



University of Bahrain
College of Business Administration
Department of Management and Marketing

The Significance of Artificial Intelligence in the Human Resources Decision-Making Process

A thesis submitted in partial fulfillment of the requirements for M.Sc.
in Human Resource Management

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Supervised By
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Kingdom of Bahrain
December 2022

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Abstract

The goal of this study is to assess how the use of AI in HR at Bahrain's Ministry of Works, Municipality Affairs, and Urban Planning affects policy decisions. In this study, we focus on descriptive-predictive artificial intelligence algorithms.

Methodology/Design Sixty workers from the Bahraini Ministry of Works, Municipal Affairs, and Urban Planning filled out an online survey for the study after the link to the survey was circulated amongst the ministry's staff. Using a five-point Likert scale, respondents were prompted to indicate the extent to which they agreed or disagreed with each item in the survey. IBM SPSS was used to run statistical tests on the acquired data to see if they supported the hypotheses.

Conclusions The findings demonstrated that algorithm-based decision-making could complement human sense-making by empowering human resources professionals to make decisions that are highly rational, very fact-driven, and exceptionally dependable. In example, prescriptive algorithms expand the amount of data available, typically without imposing any particular interpretation patterns. The HR decision-making processes in the ministry are positively and strongly connected with descriptive, predictive, and prescriptive algorithms. Human resources decisions in Bahrain's Ministry of Works, Municipality Affairs, and Urban Planning are also found to be significantly impacted by the implementation of AI algorithms. Artificial intelligence algorithms were found to have a positive and significant impact on the HR decision-making process in Bahrain's Ministry of Works, Municipality Affairs, and Urban Planning through their descriptive, predictive, and prescriptive capabilities.

AI, Keywords, and Other AI-Related Terms There are three types of algorithms:
descriptive, predictive, and prescriptive Human Resource Management

Dedication

My mother was the inspiration for my dissertation; may she rest in peace. I owe her a debt of gratitude since her words of support and encouragement inspired me to keep going when I felt like giving up.

Acknowledgment

I want to express my special appreciation and thanks to my supervisor, Dr. Ali Bin Khalifa, who has been my remarkable adviser. I want to thank him for encouraging me to do my research and allowing me to make it knowledge worthy of analysis. His advice on the study has been remarkable.

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Chapter One: Introduction to the study

Chapter One: Introduction to the study

1.1. Introduction

The constant evolution of the IT industry has been attributed to the "4.0 revolution," also known as the "fourth industrial revolution." Although it didn't really get going until the turn of the third millennium, the impact of this revolution has been felt in virtually every aspect of human life. One of the most revolutionary developments of the Fourth Industrial Revolution was artificial intelligence (AI) (Eubanks, 2022). What we mean by "artificial intelligence" (AI) is "the demonstration of intelligence on the part of machines in comparison to the intelligence of humans and animals" (Chowdhury, 2022).

Organizations today need to constantly create and apply new digital breakthroughs and Artificial Intelligence technology (Adel Ismail Al-Alawi, 2021). Artificial intelligence (AI) is "that theory of computer system development that can conduct many processes which required human intelligence," according to one definition. Artificial intelligence (AI) can be extremely important in the hiring process for the company and facilitate excellence. (Adel Ismail Al-Alawi, 2021) These processes include perception of visual and auditory stimuli, the recognition of spoken language, the making of decisions, and the translation of languages."(Renkema, 2022). Many jobs once held by humans have been automated by AI because it is more efficient and reliable. "Speech recognition, computer vision, translation between (natural) languages, and other tasks" (Poole & Mackworth, 2017) are just some of the inputs that were mapped.

The concept of artificial intelligence has been the subject of numerous theoretical descriptions and definitions. Two unique types of AI have been recognized in the literature and in the identified definition of AI. Both general and specialized forms of artificial intelligence exist. (Raj & Seamans, 2019) is a good

example. Software with the ability to reason and act autonomously is referred to as "general artificial intelligence." There is no other product available that even comes close to being a substitute for this type. The other subset is called "Narrow artificial intelligence," and it consists of "computer software that relies on highly sophisticated, algorithmic techniques to find patterns in data and make predictions about third, 2018." Based on this, we can conclude that the program engages in "machine learning," in which the machine is entrusted with establishing the tasks for which it will be utilized; specifically, that it "learns" from existing data. What machines do is controlled by a computer and follows a set of rules that have been established in advance. This, however, is not proof that using the tool will bring about enlightenment.

Artificial intelligence (AI) research is frequently viewed as a collaborative effort amongst the fields of psychology, cognitive science, neuroscience, and engineering. Artificial intelligence has the potential to revolutionize many fields, including knowledge management. Knowledge embedded in the organization's business processes and the employee's skills provides the firm with unique capabilities to deliver customers with a product or service (Adel I. AI-Alawi, 2005). Since its inception in 1952, artificial intelligence research has focused extensively on understanding how the human brain thinks, remembers, organizes, classes, relates, and acts. The advent of AI has had far-reaching effects on many fields of study, inspiring the idea of human engineering (Rich & Knight, 1991). Studies of the brain's process of gathering data, encoding it into the neural signal, and then changing it to serve different goals have been widely applied to our understanding of human thought and problem-solving (Crowder & Friess, 2013).

Over time, many executives and company heads have grown to believe that it's essential to systematically address issues of technology, people, process, and content to succeed. Companies that want to thrive in today's fast-paced, cutthroat business climate need to pay special mind to the technologically advanced surroundings in which they operate. Approximately one-third of many organizations knowledge management budgets are earmarked for technology (Aparna & Ramachandran, 2019). A major focus in the field of computer science is the development of autonomous systems that make use of artificial intelligence mechanisms to help them think, learn, adapt, and gain experience on their own. Artificial intelligence's multidisciplinary approach to resolving organizational issues by amassing the best and correct application of knowledge for organizational effectiveness has broad implications for knowledge management because knowledge management is the field of processing, creating, sharing, using, and managing knowledge (Aparna & Ramachandran, 2019). For a business to remain viable and in the flow, knowledge management is very important (Adel Ismail Alalawi, 2021).

The advent of AI has had far-reaching effects on business procedures. Companies can rethink their operations with the help of AI's many tools. Additionally, AI has been viewed as a tool that enables businesses to increase their innovativeness, improve their production processes, and think more broadly. Using AI, we can make better goods, make better decisions more quickly, and increase the satisfaction of both internal and external stakeholders. The current state of AI technology and applications allows for AI-enabled organizational agility (Wang, Lin, & Shao, 2022, p. 3).

According to Wamba (2022), business leaders are obligated to push for change and evaluate where artificial intelligence (AI) could help their company

achieve its goals and grow in the future because of the stresses and strains brought on by globalization and the special crises of recent years.

According to Al-Hawamdeh. & Aisher, (2022), AI's impact has been documented in most today's businesses. Supply chain, transportation methods, learning, organizational functions, management, marketing, and apparently other industries on the path to digitalization are just some of the areas where AI has already been used. These establishments are shifted from using antiquated, labor-intensive methods to modern, automated ones. With the use of AI tools, businesses can now respond to emergencies more effectively and use AI-powered decision-making algorithms to spot outliers and anticipate client behavior. AI promotes automation and minimizes the human-intensive labor and tediousness required in forecasting and prediction analysis (Gupta, 2022).

Over the past few years, HRM has undergone unprecedented change (Berhil, Benlahmar, & Laban, 2020). The strategic decision-making processes in HR in contemporary organizations are increasingly influenced by the complexities introduced by the diversification issues that can arise while performing HR duties. Human resources practices that make use of AI have undergone some of the most dramatic changes. Under the umbrella of AI-enabled HR practices, HR data analytics has received its due attention (Jatoba, et al., 2019).

According to Chwastek (2017), the original goal of incorporating AI into HR was to improve processes like recruiting and selection. Applications of AI have been planned to assist HR in discovering untapped potential. Human resources professionals use a variety of artificial intelligence applications, but the most common ones are screening programmers, task automation instruments, and chatbots (Albert, 2019). According to several sources (Cresswell, 2018; and Leong, 2018), incorporating AI into the recruitment and selection processes will increase

the likelihood that HR will be able to collect and analyze the necessary data in a timely and accurate manner, allowing them to select the necessary talents while avoiding the effects of bias more objectively. According to Preuss (2018), HR workers can gain a more complete picture of the organization's workforce and its needs if they use AI in their work, particularly in the data analytics process.

According to Niehueser & Boak (2020), the HR decision-making process is one of the most common difficulties encountered by HR professionals in both public and private sector organizations. Human resource (HR) decisions include hiring and training employees, as well as determining how to best manage their careers, as well as determining how much to pay them and how often they should be moved throughout the company. Human resources (HR) experts are shifting towards the implementation of Human resources data analysis to revolutionize the functions, so that HR can make the most of employee databases to improve operational performance and decision-making (Berhil, Benlahmar, & Laban, 2020).

With its foundation in "machine learning" technology, AI has emerged as one of, if not the most successful, answers to HR data analytics problems. Algorithm-based human resources decision making is one such option (Leicht-Deobald, et al., 2019). Human resources have access to a plethora of AI tools designed to improve their judgement. Berhil, Benlahmar, and Laban, (2020) found that Decision Tree was used by HR professionals 30% of the time, Support Vector Machine 17% of the time, and Random Forest 15% of the time, Logistic Regression 11% of the time, K-Nearest Neighbor 4% of the time, Multi-Layer Perceptron 4% of the time, C 4.5 of the time, and Naive Bayes 2% of the time. It is standard practice to classify these and other algorithms into one of three categories: descriptive,

predictive, or prescriptive (Leicht-Deobald et al., 2019; Ananny & Crawford, 201st Mohammed, 2019).

1.2. Research problem Statement

If the Kingdom of Bahrain is going to realize its 2030 economic vision and implement a national strategy plan, it will need the help of governmental agencies like the Ministry of Works, Municipality Affairs, and Urban Planning (MUN, 2021). Attracting talent that can solve the problems currently facing the Ministry, notably in promoting the Kingdom of Bahrain as an economic center in the GCC region, is essential if this goal is to be realized. Human Resources at the Ministry must recruit and keep talented people who can help shape urban planning, municipal, and agricultural policies and regulations that are responsive to the demands of Bahraini society. However, in recent years, the ability of HR to retain the right talents (Reddy & Lakshmikeerthi, 2017) who are necessary to achieve the objectives of the Ministry has been hampered by the growing competition between the public and private sectors in the kingdom to attract talent. To increase HR's ability to address the many challenges it faces in the areas of employee recruitment, motivation, assessment, retention, etc., better HR-based decision-making approaches are needed (Bharti, 2017).

The HR knowledge community is concluding that, considering the intractable difficulties HR faces, it is crucial to improve the HR decision-making process. It has been claimed that data analytics using AI algorithms is one of the most important solutions; nevertheless, very few studies have looked at the impact of AI algorithms on the HR-decision making process, especially in the public organizations of the GCC.

1.3 Research Questions

The following questions are expected to help the researcher reach evidence-based conclusions.

Central research question:

Is there a significant impact of applying artificial intelligence in the human resources decision-making process in The Ministry of Works, Municipality Affairs, and Urban Planning in Bahrain?

Four minor research questions are developed as follows:

(1) What are the challenges faced by the HR decision-making process in The Ministry of Works, Municipality Affairs, and Urban Planning in Bahrain?

(2) What is the relationship between descriptive algorithms and the HR decision-making process in The Ministry of Works, Municipality Affairs, and Urban Planning in Bahrain?

(3) What is the relationship between predictive algorithms and the HR decision-making process in The Ministry of Works, Municipality Affairs, and Urban Planning in Bahrain?

(4) What is the relationship between prescriptive algorithms and the HR decision-making process in The Ministry of Works, Municipality Affairs, and Urban Planning in Bahrain?

1.4. Research Objectives:

The key aim of this study is to examine the impact of applying artificial intelligence in the human resources decision-making process in The Ministry of Works, Municipality Affairs, and Urban Planning in Bahrain.

1.4.1. Specific objectives

There are a few sub-objectives that would be covered to achieve the above-stated key aim objectives,

(1) Analyze the challenges faced by the HR decision-making process in The Ministry of Works, Municipality Affairs, and Urban Planning in Bahrain.

(2) Assess the association between descriptive algorithms and the HR decision-making process in The Ministry of Works, Municipality Affairs, and Urban Planning in Bahrain.

(2) Explore the role of predictive algorithms in the HR decision-making process in The Ministry of Works, Municipality Affairs, and Urban Planning in Bahrain.

(4) Examine the effect of prescriptive algorithms on the HR decision-making process in The Ministry of Works, Municipality Affairs, and Urban Planning in Bahrain.

1.5. Research Significance:

The findings of the current study have important implications for the Human Resources division of the Bahraini Ministry of Works, Municipality Affairs, and Urban Planning. This will be supplemented by detailed suggestions for meeting these difficulties.

Another reason why this study is important is that artificial intelligence algorithms can be used in the human resources decision making process. Human

resources (HR) decision-making is hypothesized to benefit from the application of all three types of AI algorithms (descriptive, predictive, and prescriptive). Organizations in both the private and governmental sectors that experience difficulties in making HR decisions may benefit from this.

The findings of this study are useful for human resources professionals. This is because actual results have been found to match the theoretical predictions. Understanding how AI can enhance HR's future capabilities can be gained through the presentation of theories defining the HR decision-making and the AI-enabled HR practices.

