasting, 14(1), 35-62.

Zhang, J., Liu, X., & Li, X. B. (2020). Predictive analytics with strategically missing data. INFORMS Journal on Computing, 32(4), 1143-1156.

Appendix A - Survey Questionnaire

Technological Artificial Intelligence Role in Raising the Efficiency of the Performance of Employees as Human Resources Management Objectives.

Dear Participant,
The form has been designed to collect data from employees who have used electronic device in their works.

This study takes its importance from the need to keep abreast of developments in technical sciences and to have a maximum advantage of them.

Please choose the right answer to you as accurately as possible; basing your judgments on the knowledge you have gained from your workplace. Your answer will be appreciated by the researcher and will add to the enrichment of the research to be based on correct and realistic information.

* Required

1. **Please enter your name**

   _____

2. **Please enter your company's name**

   _____

3. **Please enter your age group that you belong to** *
   Mark only one oval.

   ◯ 18 - 25
   ◯ 26 - 35
   ◯ 36 - 45
   ◯ 46 - 55
   ◯ 56 and above

4. **Please select your Gender** *
   Mark only one oval.

   ◯ Female
   ◯ Male
   ◯ Prefer not to say

5. **Employee has the right to receive a performance assessment that shows his level of performance easily at any time.** *
   Mark only one oval.

   ◯ Strongly disagree
   ◯ Disagree
   ◯ Neutral
   ◯ Agree
   ◯ Strongly agree

6. **Performance appraisal should cover all aspects affecting employee performance (abilities, skills, behavior, human relationships, commitment) based on job descriptions.** *

Mark only one oval.

- ◯ Strongly disagree
- ◯ Disagree
- ◯ Neutral
- ◯ Agree
- ◯ Strongly agree

7. **Performance appraisal should be based on job descriptions as a benchmark against which staff performance is measured.** *

Mark only one oval.

- ◯ Strongly disagree
- ◯ Disagree
- ◯ Neutral
- ◯ Agree
- ◯ Strongly agree

8. **The rewards of material and moral, punishment, transfer, promotion and discipline must be based on the results of the Performance appraisal.** *

Mark only one oval.

- ◯ Strongly disagree
- ◯ Disagree
- ◯ Neutral
- ◯ Agree
- ◯ Strongly agree

9. **The negative appraisal results indicate that there is a defect in job performance, so, it must be repaired by returning to job descriptions.** *

Mark only one oval.

- ◯ Strongly disagree
- ◯ Disagree
- ◯ Neutral
- ◯ Agree
- ◯ Strongly agree

10. **When employee knows his performance level, this will help managers to choose appropriate action against him.** *

Mark only one oval.

- ◯ Strongly disagree
- ◯ Disagree
- ◯ Neutral
- ◯ Agree
- ◯ Strongly agree

11. **The primary purpose of performance appraisal is to see whether an employee is committed to performance as defined in the job description or not.** *

Mark only one oval.

◯ Strongly disagree

◯ Disagree

◯ Neutral

◯ Agree

◯ Strongly agree

12. **There must be a system that links training programs with the employee needs which identified in performance appraisal compared to what is required in the job description.** *

Mark only one oval.

◯ Strongly disagree

◯ Disagree

◯ Neutral

◯ Agree

◯ Strongly agree

13. **Modern technologies with their high capacity to extract, save, analyze and link information with others will facilitate the performance appraisal process.** *

Mark only one oval.

◯ Strongly disagree

◯ Disagree

◯ Neutral

◯ Agree

◯ Strongly agree

14. **Results based on modern technologies and it information will be more objective and realistic than personal estimates.** *

Mark only one oval.

◯ Strongly disagree

◯ Disagree

◯ Neutral

◯ Agree

◯ Strongly agree

15. **Keeping employee information in one safe, fast and accurate location will enables management to draw a realistic picture of the level of performance and skill of the staff.** *

Mark only one oval.