The findings of the current study can be used as a foundation for further research and academic study, particularly in data analytics as HR and its contributions to improving HR strategy.

1.6. Study Settings

There are a total of four chapters to this study. The following is a summary of the material covered in each of the four chapters:

"Introduction to the Study" is the title of Chapter 1. This chapter serves as "an introductory" part of the whole study. This introductory chapter serves primarily to provide readers with necessary context for the rest of the study. The research statement, questions, and aims are the essential points of this section. An essential part of this chapter is a discussion of the study's relevance. The chapter concludes with a discussion of typical research environments and associated jargon.

The second chapter is named "Literature review," and it offers the theoretical foundation. This chapter provides a thorough review of the literature pertaining to the variables and sub-variables used in the current study. Descriptive algorithms, predictive algorithms, and prescriptive algorithms are used to discuss

artificial intelligence as the independent variable. The primary section of this chapter is devoted to "Artificial Intelligence in Human Resources." Below this, the author provides a definition of AI, some historical context, some theoretical groundwork, and some practical applications of AI. The second part of this article sheds insight on "Human Resources Management (HRM)." This part is followed by the researcher's discussion on HRM, including its definition, functions, problems, and theories. The decision-making procedure in human resources is examined in detail in the third section. The use of artificial intelligence in human resource management (HRM), as well as its current and future trends and prospects in Bahrain, are all discussed here. Section 4 discusses the use of AI in HRM policy evaluation. At the end of this section, the researcher provides a theoretical conceptualization of the research variables and their connections as explored in the literature.

The third chapter is named "Research methodology," and its purpose is to help readers make the transition between the book's theoretical introduction and its empirical body. The process of the ongoing research is detailed for the audience. This is explained by presenting the study approaches, framework, and tools that were used. The study instrument's development, distribution, and analysis processes are all outlined. This chapter also includes an explanation of the statistical methods used.

The chapter presenting the instrument's validity and reliability is headed "Data analysis and Findings" (Chapter 4). After that, the demographic information is given. To help the reader understand the context of the variables in the study, descriptive statistics are provided. The results of both simple and complex regression analyses of the correlations between the study variables were then presented. This chapter's findings lay the groundwork for the researcher to present

the research's limitations, implications, and recommendations in the following chapter.

"Discussions & Recommendation" is the title of Chapter 5: Overall findings about the research variables (Using AI algorithms in the HR decision-making process at Bahrain's Ministry of Works, Municipal Affairs, and Urban Planning) are presented in this section. This section also includes proposals for future research as well as recommendations for the following audiences: (Research organizations; the public and private sectors in Bahrain; HRM practitioners; and HRM academics). There are also some comments and recommendations for further steps in the field.

Chapter Two: Theoretical Framework & Literature Review

Chapter Two: Theoretical Framework & Literature Review

2.1. Introduction

Since businesses are facing so much competition in the modern economy, they have been heavily obligated to automate their processes and optimize their leaner workforce. Therefore, it is essential for a company's owners, employees, and investors to seek out and exploit every competitive advantage they can over their domestic and foreign rivals. A competitive advantage may be gained by the strategic application of cutting-edge technology, notably artificial intelligence, to boost organizational performance in today's fiercely competitive business climate (Sivathanu & Pillai, 2019). Organizations can gain a competitive edge by making the most of two key resources: cutting-edge management technology and their most talented employees. One, the set of tools that makes process optimization possible is represented by advanced management technology. But human skill is what really matters when it comes to delivering novel solutions and carrying out lofty objectives to boost an organization's performance (Bhalgat, 2019).

Businesses in the current period are under growing pressure to adapt to the changing social and technical landscape, as stated by Erixon (2018). To combat this formidable obstacle, more and more organizations are turning to AI tools, most notably in human resource management. Computer science and large datasets are common tools in artificial intelligence (AI). Although there are theoretical challenges to developing a unified theory of AI, Erixon (2018) argues that AI has proven to be immensely helpful for today's businesses by facilitating the resolution of internal issues and the implementation of sound HR policy decisions.

Jia (2001) argues that integrating AI technology into HRM improves the field by making it easier for HR professionals to carry out their primary responsibilities. In addition, AI can help the HR department quickly evaluate suggestions and recruit high-potential candidates. Further, AI aids HR in examining how accurately roles are assigned, candidates are described, and their potential contributions to the company are predicted. Integrating AI into HRM would help business leaders better connect with workers of all ages, as stated by Jia Q. (2018). However, Jia et al. (2018) point out that some academics have raised ethical concerns about the use of AI in HRM contexts.

The researcher sheds information on the two factors that were used in the study in this section. At the outset, we have our independent variable: "artificial intelligence resources algorithms." The author provides an AI definition and some thoughts on AI's early history in this section of the research paper. There is also presentation and connection to the research issue of the ideas that explain AI. After this, the uses of AI will be discussed. Three of the most common algorithms used in human resources are illustrated. There are three types of algorithms: those that describe data, those that forecast data, and those that prescribe data.

Decision-making in human resources (the dependent variable) is the focus of the next section. The study begins with a definition of HRM provided by the researcher. After that, HR's roles, and responsibilities, along with the difficulties and theories around HR, are introduced. The definition, difficulties, and theoretical underpinnings of the Human Resources' decision-making process are the primary areas of discussion. The study sheds light on the uses of AI in HRM and what we may expect to see in the future. The future of AI in HRM in Bahrain is then discussed, along with the potential and challenges that lie ahead. Human resource management choices are also increasingly influenced by AI. The author of this study

mults about the evolution of HR decisions made using algorithms. Finally, the literature review concludes with a discussion of the moral implications of AI application to HRM practices. The chapter concludes with a theoretical framework, which is developed throughout the preceding section of the chapter (the literature review).

2.2. Artificial Intelligence in Human Resources

The advent of AI has had far-reaching effects on every facet of modern life, including human resources. There is no difference between technology-driven management and human-driven management, according to the study of Stanley & Aggarwal (2019). This research guarantees that technological progress has provided major benefits to the field of human resource management, but that human judgement will still be crucial (Stanley & Aggarwal, 2019). Effective use of technology, especially artificial intelligence, has been linked by (Vinichenko et al, 2019) to improved human decision-making, as the more precise application of the technology increases the likelihood of successful outcomes. To put it another way, combining AI with human analytics and judgement yields superior outcomes and more reliable decisions. Every business that provides goods and services must sustain positive client relationships and foster consumer loyalty to succeed (**Al-Alawi, 2004**). For this to happen, AI can assist a company learn more about its customers and develop a strategic strategy to realize its many objectives. In addition, AI tools can use the information for evidence-based decision making. There has been a tremendous shift on the part of many companies to use deep learning technology to revamp nearly every facet of their operations and to implement algorithm-based HR decision-making to keep tabs on and manage their workforce. The use of AI to improve human resource management is one of its most significant accomplishments. (Vinichenko Et Al., 2019).

2.2.1. Definition of Artificial Intelligence

There have been many research articles that tried to analyze the growing importance of Intelligent machines during the past few decades. As a result, several different explanations of what AI is had emerged (Delle Donne, 2017). One definition of artificial intelligence gives it this definition: "the technology that allows robots to learn on and make or advise action based on previously gathered data" (Prem, 2019). This description suggests that AI has broad applications in human resource management, including streamlining procedures and increasing productivity. In addition, Prem (2019) says that people might utilize their intelligence in conjunction with what they see to draw reasonable conclusions. Also, robotics are not as smart as people, but with the right input from humans in the form of data and tools, they can become extremely intelligent indeed (Prem, 2019).

Machine learning (AI) has entered the mainstream in the commercial world, as stated by El-Rayes et al. (2020). It's not novel to use software to replace human labor, but AI has opened incredible opportunities for businesses. In addition, El-Rayes et al. (2020) define AI as "the technology deployed for carrying out tasks that call for an elevated degree of intelligence." Simply said, AI is a machine programmed to perform tasks normally performed by humans. Furthermore, "artificial intelligence" could also mean "the math and science of making machines that are intelligent, brilliant computer program." Artificial intelligence (AI) is related to the same job of utilizing computers to study human intelligence (El-Rayes, et al., 2020), but AI is not limited to approaches that may be observed in biology.

According to WirePiazza (2018), AI is "an order which reviews PCs to relive the particular areas perspective and wise practices, (such as, learning process, contemplating, arranging, and so on)" (emphasis added). However, Bhardwaj et al.'s (2020) study provides a more basic definition of AI as the investigation of how to program computers to execute tasks at which humans have traditionally excelled. In addition, Bhardwaj et al. (2020) guarantee that when they talk about AI, they mean non-human intelligence created to complete activities and tasks. Machine learning and deep learning are two branches of artificial intelligence. Systems of experts that can predict outcomes based on data inputs are the product of AI algorithms in these two areas of study (Bhardwaj, and colleagues, 2020).

To add, AI is "the technological method that creates intelligent machines, great computer programs," according to John McCarthy. This definition of AI by Nawaz and Gomes (2019) connects to the somewhat comparable job of using computers to comprehend human intelligence; however, AI need not be limited to methods that can be observed in living organisms. In addition, as Liu et al. (2019) point out, AI is often implemented using a novel computer approach and a predetermined set of algorithms. But Liu et al. (2019) provide a popular definition of AI as "making a device act in a manner that would qualify as called sophisticated if somebody else were so behaving" (emphasis added).

2.2.2. Introduction of Artificial Intelligence

Artificial intelligence was once considered the stuff of science fiction, but today most experts in the business world would say that it has already altered the way companies operate. Artificial intelligence (AI) now allows machines to mimic human intelligence. Although the concept of a thinking machine has been around since ancient Greece, the actual development of AI technology is more

recent. Nawaz (2019) states that artificial intelligence (AI) development began in the 1950s. in Mikhaylov, et al. (2018), the rapid growth of the knowledge volume in they was the fundamental stimulus for developing this cutting-edge topic of study. Furthermore, the anticipated influence of AI development would not only alter the character of labor, but also bring about significant shifts in economic systems and business structures. The many opportunities for automation made possible by the latest technological advancements may also explain why artificial intelligence (also referred to has focused so heavily on machine learning, as Mikhaylov et al. (2018) assures.

Many businesses are incorporating AI into their HR procedures, however at varying rates (StarMeUp, 2018). Therefore, artificial intelligence (AI) will play a crucial role, and its effects on businesses will be long-lasting as its use spreads. Human resource professionals need to be ready for these shifts by learning about the different ways AI might improve human resource management. This cutting-edge area of inquiry is guaranteed to place a premium on exploring and employing nonconventional approaches in its quest for novel ways to arrive at practical answers. The study of intelligence of living entities, especially humans, was the primary focus of this area of study (StarMeUp, 2018).

(Srivastava, 2021) claims that Alan Turing's 1950 book "Computing Machinery Intelligence" is when the term "Artificial Intelligence" (AI) was first coined. An significant challenge that Turing, generally called the "father of computer science," posed was whether or not computers might be personified so accurately as capable of communicating intelligently as human being. According to Srivastava (2021), Turing's central concern was whether or not computers were capable of thought. The answer to this topic has prompted decades of technological development and exploration. More than that, though, this inquiry has inspired

scientists and technologists all over the world to create more sophisticated artificial intelligence systems. The now-famous "Turing Test," in which an interviewer who is human tries to tell the difference between a machine and a human written response, was derived from this query. Since (Srivasta, 2021). After that, Stuart Wilson and Peter Norvig published one of the most influential books about artificial intelligence, titled *AI: A Modern Approach*. According to Zehir et al. (2020), the seminal work by Russell and Norvig explored four distinct aims or definitions of AI, distinguishing between machines based on reason and reasoning versus action. Systems that explanation and act rationally were fundamental to the Ideal method, in contrast to the human-like systems that were central to the Human approach (Zehir et al., 2020).

At the very first Artificial Intelligence conference, held at the Dartmouth College in 1956, John McCarthy first used the term. The logical Theorist, the first functional artificial intelligence program, was then developed by Ken the author, J.C. Shaw, and Herman Simon. The first computer that utilized an artificial neural network that learns via trial and error was the Mark 1 Perceptron, which was constructed by Frank Rosenblatt in 1967. However, Kunihiro Fukushima, in the 1980s, inaugurated the period of 'Machine Learning' by introducing the neo-cognitive equipment underneath the concept of studying absent a teacher. Aspan (2020) claims that Kunihiro Fukushima believed that machines would eventually be able to program learning patterns as stimuli. Furthermore, in the course of the 1980s (Aspen 2020), neural networks that typically use the backpropagation method for training were increasingly prevalent in AI applications.

Several sectors, including academics and the military, have incorporated AI technology since the 1980s, as stated by Seaver (2017). However, ever since chess Garry Kasparov, who is was defeated by IBM's Deep Blue chess-

playing computer in 1996, there has been a heated discussion about whether or not machines have the cognitive superiority to completely replace humans. The next year, in 2011, IBM Watson defeated Jeopardy! global champion Ken Jennings & Brad Rutter to win the competition (Seaver, 2017). After that, Minwa at Baidu built a supercomputer that employs a subset of deep neural networks—the convolutional neural network—to recognize and label images with greater precision. Go world champion Lee Sudolin was defeated after a five-game match by DeepMind's AlphaGo, a program driven by a network of deep neural networks (Strozzi and colleagues, 2017).

Many academics and industry leaders believe that artificial intelligence will continue to advance and gain popularity in the coming years. Considerable progress in artificial intelligence (AI) technologies at the turn of the century has boosted 'Deep Learning' as a supplement to human cerebral brainpower. Deep networking is used in popular programs like Siri and self-driving cars because of 'Deep Learning' Thomas (Thomas Nafus, & Sherman, who was 2018). Technologies based on artificial intelligence have recently emerged as a crucial component of 21st-century business administration. In addition to deep learning, the field of machine learning, intelligence for business, as well as cognitive technologies such as skilled systems and fuzzy theory also play an important role in the perspective of driven by technology workplace management, which has a major impact on cooperative formation of strategies alongside managerial choice making (Iwamoto, 2019).

2.2.3. Theories Explaining Artificial Intelligence

Despite more than fifty years of research, there is still no generally accepted theory that can explain all aspects of Artificial Intelligence (AI). building theoretical models, or the difficulty of building a widely recognized theory of AI, is the primary

barrier to development in the field of Artificial Intelligence research. The research community, alas, must attempt to formulate a theory understanding AI. Some academics opt to follow theories that have been developed for similar issues, while others base their research on real-world concerns in the hopes that theoretical hurdles can be overcome or even avoided altogether through the use of technical fixes (Pillai while Sivathanu, 2021).

2.1.3.1. The Dilemma of No Perfect Theory about AI

Given the complexity of the AI research topic, it seems doubtful that a complete theory will be developed within the next few years (Berhil, and others, 2020). Some academics have argued that there is no good theory of intelligence since the study of intelligence is so complex and that a good theory can only be developed at the end of the inquiry (Davenport & Ronanki, 2018). However, there are many who argue that the human brain provides the most accurate model of intelligence and that any other theories we come up with are at best approximations. A third group of researchers has argued that scholars should stop wasting time on theoretical debates and instead concentrate on the real-world applications of AI (Dawson & Ronanki, 2018). In their 2017 work, Olushola and Abiola argue that, despite the risk of going in the wrong direction, AI research can proceed even in the absence of a precise or comprehensive theory to guide it. Furthermore, it may be unhelpful to rely on a theory created in another region, even if that theory has proven successful in a related one. Therefore, it's possible that any hypothesis is preferable to having none (Olushola & Abiola, the year 2017).

2.2.3.2 Challenges of AI Theory

The science-engineering duality of AI is much to blame for the difficulty of coming up with a satisfactory theory of AI and the existence of additional theoretical

problems. A theory of artificial intelligence (AI) shares some similarities with natural science theories. However, in some respects it resembles engineering theories. It's difficult to apply the methods of traditional natural scientists to the study of artificial intelligence since, unlike natural occurrences, intelligent computers are artefacts of human ingenuity. It's difficult to apply traditional engineering methods to the field of artificial intelligence since we don't yet know what we would like to develop; nevertheless, these answers can only be found through research into how humans think (Mesko, 2017).

Finding the simplest way to explain human thinking at a given level and developing machines in which people would discover most of the qualities of intelligence is the primary theoretical difficulty in producing a perfect algorithm for AI, as stated by Berhil, et al. (2020). There may be no good reason to believe it is impossible to complete this activity, despite its potential complexity and difficulty. As a result, AI researchers need to devote more time and energy to theoretical investigation in the AI domain. And they need to know what kind of theory they're trying to develop (Berhil, Benlamar, & Labai, 2020).

2.2.3.3. Desired Properties of Required Theory of AI

The necessary AI theory must possess a set of desirable features. The theory of artificial intelligence needs to describe the rules that apply to computers. To this purpose, we need an AI theory that can define "intelligence" in a way that is independent of specifics about either electrical computers or biological brains. Correctness, Concreteness, and Smallness are the three C's that should characterize the necessary AI theory (Lou & Li, 2017). Furthermore, these three factors would influence the final quality of the anticipated AI theory. As Lou and Li (2017) point out, several of the few theoretical studies in the subject of AI suffer from problems

caused by neglecting one or more of the three desirable features in favor of a narrower focus.

2.2.4. Artificial Intelligence Implementations

Every day, new innovations in technology appear that simplify our lives. One technology development that has greatly helped improve process and personnel management has artificial intelligence. Artificial intelligence (AI) has the potential to be a useful asset for any business, provided it is put to good use. In addition, AI has helped many businesses succeed financially and set themselves apart from rivals. Since each company is unique, so too are their AI application goals, motivations, strategies, tools, and approaches (Jia et al., 2018). Machine learning, as well as deep learning, are two sub-systems for specific fields of computational intelligence (AI), as described by Moyo et al. (2018). In addition, Moyo et al. (2018) confirm that neural networks are a part of deep learning. When discussing neural networks, the term "Deep Learning" usually indicates a structure with more than three hidden layers. The inputs and outputs of an algorithm that uses deep learning can be found in these three levels (Moyo et al., 2018).

According to Mesko (2017), the primary distinction between deep learning and machine learning is in the way in which their respective algorithms acquire knowledge. On the plus side, deep learning allows for the usage of bigger databases and often automates a major portion of the feature collection portion of the process. Machine learning, on the opposite hand, requires greater human involvement to find out (Mesko, 2017). To this end, Keding (2021) indicates that human specialists typically identify a structure of features needed to recognize the variances across data inputs that necessitate more structured data for learning. Deep learning, as contrast to machine learning, can analyze data automatically. Furthermore, managers can speed up machine learning with the use of Deep learning (Keding 2021).

Artificial intelligence (AI) requires well-organized data storage and regular maintenance, according to Anagnoste (2018). AI collects and processes all relevant information, empowering HR to make defensible, evidence-based choices. The HR department may now make longer-lasting, more meaningful judgements thanks to the use of AI technologies. Multiple practical uses for AI systems have been developed in recent years. Language recognition, speech recognition that is automatic, customer service, image recognition, recommendation engines, or automated stock trading are some of the most common uses for AI systems (Anagnoste, 2018). Prentice et al. (2020) state that experts in the field of technology have classified algorithms into three distinct types: descriptive algorithms, predictive algorithms, and prescriptive algorithms. Furthermore, Prentice et al. (2020) shows that the three categories of techniques, namely 'descriptive,' 'predictive,' and 'prescriptive' can provide HR departments with increasing analytical electricity; however, there are striking variations among these algorithms in terms of regarding their applications along with their underlying hidden assumptions.

2.2.4.1. Descriptive Algorithm

When it comes to HR decisions, Descriptive Systems are one type of AI algorithm that focuses on examining past acts and their effects on the present. Examples of descriptive algorithms include those that display the relationship between factors or the prevalence of values. In addition, standard deviations, means, percentage changes, and correlations are all utilized in descriptive algorithms (McDonald, et al., 2017). According to Bucher (2017), HR professionals routinely employ descriptive algorithms. The scorecard with an instrument for performance management used to track important indices like as turnover, absences, and supervising performance feedback (Bucher, 2017), is one example of a descriptive algorithm's application in human resources.

Liang and Liu (2018) argue that descriptive algorithms are an effective artificial intelligence instrument to performance monitoring because they enable users to map employees' informal social networks via data sources like email, Bluetooth, which is video, or GPS. In addition, descriptive algorithms aid in data collection for HR about employee morale and customer satisfaction. Descriptive algorithms in this area often use video-based facial recognition to analyze the correlation between service workers' emotions and customers' satisfaction levels. As a bonus, HR managers may use descriptive algorithms to monitor staff morale, assess productivity, and zero in on the most engaging strategic issues to boost morale (Liang & Liu, 2018).

According to Dubey et al. (2019), Microsoft's Yammer is a well-known HR blogging platform that utilizes descriptive algorithms. Using Yammer, departments within an organization may collaborate and share resources in real time. One of Yammer's features, Crane, is a piece of emotion identification software that examines the sentiments expressed by employees in Yammer posts. At the subunit that or company level, Crane also displays aggregate degrees of excitement, bewilderment, and other emotions. It gives human resources professionals a list of words and subjects that are likely to elicit certain emotions. Crane generally presents staff members' feelings over time as a line graph (Dubey, a researcher & Childe 2019).

2.2.4.2. Predictive Algorithms

The primary goal of most predictive algorithms is to foretell the future by extrapolating from a limited set of historical observations. When asked to predict the likelihood of a certain result, predictive algorithms often return a score. According to the study by Möhlmann and Zalmanson (2017), fraud prediction is a prime instance of a use for predictive algorithms. To prevent future dishonest trading, JP

Morgan, for one, employs an algorithm programmed that sifts through large amounts of data. To anticipate whether an employee will miss compliance classes, exceed market-risk limitations, or violate personalized trading laws, the HR department can use this program (Möhlmann & Zalmanson, 2017).

Another example of Prediction algorithms is the recruitment algorithm developed by Xerox Services (Oracle, 2019). Xerox uses this predictive algorithmic software in its call centers to better staff such facilities. With the use of cutting-edge technology, this software application assesses a candidate's potential for success in a certain role. To determine an applicant's suitability for a position, this HR prediction algorithm tool analyses the information they submit in their online application and does a cognitive skill evaluation (Oracle, 2019). According to Ananny and Crawford (2018), predictive algorithms alert compliance officials to potentially illegal actions taken by employees and help them determine whether those actions are in line with the company's compliance policies. Moreover, predictive algorithms are helpful for the HR team since they allow HR managers to hire the best candidates for the open positions. In addition, predictive algorithms offer HR professionals impartial information that improves their ability to find and hire top people. Ananny and Crawford (2018).

2.2.4.3. Prescriptive Algorithms

Predictive algorithms and prescriptive algorithms are similar in that they both originate in the academic branch of operations research and use similar approaches; however, prescriptive algorithms go above and beyond predictive algorithms by including simulations and scenario-based techniques. Prescriptive algorithms, as confirmed by Willson (2017), are designed to advise users on the optimal course of action to take in any given situation. In addition to making predictions about the future, prescriptive algorithms also offer advice on how to take advantage of

different approaches. The repercussions of each feasible choice are also shown using rigid algorithms (Willson, 2017).

Neyland and Möllers (2017) set out to investigate algorithms and provide evidence that UPS has created an HRM-related Prescriptive Algorithm. UPS has opted to implement AI technology that would shorten delivery routes, thereby saving time and money. UPS executives have installed sensors in their parcel delivery vehicles that record each stop, turn, and other driver action. UPS managers also utilize the information gleaned from these prescriptive algorithms to optimize the efficiency of their drivers' routes and establish key performance metrics against which to evaluate their employees' productivity (Neyland & Möllers, 2017).

Bersin's (2018) study backs up the usefulness of prescriptive algorithms for businesses, as they help HR professionals boost productivity by modelling intricate strategic HR decisions and prescribing appropriate employee behavior. In addition, prescriptive algorithms model information and analyze a wide range of variables to arrive at an accurate conclusion. Rigid algorithms, which may be used for both decision mechanization and decision support, have become increasingly important for the HR department, as stated by Bersin (2018). According to the results of this research, no human involvement in the procedure for making choices is possible during decision automation (Bersin, 2018).

Due to the growing recognition that people are an organization's most valuable resource, HRM has emerged as a central focus for many businesses. Human resource management focuses on organizing and ranking workers inside an organization. Human resource management (HRM) is a term that has been the subject of numerous attempts to provide universally agreed-upon definitions (Mohamed, 2017). The term "human resource management" (HRM) refers to the "planning, organizing, directing, and controlling of the purchasing, development,

compensation, integration, maintenance, and differentiation of human resources to make sure that individual, organizational, and social objectives are achieved" (Marler & Boudreau, 2017). Human resource management, corresponding to this definition, involves dealing with employment rules and practices such as hiring, firing, training, promoting, consulting, and negotiating with employees.

Also, HRM is "the personnel function associated with the purchases, development, compensation, unity, and ongoing upkeep of the employees of an organization to contribute to the accomplishment of a particular a company's major goals or objectives," according to one popular definition. Human resource management, per this definition (Liu et al., 2019), is a new way of thinking about and handling employee affairs in the workplace. That branch of management that deals with employees and their interactions with the company is called "Human Resource Management" (HRM). Its employees are its most asset, so the company strives to create a supportive environment where they may thrive and contribute to the company's success to the best of their abilities. Human resource management, as defined by Done (2017), is the process through which an organization ensures it is making the best possible use of its current pool of human resources.

However, Human Resource Management is "that part of management that focuses on the people dimension," according to Decenzo and Robbins. According to this definition, it is essential to invest in the training and education of employees, the purchase of their services, the encouragement of their increased productivity and dedication to the company to achieve their goals (Cançado, Vendramine, Oliveira and Elizângela, & Castro., 2017, for example). varied researchers used varied terminology to describe HRM, but all agreed that at its heart, HRM is concerned with the management of people inside an organization.