◯ Strongly disagree

◯ Disagree

◯ Neutral

◯ Agree

◯ Strongly agree

16. **An accurate and clear job description will facilitates the selection process for employees depending on the availability of job requirements.** *

    Mark only one oval.

    - ⬭ Strongly disagree
    - ⬭ Disagree
    - ⬭ Neutral
    - ⬭ Agree
    - ⬭ Strongly agree

17. **Job description is very important for new employee, It is a guide to what he should do rather than ask others.** *

    Mark only one oval.

    - ⬭ Strongly disagree
    - ⬭ Disagree
    - ⬭ Neutral
    - ⬭ Agree
    - ⬭ Strongly agree

18. **Knowing the job description helps the employee to perform his daily work clearly.** *

    Mark only one oval.

    - ⬭ Strongly disagree
    - ⬭ Disagree
    - ⬭ Neutral
    - ⬭ Agree
    - ⬭ Strongly agree

19. **It is the duty of Human Resources Management to review job descriptions whenever there are significant changes in the organization and inform all his employees.** *

    Mark only one oval.

    - ⬭ Strongly disagree
    - ⬭ Disagree
    - ⬭ Neutral
    - ⬭ Agree
    - ⬭ Strongly agree

20. **Organization, In order to achieve the maximum of the job description's objectives, it is necessary to evaluate the employee's performance to know if he commit to his job describing or not.** *

    Mark only one oval.

    - ⬭ Strongly disagree
    - ⬭ Disagree
    - ⬭ Neutral
    - ⬭ Agree
    - ⬭ Strongly agree

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21. **The precise definition of the duties and responsibilities of the job and the conditions that must be met by those who successfully occupy it ensures the achievement of the principle of putting the right man in the right place.** *

Mark only one oval.

- ( ) Strongly disagree
- ( ) Disagree
- ( ) Neutral
- ( ) Agree
- ( ) Strongly agree

22. **The lack of clarity of the job description of the employee will lead to the lack of knowledge of what is required to perform and thus will negatively affect the performance of his duties.** *

Mark only one oval.

- ( ) Strongly disagree
- ( ) Disagree
- ( ) Neutral
- ( ) Agree
- ( ) Strongly agree

23. **Job descriptions in order to achieve its objectives, its activities must be realistic and can be performed in proportion to the work itself.** *

Mark only one oval.

- ( ) Strongly disagree
- ( ) Disagree
- ( ) Neutral
- ( ) Agree
- ( ) Strongly agree

24. **The lack of clarity of job descriptions makes employees feel dissatisfied because they will be worried and uncertain to choose for proper implementation.** *

Mark only one oval.

- ( ) Strongly disagree
- ( ) Disagree
- ( ) Neutral
- ( ) Agree
- ( ) Strongly agree

25. **Lack of clarity of job descriptions will weakens performance appraisal process by the lack of clarity on which criteria the staff will be based on.** *

Mark only one oval.

- ( ) Strongly disagree
- ( ) Disagree
- ( ) Neutral
- ( ) Agree
- ( ) Strongly agree

26. **It is vital for every job in the Organization to have job descriptions and using of a technology that provides access for all employees to determine their career.** *

Mark only one oval.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

27. **To maintain the information an linking it to different departments, and employees with ease of change in quickly and accurately requires the use of specialized technique.** *

Mark only one oval.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

28. **Obtaining job description for all jobs which Provides all jobs with all its duties, responsibilities and conditions to be met by those who occupy it, and link them to performance appraisal system, as well as training programs, will require smart technology capable of achieving this hug duties in the least time, cost, effort and highest accuracy and safety.** *

Mark only one oval.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

29. **The using of smart devices and software in job description system and Performance appraisal system increasing do to the need to deal with a huge amount of information and analyses them and comparing them with others to have a substantive decisions.** *

Mark only one oval.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

30. **Only with artificial intelligence you can be provide with the information at any time, and you can change it, linked it to other information at all locations, and the output can be retrieved and communicated to others quickly, accurately and securely.** *

Mark only one oval.