2.3.2. Human Resources Management Functions

Human resource management entails staff recruitment, induction, development, and upkeep. Additionally, HRM focuses on fostering cohesion and cooperation among employees. Human resource management (HRM) also aids in accomplishing personal, professional, and societal goals (Castriotta, Loi Marku, & Naitana, 2019). Liu (2017) states that an organization's HR department oversees all employee-related matters. Human resource management, or HRM, is responsible for a wide range of activities, such as planning for employees' careers and jobs, conducting analyses of those jobs, finding, and hiring qualified candidates, and so on. The HRM division is responsible for a wide range of activities, including but not limited to the following: human resource auditing; maintaining industrial relations; ensuring the compliance of local, state, and the government labor laws; employee welfare; safety issues; disciplinary action; communicating with all employees; and enhancing the overall standard of work life (Liu, 2017). Human resource management's most fundamental duties include those listed above.

2.3.2.1. HR Planning

HR planning regards planning as the primary function of the HRM. Everything in the organization depends on planning, which refers to thinking about things before they occur and preparing to deal with them in advance. Poor planning negatively influences the organization's overall system and eventually leads to organizational failure. HR managers must be completely aware of the right time to do things or not to do them to achieve the organizational goals and objectives (ASDO & RCL, 2020).

2.3.2.2. HR Organizing

Organizing is one of the main functions of HRM. Organizing refers to the process of adequately making and arranging everything to avoid any potential

conflicts, crises, and confusion. Therefore, HR managers must be fully aware of organizing everything related to human resources and organization to accomplish the organizational goals (Boon, Den Hartog, & Lepak, 2019).

2.3.2.3. HR Staffing

Staffing is another critical function of human resource management. Recruiting the best employees is the primary function of human resource management. Staffing refers to employing the right people, providing them with the proper training, placing them in the right job, and paying them accordingly and satisfactorily (Dabirian, 2019).

2.3.2.4. HR Controlling

Controlling is also one of the essential functions of HRM. Therefore, HR managers must own the capability and knowledge to control all the matters related to HR. Additionally, it is inevitable for HR managers to decide what should and should not be done while dealing with the organization's employees (Khera & Divya, 2018).

2.3.2.5. HR Directing

Directing is one of the critical functions of HRM. Directing refers to knowledge, discipline, and formal communication with others directing them on what to do and what you expect them to do in an organization. Therefore, HR managers must own the ability to direct their employees; they need this capability to be efficient HR managers. Besides, the HR manager's capability of directing employees can remove any confusion in employees and can clarify the results expected by the management from employees (Zehir, Karaboğa & Başar, 2020).

2.3.3. Human Resources Management Challenges

Human Resource Management (HRM) implies effectively managing the company's operations to maximize employee performance. HRM mainly aims at meeting the employer's strategic goals and objectives. Besides, HRM typically focuses on managing people with competition, emphasizing policies and systems. However, there are some challenges that could affect a Resource Management in an organization. These problems mainly stem from the simple but crucial question of what exactly HRM is. Some HRM scholars argue that the name HRM is somehow repulsive and degrades humans as it makes just another expendable resource (Sharma, 2021).

Additionally, Boon, et al., (2019) argues that managing people in the present context takes work as it could face numerous challenges. Moreover, HRM is expected to face more challenges in the future. HRM's competitive challenges could include globalization, technology, managing change, retaining human capital, responding to market forces, and cost containment. These competitive challenges are associated with employee concerns influenced by diversity, gender issues, age, educational levels, job security, team member rights, work attitudes, family problems, and privacy issues. (Boon, Den Hartog, & Lepak, 2019).

Here are some of the biggest challenges that face effective HRM:

2.3.3.1. Globalization:

Globalization is one of the most complex challenges that heavily pressures business organizations, especially the HRM department. Globalization refers to the increasing trend toward opening foreign markets to investment and international business. As domestic markets are remarkably shrinking nowadays, several business organizations are searching for business opportunities in the global markets to grow

and prosper. Recently, the impact of globalization on business and HRM has become enormous. Consequently, Human Resource Management managers should exert significant efforts to stand up in front of the fierce local and global competition. In addition, HR officials must balance a complicated set of issues related to different cultures, geographies, business practices, and employment laws. In addition, foreigners' diverse cultures and languages could make things more complex. These different cultures and languages make it difficult for HR managers to master foreign workers' required skills and knowledge and the best way to train them. Moreover, HR managers must adjust the compensation plans to ensure equity among the employees posted to different parts of the world.

2.3.3.2. Advancements in Technology

Technological advancements do not stop, and these advancements force business organizations to change how they do their business. Today, both large and small organizations tend to use the internet to do business, which turned e-commerce into a challenge in front of businesses. The work style related to the internet has resulted in virtual offices where people can do their jobs from home or anywhere else. The implication of these technological advancements on HRM is challenging as they increase jobs requiring high skills and reduce the number of jobs that require less skill. Additionally, HR managers do their best to enhance knowledge-based training, increase productivity, lower administrative costs, speed up response times, boost customer service, and improve decision-making (Sharma, 2021).

2.3.3.3. Change Management:

Globalization and advanced technology are the major forces that drive change in organizations and HRM. Today, business success at Farley depends on the organization's capability to manage changes. In a highly competitive business

environment, firms can only be successful when they can develop a vivid culture that keeps moving constantly. In other words, change management is a business organization's core competency. In such an ever-changing business environment, HRM must focus on managing job assignments, responsibilities, and work processes whenever a change occurs. Besides, HR managers must cope with change by bearing the responsibilities of envisioning the future, communicating the vision to the organization's employees, setting clear expectations for performance, and developing the organization's capability of execution through reorganizing people and the other monetary and material resources (Boon, Den Hartog, & Lepak, 2019).

2.3.3.4. Managing Human Capital

Human capital refers to individuals' skills, knowledge, and capabilities that can add economic value to the organization. Managing human capital is crucial for organizations, as when valued employees leave, any investment in their training and development is lost. Therefore, HRM must exert great efforts in managing human capital and retaining it. Effective management of the human component could be the most critical and challenging task for HR managers as all the other monetary, and material resources depend on how effectively the human resource is managed. Besides, HR managers must develop high knowledge, skills, and experience within their workforce (Zehir, Karaboğa & Başı , 2020).

2.3.3.5. Responding to Market Forces

Modern businesses recently faced a highly competitive environment, including national and international competitors. In such a competitive environment, HR managers must respond effectively to the market forces to care for the customers' needs of innovation, variety, responsiveness, and quality. HR managers can use the two important approaches, including total quality management and process

reengineering, to effectively respond to the customers' needs. In addition, HR managers create an environment for change (ASDO & RCL, 2020).

2.3.4. Human Resources Management Theories

Human Resource Management (HRM) is a continuous process that typically deals with management functions, including organizing, planning, controlling, and directing. With the appearance of the concept of 'Human Resources Management (HRM)', it gained wide acceptability and popularity. The many HRM journals and HRM College courses available within a few years could show strong evidence for such acceptability and popularity. Human resource management (HRM) is a required field of study, so several researchers have attempted to formulate a theory to explain Human Resource Management (Mayrhofer, Gooderham, & Brewster).

Here are some of the well-known underpinning human resources management theories that can support policy and practices in any organization (Pillai & Sivathanu, 2020):

2.3.4.1. Frederick Herzberg's Motivation-Hygiene Theory

Historically, managers in any organization have always used motivation as a technique to perform tasks and duties (Al-Alawi D. A., 2005). The motivation-hygiene theory was developed by Frederick Herzberg, the pioneering researcher in the emerging discipline of industrial psychology. The motivation-hygiene theory's founding idea held that more conventional understandings of motivation are the most effective means of inspiring effort. However, Herzberg's theory emphasizes that the variables that eventually encourage men to pursue their careers are not usually the same as those that demoralize them at work, therefore it's important to strike a balance between the two. Theoretically, he named motivators the causes of positive work attitudes and hygiene issues the causes of poor work attitudes.

According to this hypothesis, employees are more likely to work enthusiastically toward organizational goals if they feel their needs are being met.

2.3.4.2. Adams' Equity Theory

Adams' Equity Theory was developed by John Stacey Adams, a workplace and behavioral psychologist. Employees' evaluations and perspectives on their company and job are influenced by several elements, some of which are subtle and difficult to pin down, according to this hypothesis. According to Adams' Equity Theory, workers lose interest in their jobs and companies when they perceive that their efforts are not rewarded enough. This hypothesis predicts that when employees feel this way, they may react in a variety of ways, such as by becoming unmotivated, unhappy, slacking off, or disrupting the workplace. Thus, Adams' Equity Theory considerations must be considered when a firm attempts to boost employee motivation and contentment.

2.3.4.3. Edwin Locke's Goal-setting theory

In the late 1960s, Edwin Locke was the first to propose the philosophy of creating goals. According to this hypothesis, one's own plans to act in pursuit of a goal can be a powerful inspiration to get the job done. In all, goals can help workers focus their efforts and get the job done. According to the notion of goal setting, the bar for performance rises in tandem with the difficulty of the goals. Goals for employees can be established by managers or employers, or they can be created through collaborative effort between managers and employees. Employees that take part in goal planning may be more committed to achieving those goals since they had a hand in crafting them. It is less crucial whomever sets the goal than it is to provide regular feedback on employee performance.

2.4. Human Resources Decision-Making Process

Human resource management is seen by some as an ancillary business function that acts in accordance with decisions made by upper management. Nijjer et al. (2019) suggest that this narrow perspective may have been partially accurate a few years ago. This perspective, however, is no longer mainstream. Decision making is central to human resource positions, and this fact has only recently been recognized by corporations and the HR community. To rephrase what Nijjer, Singh, and Raj (2019) have written, Human Resources is now a business partner. The function of IR has evolved into an essential part of any business, no matter how big or little. Human resources (HR) departments are increasingly valued by all businesses due to their ability to attract and keep talented employees. Furthermore, they recognize HR's contribution to cost savings through reduced turnover.

They have also learned the importance of the employees that HR chooses and recruits to an organization's success. As a result, HR professionals are tasked with maximizing efficiency at a time of increasing demand for qualified labor. In addition, they are answerable for ensuring that workers are content and that all applicable regulations are followed (Brockmann, Schuhbauer, in addition to Hinze 2019).

2.4.1. HR decision-making the definition

Human resource decision making is guaranteed to be one of the most important procedures in any organization by Wicks (2022). In human resources, decision making is "the procedure of determining the most efficient way of investing in staff. This includes making choices about how and where to invest money and other sources to boost organizational effectiveness. Consensus exists that the HR decision-making process must account for the dynamic nature of the global corporate landscape.

2.4.2. Aspects of HR Decision-making Process

Human resources decision making is not a shot in the dark but rather follows a methodical procedure. The HR process of decision-making has been taken more seriously by most businesses, as HR choices are more vital to the success of a company (O'Donovan, 2019).

Several key features of human resource management illustrate the decision-making process and its outcomes:

2.4.2.1. HR decision making Influences all Business Processes

Almost every aspect of a company can be impacted by human resources decisions. The HR decision-making process, however, encompasses the entirety of the people processes.

When the choice made by this department generally span an employee's entire tenure with the company, from spotting talent potential to offering a competitive salary and reviewing their job performance. The HR department's actions also have far-reaching effects on the company's operations. When, for example, a business project in the works calls for expertise that doesn't yet exist, it will be up to HR to draw up a Skills Matrix to help decide whether to train existing employees or bring in outside help. Human resource professionals influence these strategic company decisions (Bernstein, 2017).

2.4.2.2. HR decision making is Connected to Organizational Goals

Human resources choices are always made with the organization's aims in mind. It's unusual in modern businesses for the human resources department to function independently from other departments. The HR department oversees creating the company's overarching objectives, such as the company's metrics against which

employees will be evaluated. A good recognition strategy is one way that human resources may help an organization reach its aim of becoming a market leader (Ajunwa, Warren, & Schultz, 2017).

2.4.2.4. HR decision-making Relies on Internal and External Data

HR In order to make rapid and effective decisions, HR managers rely heavily on market data as well as suggestions and criticism from within the firm. For instance, the size from the jobs, the way jobs are paid, and the difference in pay in contrast to the external market all factor into decisions about compensation increases (Mahmoud, Shawabkeh Salameh, in addition to Al Amro, 2019).

2.4.2.5. HR Decision-Making Challenges

Fix, (2018) ensures that some challenges face the HR decision-making processes in modern organizations. The first of these challenges is that HR managers are forced to deal with many dilemmas when making decisions about their HR practices. Also, HR managers always face situations in which they find it difficult to differentiate between “What is” and “What should be” undertaken through the decision-making process. However, it is a fact that “What is” never explains” What ought to be.” A third challenge is that decisions are not always effective in different situations. One decision can be effective in one situation, while it is not effective in other situations. This confuses HR managers responsible for making effective decisions in critical situations.

Further to the above, HR decision-making faces a drastic challenge: the state of uncertainty that has overwhelmed business environments in the past few years. HR decision-makers think that the consequences of any decision are challenging to predict. In addition, every organization possesses ethical codes that determine how and why decisions are made. These ethical codes may differ in some issues,

especially in times of crisis, the ethical stand of the critics. Decision-makers must be careful about making decisions in these periods since they differ from regular ones. Their consequences could be more predictable too.

Moreover, HR specialists admit that numerous challenges occurred throughout the 21st century for HR decision-makers. These are mostly related to HR decision-making ethicality. Such challenges are only sometimes solved through standard ethical guidelines. For example, restructuring an organization amounts to layoffs. Restructuring is a must to strive in the global environment.

How will it balance against the job loss, capital investment, etc.?