- ( ) Strongly disagree
- ( ) Disagree
- ( ) Neutral
- ( ) Agree
- ( ) Strongly agree

31. **Modern technology deals with information through the collection, conservation, processing, and retrieval in a manner that cannot be achieved by any employee, no matter how is his efficient.** *

Mark only one oval.

- ( ) Strongly disagree
- ( ) Disagree
- ( ) Neutral
- ( ) Agree
- ( ) Strongly agree

32. **Using of artificial intelligence helps to choose the best decisions since the availability of all information, data to develop many scenarios and choose the most appropriate one.** *

Mark only one oval.

- ( ) Strongly disagree
- ( ) Disagree
- ( ) Neutral
- ( ) Agree
- ( ) Strongly agree

33. **Advanced technology links job descriptions, performance appraisal, and training programs to identify the type of training which is appropriate to employee performance deficiencies.** *

Mark only one oval.

- ( ) Strongly disagree
- ( ) Disagree
- ( ) Neutral
- ( ) Agree
- ( ) Strongly agree

34. **The managerial intelligence of human resource management is to benefit from artificial intelligence, which integrates a range of different technologies to give it high quality output in the least time, effort and cost.** *

Mark only one oval.

- ( ) Strongly disagree
- ( ) Disagree
- ( ) Neutral
- ( ) Agree
- ( ) Strongly agree

35. **A single technical program could save the organization from a group of staff who were a financial burden, with the possibility of making mistakes and delaying transactions.** *

Mark only one oval.

- ( ) Strongly disagree
- ( ) Disagree
- ( ) Neutral
- ( ) Agree
- ( ) Strongly agree

36. **Computers are more able to reduce the costs of information processing, communications, and coordination rather than paper transactions.** *

Mark only one oval.

- ( ) Strongly disagree
- ( ) Disagree
- ( ) Neutral
- ( ) Agree
- ( ) Strongly agree

37. **Artificial intelligence by reducing costs and improving the quality of production will help organizations to operate and increase their production with the highest efficiency beyond human perception.** *

Mark only one oval.

- ( ) Strongly disagree
- ( ) Disagree
- ( ) Neutral
- ( ) Agree
- ( ) Strongly agree

38. **The handling of artificial intelligence with his provision of accurate, quick and successful information to solve problems, made it as a consultant which trusted by officials, especially in the decision-making process, related to human resource.** *

Mark only one oval.

- ( ) Strongly disagree
- ( ) Disagree
- ( ) Neutral
- ( ) Agree
- ( ) Strongly agree

39. **The value of information technology is determined by the ability to of using it by individuals and their suitability with the tasks they perform.** *

Mark only one oval.

- ⬭ Strongly disagree
- ⬭ Disagree
- ⬭ Neutral
- ⬭ Agree
- ⬭ Strongly agree

40. **The ability of smart devices and software to collect, organizes, analyze and retrieve information in a timely and efficient manner makes reliance on it, not an entertainment, but it is an administrative duty for organizations to succeed.** *

Mark only one oval.

- ⬭ Strongly disagree
- ⬭ Disagree
- ⬭ Neutral
- ⬭ Agree
- ⬭ Strongly agree

41. **When selecting smart software, organizations should choose programs that have a good reputation and have been proven successful with many other organizations.** *

Mark only one oval.

- ⬭ Strongly disagree
- ⬭ Disagree
- ⬭ Neutral
- ⬭ Agree
- ⬭ Strongly agree

42. **It is increasingly important to use smart devices for the need for quick and safe information that can be obtained quickly and for all employees, whether heads or subordinates at the same time for all.** *

Mark only one oval.

- ⬭ Strongly disagree
- ⬭ Disagree
- ⬭ Neutral
- ⬭ Agree
- ⬭ Strongly agree

43. **Programs must be selected for the tasks which it is chosen for, and organizational recourse rather than simply for the desire to use technology.** *

Mark only one oval.