2.5. Applications of Artificial Intelligence in HRM

It is essential to investigate the evolution of the application of artificial intelligence in human resources management to understand the increasing role of AI in turning HRM to be more effective. Albert E., (2019) argues that there have been continuous efforts to enhance organizational optimization by integrating advanced technology in human resource management and decision-making. This paper also assures that the remarkable advancements in Artificial Intelligence (AI) could significantly impact how an organization utilizes its data flow growth and exponential data creation. In addition, AI could affect the management processes adopted to optimize the organization's operations and enhance its efficiency. Eventually, this paper concludes that the specific, measurable, attainable, realistic, and timely adaptation and implementation of Artificial Intelligence (AI) for understanding the organization's initiatives, opportunities, and projects could achieve the organization's optimum development (Albert E., 2019)

Moreover, the effective implementation of Artificial Intelligence could also help in perceiving the skills, competence, ability, capability, maturity, and

potentiality of the organization's human resources that enable them to respond immediately and successfully to all the available opportunities. Such effective response from the organizations' human resources reflects the organization's effective team management and demonstrates the optimization and readiness of the corporate human intellectual capital. Nascimento & Queiroz (2017) argue that adopting artificial intelligence and digitalization in HRM has made the HR processes less complicated. In addition, Artificial Intelligence can transform every aspect of an organization using deep learning technology. Eventually, this research paper concludes that Artificial Intelligence is a system of extreme significance in enhancing the effectiveness of Human Resource Management (Nascimento & Queiroz, 2017).

According to Kamble, (2021), the role of Artificial Intelligence in human resource management decision-making is crucial. Besides, deploying Artificial Intelligence in human resources management can benefit the organization. First, integrating AI and human resource management can enhance the experience of the organization's workforce and candidates. In addition, employing AI can enable the HR department to analyze their resources and skillset and to recommend a training module based on their job roles. Moreover, AI-integrated HR Software can simplify the onboarding process for new hires. Besides, integrating machine learning represented in AI and human resource management can result in a more predictive work environment and an effortless work process.

There are several applications of AI throughout nearly every profession and industry, and human resources management is no exception. According to Kamble, (2021), the interplay between algorithms and data may enable various monitoring techniques to create more transparent and efficient HR processes. It is ensured that Artificial Intelligence has significant applications in the sector of HRM. Among the

numerous applications of AI in the human resources sector, some of the first changes HR professionals should expect to see are recruitment and onboarding, talent acquisition, training and development of team member experience, process improvement, internal mobility, employee retention, analytical decision making, and the automation of administrative tasks (Kamble, 2021).

2.5.1. Artificial Intelligence and Talent Acquisition

AI could play a key role in conducting the talent acquisition process of the HR department. Nawaz, (2020) argues that AI greatly helps the HR team as it can handle numerous mundane tasks, including resume screening, selecting the most appropriate resumes, answering common questions, and scheduling interviews. Moreover, AI helps HR professionals save time from repetitive tasks and focus on more valuable tasks, including HR marketing, sourcing, employee engagement, etc., Nawaz, (2020). The research study of Esch, et al., (2019) reveals that the talent acquired through deploying the AI screening process will eventually hire the most appropriate talent with the most relevant experience and skills that fit the job description. Esch, et al., (2019) confirms that AI chatbots typically interact with capable candidates that match job requirements. In other words, AI helps to make an interview schedule, recruit the best candidate for the job, and enables the HR team to filter the candidate funnel to the most desirable candidates (Esch, Black, & Ferolie, 2019).

2.5.2. Artificial Intelligence with Training and Development

Business organizations require employees to upgrade their skill sets to be in their best form for the job. Artificial Intelligence helps the HR team analyze their resources and skillset for recommending appropriate training courses that suit their job roles. According to Kaplan & Haenlein, (2019), integrating AI in the Human

Resource Management System (HRMS) benefits an organization in training employees in their fields. In addition, AI is highly beneficial in gathering all the required data and helping the HR team decide which training to conduct to improve skills. Kaplan & Haenlein, (2019) ensure that HR leaders can integrate an AI algorithm that can define the career path depending on their skills. Additionally, AI training equips the workforce of an organization with new skills and brushes up their existing knowledge (Kaplan & Haenlein, 2019).

2.5.3. Artificial Intelligence and Onboarding Process

Onboarding plays a crucial role in reducing attrition and enhancing the productivity of the HR department. According to Pillai & Sivathanu, (2020), Artificial intelligence integrated HR Software can be beneficial in simplifying the onboarding process for new hires. AI typically enables the HR team to personalize their onboarding process to suit all the employees in the organization according to their position. Besides, an organization can define and set the algorithm based on its agenda (Pillai & Sivathanu, 2020).

Additionally, the onboarding process starts when the hiring managers find the best fit for their open positions. According to Galanaki, et al., (2019), deploying the integrated HR AI Software has made huge improvements over the onboarding processes of the past, as they have become not restricted to standard business hours. The main reason for this flexibility is that AI technology enables new hires to utilize human resources support at any time and location using chatbots and remote support applications. Galanaki, et al., (2019) concludes that AI technology not only provides employees with the ability to go through the onboarding process at their own pace, but it remarkably reduces the administrative burden and results in faster integration, as well (Galanaki, Lazazzara & Parry, 2019).

2.5.4. Artificial Intelligence and Analytical Decision Making

The HR department is responsible for the overall well-being of employees apart from their work inputs. That department makes data-driven decisions vital to the organization's growth. According to a study by IBM, (2018), HR software with artificial intelligence benefits an organization, especially in making data-driven decisions. Integrating AI with the functions of the HR department helps the HR team understand the employee's mood and decide whether the employees need a break or can continue work. Additionally, AI gauges the employees' anxiety through their voices, enabling the HR team to make efficient decisions and take things under control at the right time (IBM., 2018).

2.5.5. Artificial Intelligence and Administrative Tasks

Deploying HR artificial intelligence software benefits an organization as it can automate numerous administrative tasks. In other words, AI software typically speeds up several administrative tasks, including payroll management, employee engagement, strategies, compliance with company policies, etc. In addition, AI software could be crucial in helping the HR team take strategic action. The research paper of ASDO & RCL, (2020) reveals that the HR team is not responsible for spoon-feeding employees the information they need. Artificial Intelligence chatbots save the time and effort of the HR team as they can manage all the queries of the organization's employees and provide them with the most appropriate solutions. What is more, the HR AI software helps to cut down on unnecessary expenses of an organization. The HR AI software typically revises all the company expenses and purchases and helps the HR team decide whether the expenditure is necessary (ASDO & RCL, 2020).

Additionally, the research paper of Why, (2018) reveals that one of the key benefits of integrating AI software in various human resources processes is conducting repetitive administrative tasks automatically. Automating low-value administrative tasks can save the valuable time of HR professionals and give them more opportunities to contribute more effectively to strategic planning at the organizational level. Why, (2018) also confirms that integrating AI in HR management can automate a substantial number of administrative processes, including the pre-screening of candidates, scheduling interviews, administration of benefits, and many more. Each of these functions is important to the overall success of an organization; however, such processes are generally time-consuming and increase the burden of the HR professionals. Utilizing AI software in performing such administrative tasks can ease the burden of HR professionals and devote their energy and time to more strategic tasks (Why, 2018).

2.5.6. Artificial Intelligence and Business HR Leaders

According to Mariana, et al., (2019), artificial intelligence software is a significant invention for HRM as it can potentially boost employee productivity. Moreover, AI can enable HR leaders to perform and excel. The AI software also helps the HR team gather feedback about the HR leaders. As a result, HR leaders can depend on the gathered feedback in making brave decisions to change their misunderstood perspective. The HR leaders can easily access the data and compare the team performance using AI software. Eventually, that software can enable the HR team to gauge their strategies and decide on the areas that need improvement (Mariana, et al., 2019).

2.5.7. Internal Mobility and Employee Retention with Artificial Intelligence

In addition to the remarkable improvements to numerous HR processes, HR professionals can utilize Artificial Intelligence technology to enhance internal mobility and employee retention within an organization. It is incredibly beneficial for the HR team to understand the overall needs of the organization's employees. According to (IEEE, 2017), deploying Artificial Intelligence technology can provide HR departments with employee recognition systems that enable the HR team to gauge employee engagement and job satisfaction more accurately (IEEE, 2017). Additionally, several HR teams deploy AI software to drive internal mobility by evaluating the key indicators of employee success to identify the organization's employees who should be promoted. The research of (Bhardwaj, et al., 2020) confirms that deploying Artificial Intelligence technology can significantly boost employee retention rates and reduce talent acquisition costs. Moreover, AI technology is not limited to identifying who deserves the promotion opportunity, but it can help the HR team predict who is most likely to quit the organization. Acquiring relevant knowledge about the organization's employees can enable HR professionals to deploy retention efforts, eventually reducing employee attrition (Bhardwaj, Singh, & Kumar, 2020).

2.6. Trends and Opportunities of Artificial Intelligence in Human Resource Management in Bahrain

Artificial Intelligence is a relatively recent field of research; however, it has proven to be of great importance in managing human resources in countries all over the world, and the Kingdom of Bahrain is no exception. Several business experts argue that Bahraini organizations must develop their human resources to cope with the tremendous changes that artificial intelligence will bring to career specializations and the nature of future jobs, especially in the Kingdom of Bahrain (Mahmood, 2018). For example, the research paper of (Hamdan, et al., 2021) assures that

deploying AI technology can create specialized environments for each employee and that AI enables business organizations to improve the imagination of a transformation and to design new technological experiences. Additionally, Hamdan, et al., (2021) concludes that the most critical applications of AI technology are apparent in the HR processes that include recruitment, career path, talent acquisition, training and development, compensations, and performance analysis (Hamdan, et al., 2021).

2.6.1. Artificial Intelligence in Bahrain

Several research papers have attempted to understand the global trend of deploying Artificial Intelligence (AI) in HRM, especially in the Kingdom of Bahrain. For example, the research paper of Fakhro, (2017) reveals that implementing the 2030 vision in the Kingdom of Bahrain has provided the Bahraini public sector with great opportunities to keep up with the digital transformation. As part of its success in implementing the 2030 vision, the Kingdom of Bahrain has reached a fifty-eighth place in Internet speed worldwide. In addition, Bahrain has won the fourth country in the telecommunication infrastructure index (TII). Additionally, the report of ITU has declared that internet users in Bahrain have reached 98% of its population, considered the third internationally. All these success factors have enabled the Kingdom of Bahrain to integrate Artificial Intelligence into the Bahraini public sector (Fakhro, 2017). Due to these brilliant factors, Bahrain has been able to design an ambitious framework that has empowered the government to smooth the digital transformation in a responsible, sustainable, and professional manner. Consequently, Artificial Intelligence (AI) has been integrated with all the different arenas in the Kingdom of Bahrain, including the schools of the future, intelligent universities, smart cities, financial technology zone, Traffic and Road functions,

digitalizing oil and gas sector, Electricity and Water services, and electronic healthcare services (Radhi, 2019).

2.6.2. New Trends and Opportunities of AI in Bahrain

Besides, the research paper of Upadhyay & Khandelwal, (2018) reveals that AI could be the magic formula enabling Bahraini organizations to produce machine learning, predictive analytics, digital wallets, smart contracts, etc. According to Upadhyay & Khandelwal, (2018) it is advisable for Bahraini business organizations that work in an unstable environment to apply Artificial Intelligence (AI) as a fundamental approach that can enable them to accomplish their goals. This study concludes that the sector of HRM is one of the sectors that were remarkably influenced by the new trends and opportunities of AI (Upadhyay & Khandelwal, 2018). Bahrain is a country that encourages innovation and technological transformation.

Here are some of the most remarkable trends and opportunities for deploying AI technologies in the Kingdom of Bahrain:

2.6.3. Bahraini FinTech and AI

According to Fadhul & Hamdan, (2020), FinTech is one of the trends related to AI in the Kingdom of Bahrain. Bahrain owns a fertile ground that has helped the different Bahraini businesses to flourish because Bahrain has excellent infrastructure and nonstop achievements in digital transformation. Such potential abilities have enabled Bahrain to generate an ideal place for innovation, especially in the financial and banking sector. FinTech typically refers to ‘the specialized software developed by experts with specific advanced characteristics and innovative features to be installed on computers and smartphones’ (Fadhul & Hamdan, 2020). In simple words, financial technology is a tool that can simplify actions that may take ages,

reducing the exerted efforts and the expected errors. According to Razzaque & Hamdan, (2020), FinTech Bahrain Bay is the largest platform in the region in Manama. This study concludes that many financial transactions in Bahrain can be autonomously processed through artificial intelligence devices, including payments, online banking, lending, insurance, money transfer, and many more (Razzaque & Hamdan, 2020).

2.6.4. Female Employees' Empowerment and Artificial Intelligence in Bahrain

Bahrain and UAE are in a race to become the leader in FinTech in the Gulf region. To win in such a race, the Central Bank of Bahrain has created and regulated a Sandbox system. According to a study by Al Kurdi, (2021), The Sandbox system typically refers to a virtual space that permits firms to test their FinTech solutions and avoid using them for illegal practices. In the last century, women's labor market involvement has grown significantly (Adel Ismail Al-Alawi, 2016). Additionally, the research paper of Fuad, et al., (2021) clearly states that with the help of AI technology, Bahraini women have presented a significant contribution to the digital age and FinTech, especially in the financial and banking sector. For instance, the Bahraini Researcher Ms. Rana Al Qasim is the first woman to obtain the Postgraduate Certificate in Digital Banking and FinTech in the Kingdom of Bahrain. Besides, women in Bahrain have shown excellence in deploying AI and FinTech solutions as they have occupied several difficult jobs in extraordinary fields such as mechanical engineering, electrical engineering, civil engineering, mechatronics, chemical and maintenance operations, cars technology, and software development (Fuad, et al., 2021).