- ⬭ Strongly disagree
- ⬭ Disagree
- ⬭ Neutral
- ⬭ Agree
- ⬭ Strongly agree

44. **Relying on technology has to create an organizational environment with training staff who know use and maintenance it as well as, believe in its importance to the development of work.** *

Mark only one oval.

- ◯ Strongly disagree
- ◯ Disagree
- ◯ Neutral
- ◯ Agree
- ◯ Strongly agree

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Appendix B - Validation Survey Questionnaire

Question1	Do you see that using AI in appraisal systems has covered all aspects that required knowledge about employee performance?
Question 2	Do you believe that AI appraisal system information was comprehensive, accurate and clear about the employees' performance?
Question 3	Can we prove that the AI appraisal system's data could be proven and compared with the available information and reports on the employee's performance?
Question 4	Can we say that the AI appraisal system has helped build a clear picture of employee performance?
Question 5	Can we say that the results of using AI appraisal system have been objective and reduced personal opinions?
Question 6	Is it possible that the AI appraisal system will discuss performance appraisal results with subordinates without problems?
Question 7	Do you see that using AI appraisal system has enabled me to define employees' performance levels more accurately than before?
Question 8	Do you really believe that the job performance appraisal system using the new AI appraisal is more specific and accurate?
Question9	Do you believe that the AI appraisal system contains everything related to the employee's performance in the past and present?
Question10	Do you hope the organization uses AI appraisal system instead of the previous job performance appraisal method?

Appendix C - Ethical Approval Letter

21 August 2018

LETTER OF APPROVAL (CONDITIONAL)

Applicant: Mr Ahmed Al-rashedi

Project Title: Artificial Intelligence for employee performance

Reference: 11828-LR-Aug/2018- 13952-4

Dear Mr Ahmed Al-rashedi

The Research Ethics Committee has considered the above application recently submitted by you.

The Chair, acting under delegated authority has agreed that there is no objection on ethical grounds to the proposed study. Approval is given on the understanding that the conditions of approval set out below are followed:

- The agreed protocol must be followed. Any changes to the protocol will require prior approval from the Committee by way of an application for an amendment.
- As per our previous request for changes, you <u>must</u> supply your Participants with a detailed information sheet before handing out questionnaires or interviewing them. Please follow the link below to view an example of a 'Participant information sheet'.
https://intra.brunel.ac.uk/cedps/_layouts/15/WopiFrame.aspx?
sourcedoc=/cedps/Research%20Ethics%20Library/MODEL%20PARTICIPANT%20INFORMATION%20SHEET.docx&action=default&DefaultItemOpen=1
. This can be attached to the start of your questionnaire if necessary, rather than as a separate document.

Please note that:

- Research Participant Information Sheets and (where relevant) flyers, posters, and consent forms should include a clear statement that research ethics approval has been obtained from the relevant Research Ethics Committee.
- The Research Participant Information Sheets should include a clear statement that queries should be directed, in the first instance, to the Supervisor (where relevant), or the researcher. Complaints, on the other hand, should be directed, in the first instance, to the Chair of the relevant Research Ethics Committee.
- Approval to proceed with the study is granted subject to receipt by the Committee of satisfactory responses to any conditions that may appear above, in addition to any subsequent changes to the protocol.
- The Research Ethics Committee reserves the right to sample and review documentation, including raw data, relevant to the study
- You may not undertake any research activity if you are not a registered student of Brunel University or if you cease to become registered, including abeyance or temporary withdrawal. As a deregistered student you would not be insured to undertake research activity. Research activity includes the recruitment of participants, undertaking consent procedures and collection of data. Breach of this requirement constitutes research misconduct and is a disciplinary offence.

Professor Hua Zhao

Chair

College of Engineering, Design and Physical Sciences Research Ethics Committee
Brunel University London

Appendix D – Interfaces of Human Resources Management System

D.1: Creating a new company.

D.2: Job descriptions of the existing jobs, the possibility of creatinga new job and its description.

D.3: Setting of duties for each created job.

D.4: Set of skills for each created job.

D.5: Set of steps to explain the job skills.

#	Name	Type	Collation	A
1	employee_id 🔑	int(11)		
2	employee_name	varchar(45)	utf8_general_ci	
3	date_of_birth	varchar(20)	utf8_general_ci	
4	identity_number	int(11)		
5	marital_status	varchar(45)	utf8_general_ci	
6	phone_number	varchar(45)	utf8_general_ci	
7	educational_level	varchar(45)	utf8_general_ci	
8	specialization	varchar(45)	utf8_general_ci	
9	current_job	varchar(45)	utf8_general_ci	
10	hired_date	varchar(45)	utf8_general_ci	
11	company_name	varchar(100)	utf8_general_ci	
12	department	varchar(45)	utf8_general_ci	
13	date_of_last_assessment	varchar(45)	utf8_general_ci	
14	feedback_of_last_assessment	varchar(45)	utf8_general_ci	
15	assessmet_of_last_five_years	varchar(45)	utf8_general_ci	
16	date_of_last_promotion	varchar(45)	utf8_general_ci	
17	grade_of_staff	varchar(45)	utf8_general_ci	
18	date_of_next_promotion	varchar(45)	utf8_general_ci	
19	general_evaluation	varchar(45)	utf8_general_ci	

D.6: All the data related to each employee.

#	Name	Type	Collation	At
1	rec_id 🔑	int(10)		
2	employee_id	int(11)		
3	job	varchar(45)	utf8_general_ci	
4	department	varchar(45)	utf8_general_ci	
5	company	varchar(45)	utf8_general_ci	
6	country	varchar(45)	utf8_general_ci	
7	hired_date	varchar(45)	utf8_general_ci	
8	fired_date	varchar(45)	utf8_general_ci	
9	reasons_of_fired	varchar(45)	utf8_general_ci	
10	assessment_of_last_year	varchar(45)	utf8_general_ci	
11	promotion	varchar(45)	utf8_general_ci	

D.7: Previous experience for each employee – if this exists

#	Name	Type	Collation	Att
1	rec_id 🔑	int(11)		
2	employee_id	int(11)		
3	course_name	varchar(45)	utf8_general_ci	
4	start_date	varchar(45)	utf8_general_ci	
5	end_date	varchar(45)	utf8_general_ci	
6	place	varchar(45)	utf8_general_ci	
7	trainer	varchar(45)	utf8_general_ci	
8	acquired_skills	varchar(45)	utf8_general_ci	

D.8: All training courses that employees had in their jobs.

#	Name	Type	Collation	
1	rec_id 🔑	int(11)		
2	employee_id	int(11)		
3	year	varchar(45)	utf8_general_ci	
4	month	varchar(45)	utf8_general_ci	
5	employee_achievments	varchar(250)	utf8_general_ci	
6	other_employee_strenghts	varchar(250)	utf8_general_ci	
7	influential_employee_weakness	varchar(250)	utf8_general_ci	
8	employee_failure_aspects	varchar(250)	utf8_general_ci	
9	feedback	varchar(250)	utf8_general_ci	

D.9: Issues that have impacted the employee positively and negatively.

#	Name	Type	Collation
1	rec_id 🔑	int(11)	
2	employee_id 🔑	int(11)	
3	year 🔑	varchar(45)	utf8_general_ci
4	evaluation_date 🔑	varchar(45)	utf8_general_ci
5	evaluation_author 🔑	varchar(45)	utf8_general_ci
6	evaluation_scale	varchar(45)	utf8_general_ci

D.10: All the evaluations that employees had in the previous years.