2.6.5. Artificial Intelligence and HRM in Bahrain

According to Abdeldayem & Aldulaimi, (2020), Artificial Intelligence (AI) has increased organizational productivity and raised the level of staff work because it has reshaped the ways business organizations adopt for managing their workforce and developing their human resource plans. Abdeldayem & Aldulaimi, (2020) confirms that Artificial Intelligence represents a significant breakthrough in business management, and it proved to have a substantial effect on the performance efficiency of organizations' employees, especially the efficiency of the departments of employment and human resources. The study by Abdeldayem & Aldulaimi, (2020) concludes that Artificial intelligence (AI) technologies do have a significant positive impact on the management of human resources (Abdeldayem & Aldulaimi, 2020).

Additionally, the study of Fuad, et al., (2021) confirms that applying Artificial Intelligence in business has influenced several areas, especially HRM, where it has provided endless potential opportunities. The public sector in Bahrain has exerted great efforts to deploy algorithms and artificial intelligence in the HRM processes. The most influential areas of HRM include planned training and development, recruitment and selection, tactical performance appraisal, and the decision-making process. This research paper concludes that implementing algorithms and artificial intelligence in Bahrain has significantly increased public sector organizations' efficiency and offered essential resources to HR planning (Fuad, Al-Hashimi, & Hamdan, 2021).

2.7. Artificial Intelligence in HRM Decision Making

According to Nawaz N., (2019), Artificial Intelligence (AI) has presented numerous opportunities for the HR team to master new skills and gain more free time. Moreover, AI has enabled HR teams to expand their current roles to become strategic ones within their organization. Additionally, several HR professionals assure that the continuous improvement in AI has enabled the HR department to

perform its processes more accessible and faster. According to Chakraborty, et al., (2020), with effective implementation of Artificial intelligence, the HR department can easily carry out their responsibilities and make real-time decisions with the help of pre-built algorithms. Besides, combining the effective implementation of Artificial Intelligence with efficient HRM can provide an organization with a seamless workflow and enhance its ability to make more effective decisions (Chakraborty, Giri, Aich, & Biswas, 2020). In addition, Mesquita, (2018) assures that AI is a breakthrough innovation that shapes real-time decision-making. Mesquita, (2018) assures that the integration of artificial intelligence and HRM has resulted in a more robust representation of HR' 's at the organization's high level of decision-making (Mesquita, 2018).

In line with that, to accomplish the most efficient functioning, Artificial Intelligence needs appropriate data storage and maintenance. According to Suen, et al., (2020), the role of Artificial Intelligence in HRM has become highly crucial. AI can gather and analyze all the necessary data, enabling the HR department to make sound, data-driven decisions. In other words, Ai helps the HR team make sustainable and impactful Data-driven decisions. Moreover, Artificial Intelligence provides managers with more credible information, which results in more assertive decision-making (Suen, Hung & Lin, 2020).

In addition, the research paper of Harris, (2018) reveals that Artificial intelligence has enabled the HR department to carry out their responsibilities with ease. Besides, AI has enabled HR managers to make real-time decisions with the help of pre-built algorithms. Harris, (2018) assures that AI can help with the decision-making process of HR, and it can bring about several benefits to an organization more than just improving the decision-making process of HR. Besides, AI can help an organization improve its employees' overall experience and increase

its revenues. Eventually, this paper concludes that combining artificial intelligence and HR development can result in more effective decisions and can provide a better workflow. According to (Harris, 2018), there are numerous impacts of Artificial Intelligence on the HRM decision-making process.

Here are some of these impacts:

2.7.1. Artificial Intelligence-Based Recruiting

The HR department of any organization has numerous tasks and responsibilities. Hiring new employees and talent acquisition could be their most serious and time-consuming responsibilities. However, business organizations that effectively implement Artificial Intelligence in their HRM can do these complex processes easier and faster. Recruitment is the area of HR where algorithm-based HR decision-making techniques have proved particularly significant. Several well-known organizations have already integrated AI technology into their recruiting efforts. Nawaz, (2020) argues that these organizations have realized that there are tremendous opportunities for HR professionals to adapt their recruiting processes and reap the great benefits of using AI technology.

Additionally, they have recognized that implementing Artificial Intelligence can remarkably reduce the time the HR team spends hiring new employees via several tasks, such as scheduling interviews, screening the candidates, attending to job seekers' queries, etc (Nawaz, 2020). According to Pillai & Sivathanu, (2020), the HR team usually deploys Artificial Intelligence technology in their recruitment process not only to benefit the hiring organization but also the job applicants. In addition, Pillai & Sivathanu, (2020) ensure that AI technology can streamline application processes by designing user-friendly application forms that make a job applicant more likely to complete. AI can enable the HR department to make better

assessments by performing a screening process focusing on the candidate's relevant job qualifications. Besides, Artificial Intelligence can guarantee that the decisions of the HR team are free from any human bias and discrimination by gathering the applicants' data and comparing it with other applications, making the screening process more effective. AI has provided the HR team with more straightforward and meaningful applications (Pillai & Sivathanu, 2020).

In addition, the approach of integrating AI into HR recruitment has made the HR department's role much more manageable. According to Nicastro, (2018), deploying Artificial Intelligence technology has played an important role in candidate rediscovery. By maintaining a permanent database of past applicants, deploying AI technology in the HR processes can analyze the existing applicants on the database and identify those suitable for the new roles. In other words, the HR team can use AI technology to identify qualified employees more quickly and efficiently than ever (Nicastro, 2018).

2.7.2. Learning and Training with Artificial Intelligence

Artificial Intelligence could significantly transform and enhance human resource management through teaching and training employees. Moreover, the HR teams can deploy AI to assess employees' skills. After analyzing the activities of employees, the AI system can suggest and recommend the appropriate learning programs to help them improve. In addition, Artificial Intelligence can enable the HR team to formulate individualized learning plans on interactive e-learning platforms. In other words, AI learning and training programs can provide the organization's employees with the necessary personalization level.

2.7.3. Artificial Intelligence-Based Conversational Assistants

Artificial Intelligence enables the HR team to use intelligent conversational assistants to interact more effectively with applicants and employees. According to Markopoulos, et al., (2019), AI-powered conversational assistants can improve the quality of interaction by deploying Natural Language Processing and Machine Learning that delivers meaningful responses in seconds. Moreover, the department of HR uses AI-powered conversational assistants to analyze conversations and identify their employees' needs. Markopoulos, et al., (2019) confirm that when the HR team identifies the employees' needs, they can easily take action and show that they value them. In other words, implementing AI can enable the HR team to reduce employee turnover and boost employee engagement with the organization. Furthermore, conversational AI assistants are easy to use, deploy, and implement (Markopoulos, Kirane, Balaj, & Vanharanta, 2019).

2.7.4. Artificial Intelligence and Effective Decision-making

Artificial Intelligence has become significant in the decision-making process of the HR department as it typically reduces human bias. Besides, AI can enable the organization's individuals to make quick decisions in their daily lives. According to Baldegger, et al., (2017), deploying AI for observing and analyzing the activities of each employee can enable the HR team to gain more insights about the employees. In addition, AI can help the HR team understand the employees and their behaviors more, enabling them to predict how the employees are likely to make decisions in the future (Baldegger, et al., 2017).

2.7.5. Artificial Intelligence and Administrative Tasks

Thelwall, (2018), deploying Artificial Intelligence could benefit the HR team as it can save their time and effort by automating several repetitive administrative

tasks. It saves the HR team from completing time-consuming tasks and improves efficiency. Furthermore, automating the repetitive administrative tasks enables the HR employees to reduce the workforce and focus on other, more valuable tasks. Moreover, reducing the workforce of the HR team can help the organization decrease its operational costs (Thelwall, 2018). Some administrative tasks the HR department can automate include HR Support, Payroll, and Records Management.

2.8. Algorithm-Based Decision-Making

Algorithm systems are relatively new, yet they play an increasingly important role in helping with decision-making. To conclude correlations or generate data which could be beneficial for making judgments, statistical decision systems (ADS) often rely on the analysis of enormous volumes of personal data. Randstad (2020) claims that ADS have a large impact on people's lives and may be seen in a variety of contexts, including but not limited to: job opportunities, credit decisions, sentencing in the legal system, healthcare decisions, and more. A few ethical, scientific legal, and political concerns are raised, however, by the growing reliance on ADS to sway people's judgments in such crucial areas. Researchers in the field of artificial intelligence must, therefore, make significant efforts to thoroughly address and understand ADS (Randstad, 2020).

Several academics and researchers have spent much time and effort trying to learn how technology affects the choices we make. For instance, Lee's (2018) study shows that in modern businesses, the use of algorithms for human resources decisions is an unstoppable force. Human error in decision-making can lead to prejudice, a loss of individual agency, and unequal treatment. As a result, algorithmic decision-making requires increased human involvement. In addition, it guarantees that businesses have received credible responses from algorithm-based

HR decision-making, allowing them to establish norms, objectives, punishments, and incentives.

In addition, Lee (2018) finds that algorithm-based the decision-making process heavily influences and perhaps replaces human decisions in commercial organizations. According to Beer (2017), tech companies believe that algorithm-based HR decisions is more objective, fair, and accurate than human intuition. They guarantee that algorithmic decisions are more objective and less prejudiced than those made by humans, and that the ensuing solutions can help businesses triumph in the battle for top talent. Furthermore, it has been shown that algorithm-based HR decision-making strategies can aid in the automation of labor-intensive activities (Beer, 2017).

In addition, the research paper by Kaushal & et al., (2021), whose primary goal is to clarify how AI has been incorporated into the primary HR activities, guarantees that ignoring algorithm-based HR decision-making will deprive businesses of several anticipated benefits. Risks to people, businesses, the economy, and society at large can result from ignoring algorithm-based HR decision-making (Kaushal & et al., 2021). However, Tutt's (2017) study suggests there may be constraints and risks associated with installing the ADS. These dangers may be deliberate, unintentional, or the result of mistakes or inaccuracies in the ADS.

Tutt's (2017) research confirms the dangers of relying on algorithm-based HR tools for decision-making for a variety of reasons. Accountability is an extremely fundamental criterion for protecting individuals, and this study finds the fact that openness could be the golden potion for overcoming the hazards of algorithm-based HR systems for decision-making According to Kitchin's (2017) research, it's possible that ensuring security, fairness, and dependability in algorithm-based HR systems for decision-making may benefit from greater levels of transparency.

Finally, this paper suggests that organizations are strongly necessary to take advantage of the great potential of ADS and to modify its drawbacks and dangers (Kitchin, 2017), and that transparency is essential in decreasing expected risks related to relying from algorithm-based HR decision-making processes.

2.8.1. A Brief History of Algorithm-Based HR Decision-Making

Philosophers like Bentham's and Adam Smith can be seen as the originators of the movement to collect data on employees and increase workplace transparency. At the dawn of the 20th century, management thinker Frederick Taylor allegedly performed his productivity tests with the premise that workers must be seen because unobserved workers are unproductive. This is according to Kaushal et al. (2020). As a result of these tests, it is now necessary to keep an eye on how hard employees are working around the clock. Following this, Ball and Margulis coined the phrases "workplace monitoring" and "workplace surveillance" to describe the practice of collecting and analyzing information about workers' behaviors for managerial purposes (Kaushal, Kaurav, Sivathanu, & Kaushik, the year 2020).

According to Lowrie (2017), the launch of electronic tracking of performance in the late 20th century was a major step toward adopting algorithm-based HR decision-making. When it comes to monitoring things like task performance, adherence to corporate standards, and workers' job-related conduct, Lowrie (2017) guarantees that computerized performance monitoring is often a step towards standardizing jobs. In addition, Lowrie (2017) explains that electronic performance monitoring often encompasses a wide range of monitoring techniques, including internet, video, audio, and GPS-based observation of workers at work. 2017).

There are three ways in which the modern uses of algorithm-based the hiring process differ from conventional electronic monitoring, as argued by Norikumo

(2019). First, the algorithm-based decision-making tools of today may track extra-workplace activities including employee participation and wellness. Keystrokes, electronic calendars, browser histories, and location information acquired from handheld devices and fitness wristbands are just some of the various data kinds that can be utilized by these systems (Norikumo, 2019). In addition, utilizing video-based facial recognition algorithms or email content analysis, these solutions can help businesses track employees' emotional states. Second, data from multiple sources can be integrated into algorithm-based HR decision-making tools. According to research by Frisk and Bannister (2017), industry leaders like IBM, SAP, and Oracle can provide integrated people administration packages for gathering data from a wide variety of sources and databases. Third, the technological capacity of modern algorithm-based HR decision-making systems to analyze employee performance data is high (Frisk & Bannister, 2017).

2.8.2. Ethicality of AI in HRM Decision Making

The subject of Human Resources Management (HRM) will continue to evolve thanks to advances in artificial intelligence technology, but HR practitioners should be wary of the ethical complications that may arise from doing so. Algorithm-based HR decision-making, as stated by Shilton & Anderson (2017), has the potential to help the HR department keep tabs on employees more closely, but it also presents certain ethical challenges. One of the most prominent barriers that prevents the widespread adoption of AI in the workplace is the concern for data security and privacy. AI decision-making in HRM can leverage private data to generate actionable insights. According to a recent survey (Shilton & Anderson, 2017), 91% of respondents said they wanted their employers to protect and respect their personal information. According to Martin's (2018) study, HR practitioners should be more cognizant of ethical and privacy problems related to the deployment of AI

technology and should seek approval before employing such technology to collect information about the organization's personnel. Martin (2018) argues that it is crucial for IT companies to make artificial intelligence (AI) software more user-friendly and secure. HR managers need to take into mind the right security measures to make businesses feel more secure from data breaches (Martin, 2018).

Human resource managers also need to be aware of how AI is changing HRM. However, incorporating AI into the HRM decision-making process may face some obstacles that make it harder to keep up with the rapid technological advancements that occur. Efficiency-driven philosophy of algorithm-based human resources decision-making presents a challenging challenge, as shown in the study by Noble, (2018). The risk that it could make compliance a higher priority than protecting employees' integrity represents this difficulty (Noble, 2018). Algorithm-based decision-making threatens the delicate balance between legitimacy and integrity, as stated by Sheila et al. (2018).

Furthermore, when black box technologies took over making decisions, the discursive culture of a company is put in jeopardy. Sheila et al. (2018) adds that human interaction is often preferred over machine interaction in the workplace. Consequently, HR professionals must be ready to address these ethical problems by keeping up with the rapidly developing trends and technologies (Sheila, Steven Chad, & Mayank, 2018).

Algorithm-based HR decision-making for tracking employees overseeing increasingly popular as it is more efficient and objective (Leicht-Deobald & al., 2019). However, a serious ethical concern threatens to derail this trend. An ethical problem arises from the possibility that algorithm-based HR decisions will tip the scales in favor of compliance at the expense of employees' integrity. Furthermore, (2019) guarantees of dependence on algorithm-based HR choices could increase

blind reliance on rules and operations, which could eventually diminish the role for human comprehension in the decision-making process. According to the findings of this study, algorithms limit employees' sense of autonomy and display a deficiency in moral imagination (Leicht-Deobald et al., 2019).

However, it is difficult for HR managers to put in place algorithm-based decision-making in human resources in ways that do not harm employees' integrity, as stated by Leclercq-Vandelannoitte (2017). Algorithm-based HR making decisions is advantageous because it decreases particularism, provides options that address the talent shortages enables fact-based decision-making processes, and increases efficiency. Proponents of algorithm-based decisions, according to Leclercq-Vandelannoitte (2017), wrongly presume that algorithms are either objective or fair. Algorithm-based decision-making has been the subject of numerous conversations, with many of those talks centering on concerns of objectivity (Leclercq-Vandelannoitte, 2017). Furthermore, the viewpoint of the people who create and fund HR algorithms is implicit in the decisions they make. Devlin (2017) found that the most common algorithmic code mirrors the cultural background of its creator, suggesting that some racial and gender preconceptions may persist in algorithm-based HR decision-making. As a result, HR decision-making that relies on algorithms is often shrouded in secrecy because it depends on off proprietary code that IT companies are reluctant to disclose. Due to the lack of disclosure, it may be challenging for human resources managers to spot biases in an algorithm's programming or in the information it uses to make decisions (Devlin, 2017).

Recruitment and performance evaluations made by the HR department utilizing algorithm-based HR decision-making are more unlikely to be fair and trustworthy, according to research by Khalifa et al. (2022). The use of algorithms to make decisions has the potential to be more emotionally charged than human

decision-making. Also, Khalifa et al. (2022) affirm that the complicated link between data, analytical tools, and personal sense-making makes it more than just a technical difficulty to integrate algorithm-based HR instruments for decision making into both official and informal decision-making processes. However, trusting analytics algorithms to make sense of data may strain human cognition. There is a growing trend in organizations to use algorithm-based HR decision-making tools, which can put individuals under pressure to place more faith in the objectivity and superiority of the algorithms' judgments than in their own unique set of human abilities like emotion, intuition, and logic (Khalifa, Al Baz, & Muttar, 2022).

2.9. Theoretical Framework

During the past few years, human resource management has undergone incredible changes (Berhil, Benlahmar, and the Laban, which is 2020). The increasing impact of diversification challenges on strategic choices to be made processes of HR in contemporary firms is largely responsible for the HR industry's rapid evolution. Human resource procedures that have been made possible by AI have undergone the most dramatic changes. Artificial intelligence (AI) enabled human resource strategies to have focused on HR data analytics (Jatoba, et al., 2019, among others).

According to Chwastek (2017), HR's use of AI has always had one primary goal: to improve processes like hiring and screening. HR professionals can use AI tools to help their companies unearth untapped potential. Screening applications, automating tasks tools, and chatbots were the most common types of AI applications used by HR professionals during the recruitment and selection processes (Albert, 2019). According to two recent studies (Cresswell, 2018; when Leong, 2018), incorporating AI into the recruiting and hiring procedures increases the likelihood that HR will gather and process the necessary data in a more effective and quick

manner, allowing them to objectively select the necessary talents yet resolving the unconscious bias that often plagues such processes. According to Preuss (2018), HR professionals can gain a more complete picture of an organization's workforce and its needs by incorporating AI into their work, particularly in information analytics process.

Niehueser According to Niehueser & Boak (2020), the HR the decision-making process is one of the most common difficulties encountered by HR professionals in both public and commercial enterprises. Human resources decisions involve things like hiring new employees, providing them with on-the-job training, determining whether they are a good fit for an open position, and determining their pay and other perks. Human resources professionals are shifting toward the use of human assets data analysis to completely transform the functions mentioned previously (Berhil, Benlahmar, as well as Laban, however, 2020). This allows HR to make better use of employee databases, which in turn leads to better decisions and enhanced operational performance.

One of the many, if not the most, efficient solutions to HR problems with data analytics is artificial intelligence, which is based on "machine learning" technology. Algorithm-based human resources decision making is one potential answer (Leicht-Deobald, et al., and others, 2019). Human resources have access to a plethora of AI tools designed to improve their judgment. Berhil, Benlahmar, as well as Laban, a (2020) report that Decision Tree is used by HR professionals 30% of the time, followed by Support Vector Machines (SVM) and Random Forest at 17%, Logistic Regression at 15%, K-Nearest Neighbor (KNN) at 11%, Multi-Layer Perceptron (MPL) at 4%, C 4.5, and Naive Bayes at 2%. Most of these algorithms, along with many others, fall into one of three general classes: Algorithms can be broken down into three categories: those that describe data, those that predict data, and those that

prescribe data (Leicht-Deobald et al., 2019 at Ananny and Crawford, 2018; Mohammed, 2020). The following philosophical framework (figure 1) is proposed for this study based on the preceding discussion. 1).

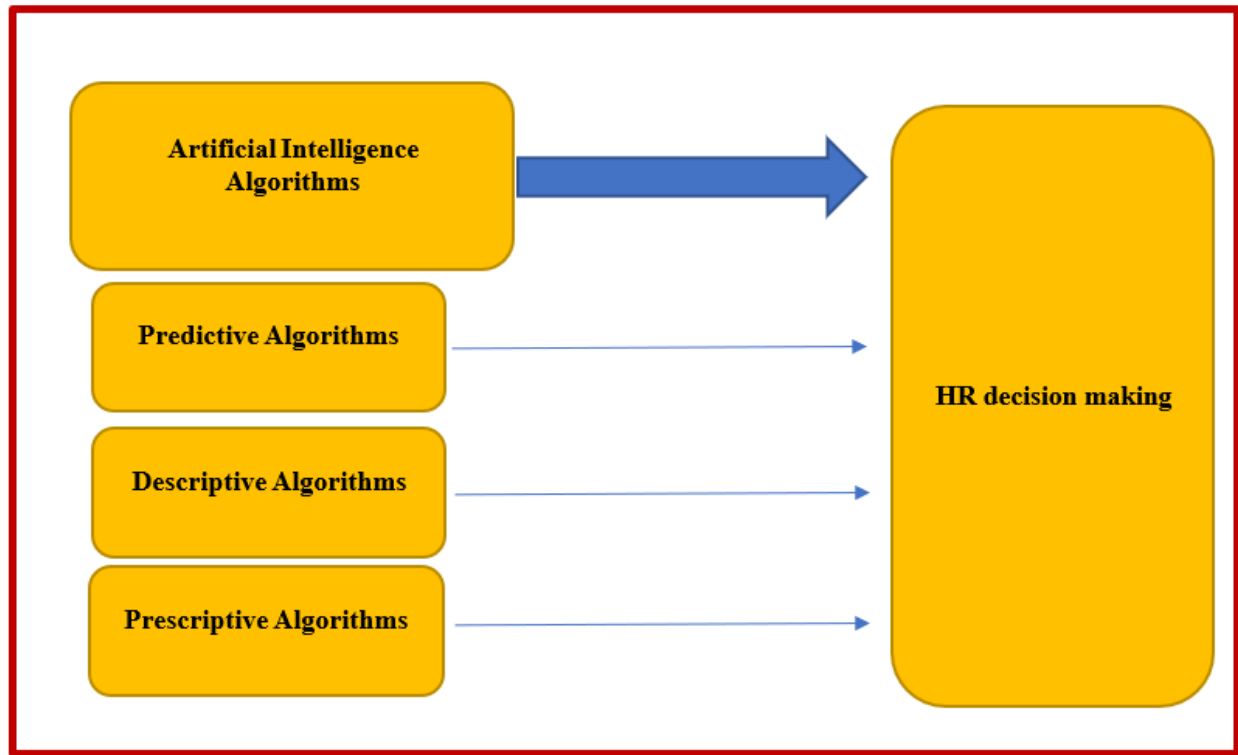


Figure 1 Theoretical framework

2.10. Conclusion:

In this chapter, the researcher conducted an extensive literature review of the available literature that addressed the two variables and the relationship between them. The researcher concentrated on moving smoothly between these variables. The beginning was with Artificial intelligence as the independent variable. In this opening section, there are definitions for AI, its introduction, and the theories explaining AI. Artificial Intelligence implementation was then listed. These included descriptive algorithms, predictive algorithms, and prescriptive algorithms. This was

followed by explaining what human resources management is, what functions it undertakes, and what challenges it confronts. The researcher moved to cast light on HR decision-making through definitions and challenges. Artificial intelligence applications in HRM were a pivotal component of this chapter. Then the researcher explained the trends and opportunities of artificial intelligence in human resource management in Bahrain. Algorithm-Based HR Decision-Making was also pivotal in discussions in this chapter.

Chapter Three: Research Methodology

Chapter Three: Research Methodology

3.1. Introduction

This chapter discusses the methodological approach the researcher used in carrying out this research. In other words, this chapter presents the methodological method used in this research, which the researcher has chosen because it is appropriate for both the aim and the nature of this researcher. The researcher has come to decide the methodological approach used in the research after the deliberate investigation of the previous studies that explored the topic of this research. The choice of the appropriate methodological approach is of great importance to the fulfillment of any academic study. This process of choosing the methodical approach of the research should be carried out cleverly to satisfy the research requirements.

In addition, it would enable the researcher to accomplish the objectives of the research and to get answers to the research questions, as well. Furthermore, this chapter concentrates on introducing the research philosophy. It also overviews the research tools that the researcher has decided to use to help in obtaining answers for the research questions that were formerly formulated in the first chapter of this research.

This chapter also sheds light on the sampling technique that the researcher used to select the sample respondents. Besides, the researcher discusses the study population of the research and the study sample selected to give their responses to the items of the questionnaire that the researcher devised to achieve its objectives. This questionnaire represents the research instrument used to collect the primary data for this research purpose in relation to "The Significance of Artificial Intelligence in the Human Resources Decision-Making Process: The case of the

Ministry of Works, Municipality Affairs and Urban Planning in Bahrain". The researcher divided the questionnaire form into two main parts. The first part covers the demographic data of the sample respondents such as gender, age, education, years of experience, position, and nationality. The second part is divided into two sections, with 36 items covering the questions and objectives of the research. Moreover, the chapter presents the components of the questionnaire sections. Finally, this chapter overviews the validity and reliability of the questionnaire items with some statistical descriptions and their measurement.

3.2. Research philosophy:

By "research philosophy," we mean the underlying assumptions, norms, and guidelines that shape how scholars in each field approach and conduct their studies. Research philosophy examines the origin, nature, and progression of knowledge (Bajpal N, 2011) . Additionally, the methodology of study that is adopted "directs the angle that helps researcher formulate inquiries, plan how the problem may be investigated, select the design of the study, as well as identify which approaches are used and how knowledge is collected, analyzed, or interpreted" (Praiwan, 2013).