#	Name	Type	Collation
1	rec_id 🔑	int(11)	
2	employee_id	int(11)	
3	absence_date	varchar(45)	utf8_general_ci
4	absence_reasons	varchar(45)	utf8_general_ci
5	absence_excuse	varchar(45)	utf8_general_ci
6	leave_type	varchar(45)	utf8_general_ci
7	effect_on_work	varchar(45)	utf8_general_ci

D.11: Attendance of employees.

#	Name	Type	Collation
1	employee_id 🔑	int(11)	
2	assessment_year 🔑	varchar(45)	utf8_general_ci
3	assessment_month 🔑	varchar(45)	utf8_general_ci
4	assessment_item 🔑	int(11)	
5	self_scale	varchar(45)	utf8_general_ci
6	superior_assessor	varchar(45)	utf8_general_ci
7	superior_scale	varchar(45)	utf8_general_ci

D.12: All assessments conducted.

#	Name	Type	Collation
1	rec_id 🔑	int(11)	
2	employee_id	int(11)	
3	date	varchar(45)	utf8_general_ci
4	issue_name	varchar(100)	utf8_general_ci
5	proposed_solution	varchar(100)	utf8_general_ci
6	action_required	varchar(100)	utf8_general_ci

D.13: All issues related for each employee superior.

#	Name	Type	Collation
1	issue_id 🔑	int(11)	
2	issue_name	varchar(100)	utf8_general_ci
3	proposed_solution	varchar(100)	utf8_general_ci

D.14: All the issues expected and respective proposed solutions.

D.15: All complaints that made against each employee.

D.16: A list of the training proposed by managers or employees themselves.

D.17: List of tasks that done by employees.

#	Name	Type	Collation	
1	rec_id 🔑	int(11)		
2	task_id	int(11)		
3	employee_id	int(11)		
4	action_title	varchar(45)	utf8_general_ci	
5	action_text	varchar(500)	utf8_general_ci	
6	action_date	varchar(45)	utf8_general_ci	

D.18: All conversations and actions done on particular task.

#	Name	Type	Collation
1	rec_id 🔑	int(11)	
2	employee_id	int(11)	
3	report_year	varchar(45)	utf8_general_ci
4	report_date	varchar(45)	utf8_general_ci
5	report_author1	varchar(45)	utf8_general_ci
6	report_details	varchar(250)	utf8_general_ci
7	bonus_accrued	varchar(45)	utf8_general_ci
8	promotion_accrued	varchar(45)	utf8_general_ci
9	report_author2	varchar(45)	utf8_general_ci
10	author2_remarks	varchar(250)	utf8_general_ci
11	employee_confirmation	varchar(250)	utf8_general_ci

D.19: Employee reports managed by their managers.

#	Name	Type	Collation	A
1	user_id 🔑	varchar(100)	utf8_general_ci	
2	user_name	varchar(45)	utf8_general_ci	
3	user_pass	varchar(45)	utf8_general_ci	
4	user_type	int(11)		
5	company_name	varchar(100)	utf8_general_ci	

D.20: The user who manages the system.
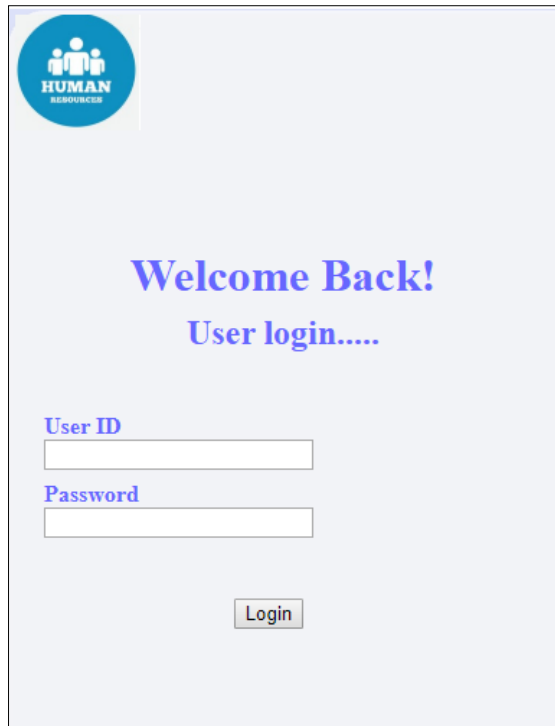
D.21: System login page.

D.22: The Main menu which is seen by all employees and managers.

D.23: Job Descriptions for an existing job.

D.24: Job Descriptions for an update job.

D.25: Job Descriptions for a new job.

D.26: Adding duties, skills and process for each created job.

D.27: Review an existing employee profile or add a new employee.

D.28: Creating a new username (employee id) and password.

D.29: Display of all employee information.

D.30: Employee complaint against colleagues / managers.

D.31: Employee self-evaluation.

D.32: Previous employee experience.

D.33: Employee attendance and the organization leave types.

	Information	Previouse Experinece	Previouse Training	Attendance	Issues	Required training	Complaints
		Evaluation	performance	meetings	Voluntary tasks	Reports	

** employees issues record\ Employee ID: 1

date	issue_name	proposed_solution	action_required	
13/04/2019	an issues with his\her clients	workshop	meeting and attention	
15/02/2018	an issues with his\her superior	workshop	meeting was held	
2019-01-01	have the required knowledge with inability to	Training required	as it is proposed	
2019-11-29	have an issue with hisher superior	Training required	training is recommended	

D.34: Employee problems and alternatives for solving them.

	Information	Previouse Experinece	Previouse Training	Attendance	Issues	Required training	Complaints
		Evaluation	performance	meetings	Voluntary tasks	Reports	

** Training expected in the future\ Employee ID: 1

training_type	place	operator	deadline	
training	USA	UKVI	1/06/2020	
workshop	jordan	mcdl	31/12/2019	

D.35: A list of proposed training courses.

** Complaints against employee \ Employee ID: 1

complaint_subject	complaint_date	complainant	complaint_details	employee_justifications	direct_superior_name	direct_superior_report	supreme_head_name	supreme_head_report	final_decision	
delay	2019-12-01	head of de	he comes late	transportation	anas	this excuse is unac	ahmad	this excuse is unac	holding mee	

D.36: Complaints against the employee.

** Employee Evaluation\ Employee ID: 1

year	evaluation_date	evaluation_author	evaluation_scale	
2015	2016-06-15	anas	Excellent 90-100	
2015		direct superior	v.good	
2015		supreme head	good	
2016	2017-06-15	ahmad	Very good 80-89	
2016		direct superior	v.good	
2017		direct superior	v.good	
2018	2019-06-01	anas	Very good 80-89	

D.37: All previous employee evaluations.

** Employee Performance\ Employee ID: 1

year	month	employee_achievments	other_employee_strenghts	influential_employee_weakness	employee_failure_aspects	feedback	
1981	JUN	all done	hard worker	nothing	nothing	nothing	
2019	MAY	v.good achievement	he has good English skills	computer skills	nothing	training in cor	
2015	JUL	all done	hard worker	nothing	nothing	well done	

D.38: Issues affecting employee performance.

meeting_date	meeting_operator	meeting_reasons	employee_report	direct_superior_report	confirmed	
2000-01-01	relaxe	ff	ffffffffffffffff	aaaaaaaaaaaaaaaaaa	confirmed	
2000-01-01	relaxe	ssss	sssssssssssssss	mky klgf hjk	confirmed	
2000-01-01	ahmad	asasd	asssssssssssssssssssssssss	seen and confirmed	confirmed	
2000-01-01	2	2	2	2	confirmed	
2000-01-01	2	2	2	hhhhhhhhhhhhhhhhhhhhhhh	confirmed	

D.39: Old and desirable meetings.