The positivist worldview provided the inspiration for the researcher to use a quantitative methodology in this study. This positivist framework places an emphasis on scientific objectivity, deductive reasoning, and predictive ability. That "there is only one reality, which exists et can be validated using all senses," that "knowledge may be described and explored using meticulous examination of the event of interest," and so on constitutes the ontological assumption in this chain. All human conduct is seen as objective, meaningful, and observable by researchers (Sukpiti, 2009). Studying research hypotheses or issues that acknowledge the presence or characteristic of the notion, and testing the association and a relationship, examining connections between causes and effects among factors and testing the

interference efficacy, are all part of this. To this end, it is important that the researcher not participate in the study, so that factors like skepticism and personal values don't skew the results (Creswell, 2012). Instead, the researcher should develop an analysis tool or tool that can measure the phenomenon under study. This strategy centers on "numerical gathering of data then underwent statistical analysis," which guides the investigation. With quantitative studies, "the focus or perspective is typically succinct and accurate, meaning that the entire thing cannot be studied, but will be cut down into parts in order to examine the parts" (Ahuja, 2010). More than that, "quantitative work requires supervision in order to recognize the problem and care to reduce the influence of extraneous or unrelated variables that have nothing to do with the focus of the investigations" (Ary, the previous year). To ensure whether the study's findings and results accurately reflect reality, control, tool, including statistical evaluations are employed. According to Roni and Margaret (2020), this would allow the researcher to extrapolate their findings.

3.3. Research approach (Quantitative):

The researcher has chosen to use a quantitative methodology. Quantitative research aims to produce knowledge and enhance comprehension of the social world (Allen, 2017). It is well suited to the study's topic: determining how AI algorithms have affected human resources decision-making at Bahrain's the Ministries of Works, Municipality Affairs, and Urban Planning. The goals of this study lend themselves well to a quantitative methodology. The researcher's decision to utilize a descriptive and exploratory studies design indicates that a quantitative method is most suitable for this study. This study's focus on relationships makes it ideally suited for a quantitative methodology.

The quantitative method has been defined by a few researchers and academics in the published literature. There are many different interpretations, yet none that

adequately capture its complexity. On the other hand, the quantitative method has been defined as "the recently methodical empirical examination of apparent events via statistical, mathematical, or computing techniques" (Popal, 2015). "Clarifying occurrences by collecting numerical information can be analyzed using computational methods" (Randolph, 2009) is how some other researchers characterize it. Research in this area is known as "empirical social science," and it is described as "a social science that uses empirical approaches and empirical claims" (Richards, J. C., and Schmidt, for example, 2003).

Several areas of study in the natural and social sciences frequently employ the quantitative method. Because the quantitative method places such emphasis on collecting numerical data and information regarding the phenomenon under study or the interaction between the many research variables, this term is often employed in this context. After collecting this information, researchers use any available method of statistical analysis to draw conclusions. It is via this process of analyzing the raw data that is acquired that the relationship across the research variables is determined (McMaster & Cooking and 2019). This connection between research variables is the Holy Grail of academic inquiry. Using this methodological choice, the researcher can examine the role of AI in the Human Resources Choice Process at the Bahraini Ministries of Works, Municipal Affairs, and Urban Planning. This allows the researcher to learn how AI algorithms impact human resources decisions at Bahrain's Ministry of Works, Municipal Affairs, and Urban Planning.

In addition to the previously mentioned reason for choosing the quantitative approach in this research, some other reasons made the researcher decide to utilize the quantitative approach. First, the quantitative approach allows objective and reliable outcomes from the gathered data. Second, the obtained results can be generalized authentically due to their statistic numeric nature. Third, this quantitative

approach allows the researcher to test the research hypotheses to decide which to accept and which to reject (Boeren, 2018). Fourth, the research sample selected for the research purposes can highly represent the entire research population. Lastly, the usage of the quantitative approach enables researchers to minimize the researchers' subjectivity.

3.4. Research Design (Descriptive):

Research Design is like a blueprint specifically created in order to answer the questions of the research and to control the variance (Dulock, 1993). From the theoretical point of view, the research design refers to the layout, organization, or structure that researchers follow so that they can build and carry out their studies. In literature, the research design is defined as "The framework that has been created to seek answers to research questions" (Creswell, 2012). It allows the researcher to decide upon the research type they can go to when they are conducting their research. Besides, the accurate selection and employment of the research design enable the researcher to organize the research body correctly. This includes appropriately formulating the research objectives, questions, hypotheses, and variables and "using methods of data collection and research instruments for collecting data, as well as carrying out the statistical analysis correctly" (Vaus, 2011).

This research falls in the category of descriptive research since it seeks to explore the significance of artificial intelligence in the Human Resources Decision Making Process in the Ministry of Works, Municipality Affairs, and Urban Planning in Bahrain. Consequently, the researcher has decided to use the quantitative approach. This quantitative approach allows the researcher to follow specific steps in the research. These planned steps result in reaching the statistical numeric data. This data can be interpreted descriptively. Therefore, the quantitative approach

focuses on "the research method, hypotheses, objectives, in addition to the methods used to collect data and its analysis to reach the study results" (Kothari, 2010).

The researcher employed the two research design types, mainly the descriptive and exploratory types. The exploitation of the exploratory type is to recognize and represent the research problem inspected in the research. This type of research concentrates on examining, reviewing, and collecting themes, ideas, concepts, information, theories, and prior studies associated with the research topic. Exploratory research aims to shed light on and comprehend the issue that the researcher is grappling with (Surbhi S, 2017). Consequently, it allows the researcher to develop perfect concepts, establish the significance of ideas and produce operational, academic definitions of the various terms and concepts related to the research variables. It enhances the overall scheme and organization of the research. To do this kind of exploratory research, different methods are used. These methods include reviewing the significantly related literature, the experience survey, and examining concepts and ideas created in the literature review. Generally, this exploratory research guides and directs the researcher to be able to choose suitable instruments and methods for gathering the prerequisite data for the research (Shields & Rangarjan, 2013).

To sum it up, the descriptive approach is conclusive because of its quantitative nature. Therefore, it is used in the research design and structure so that the researcher can statistically infer the data and information collected. In other words, descriptive research focuses mainly on the "development and formation of the research objectives, methods used for data collection, selection of the sample, processing, and analyzing the data collected, and then describing and reporting the results" (Ahuja, 2010). Generally, the descriptive research seeks to reach accurate, comprehensive data for the research. It uses different methods such as the "quantitative analysis of

primary data, questionnaires, and survey usage, observations, interviews, etc. The employment of descriptive research paves the way for researchers to reach the hoped results of their research" (Mustafa, 2010).

3.5. Research Conceptual model

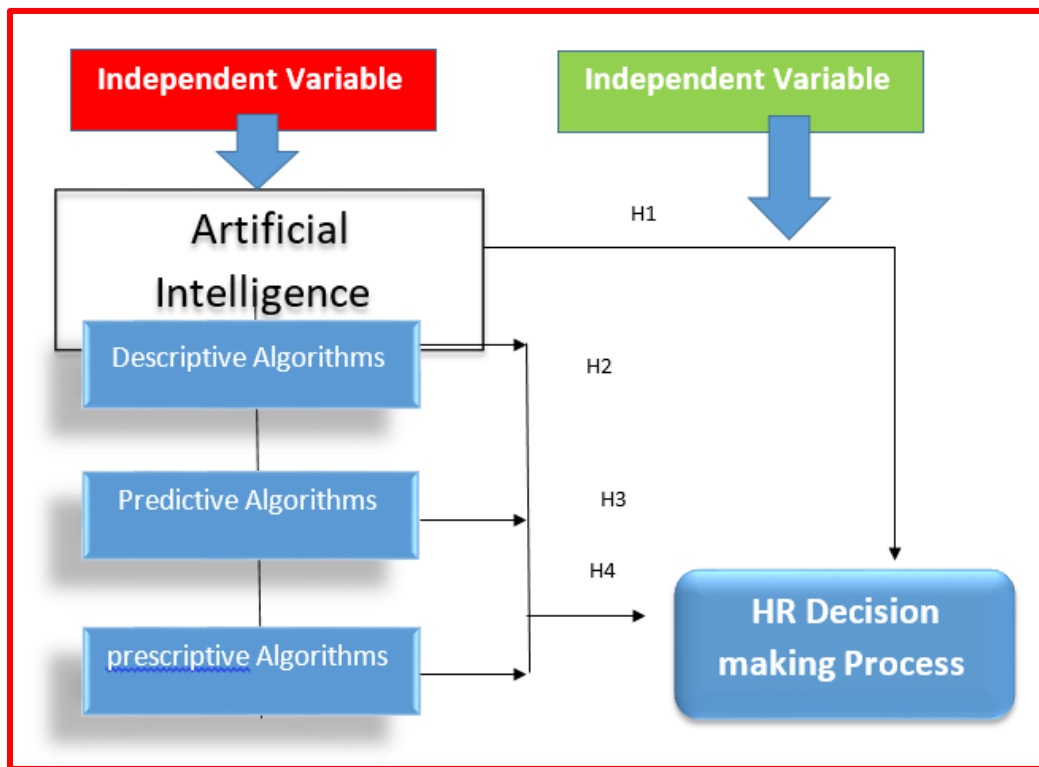


Figure 2 Research Conceptual model (Devised by the researcher)

This research is entitled "The Significance of Artificial Intelligence in the Human Resources Decision-Making Process: The case of the Ministry of Works, Municipality Affairs and Urban Planning in Bahrain"; therefore, there are two research variables in this present research. Consequently, the research variables could be identified in the following way:

1. The independent variable: "Artificial intelligence" stands in for the independent variable in this study. Artificial intelligence is "the method that enables machines do actions that would require wisdom if carried out by man" (Schmidhuber, the year 2015).

The independent variable, AI, is broken down into three sub variables. Here are the three components at play: (a) Descriptive algorithms, or "the techniques used to analyze what occurred in the past and how it impacts the present" (Souza, 2014).

In contrast, (b) predictive algorithms are "the programs used to forecast that could have been the result from particular past- and real-time observations on prospective outcomes" (Krumeich, Werth, & Loos, however 2016).

(c) "Prescriptive algorithms" are "the algorithms used to specify what must be performed in light of the various probable scenarios." They go beyond simple prediction by outlining potential courses of action and showing how those choices would play out in various scenarios (Burrell, 2016).

2. The dependent variable: HR policymaking incorporates the dependent variable into consideration. Investing in people in the most productive ways is the goal of human resources decision making. It's the process of deciding how to allocate funds such that "business and the performance of team members are maximized" (Berhil, Benlahmar, as well as Laban, a 2020).

3.6. Research Hypotheses:

Human resources decisions made by the Ministry of the Environment of Functions, Municipal Affairs, and urban development in Bahrain are significantly impacted by the implementation of AI algorithms, H1.

A major impact may be seen when descriptive algorithms are used to human resources decisions at the government's Ministry of operates, Municipal Affairs, the Urban Planning in Bahraini (H2).

Predictive algorithms have a considerable impact on human resources decisions in Bahrain's Ministry of Works, Municipalities Affairs, and Urban Planning (H3).

Human resources (HR) decisions made by the umbrella of the ministry of Works, City Affairs, and Urban Development in Bahrain are significantly impacted using prescriptive algorithms, H4.

3.7. Data collection method

The data collection process is critical to the accomplishment of the research. Data collection is crucial to research because it gives the knowledge needed to examine relationships, study phenomena, test hypotheses, and come to meaningful conclusions (Deeraj, n.d). The researcher has used two key data collection sources to collect the essential data and information for this research. These two sources are "secondary and primary sources" for gathering data. Primary data are facts and details gathered especially for the investigation at hand (Rabianski, 2003).The utilization of these two data sources comes in harmony with the research's quantitative nature. Undoubtedly, the nature of the research, which has both an empirical part and a descriptive part, makes it necessary for the researcher to benefit from the two sources of collecting data to accomplish the research objective (Jackson, 2009).

3.7.1. Secondary Data Sources:

Secondary data is gathered for different reasons than primary data, which is gathered to find a solution to the current issue(Ajayi, 2017). The secondary data sources are

essential to any researcher's academic research. Usually, the usage of secondary data sources appears intensively in the literature review section in chapter two of most of the research. The secondary data sources represent the formerly reached and obtained data by preceding researchers while conducting their academic studies (Ajayi, 2017). This data type comes from many resources, including "theses, studies, journal articles, government publications, websites, books, internal records, etc.". (Ajayi, 2017). This data or information enables the researcher to get an overall outlook about what has been reached in the topic of his/her research. This includes relevant theories, concepts, and definitions, in addition to prior studies exploring the same variables of the new research. The information obtained from secondary sources is really of excellent value to any researcher while carrying out new research.

3.7.2. Primary Data sources:

The primary data represents the new data, information, or facts researchers reach when doing their research. This type of data is novel. Researchers can get or obtain this new data by employing different tools for collecting data. These tools or instruments include "the questionnaire, interview, or observation. The most widely used to collect this primary data is the questionnaire form" (Sparrow, 2015). The questionnaire form is one of the most widely used research instruments to collect new data. When doing research, and after selecting the research sample, researchers devise a self-constructed questionnaire. This questionnaire covers the research objectives, questions, and hypotheses. The researchers distribute it to the chosen research sample, where they respond to the questions and items included. After that, researchers decode and analyze the collected data so that they can reach the results of their research. These results enable them to test the hypotheses and find answers to the research questions. Thus, they can achieve the objectives of their research.

This analyzed data and results usually come in the part, section, or chapter allocated to the empirical part of the research (Oppenheim, 2011)

Utilizing both sources of gathering data allows the researcher to finalize the academic research with the appropriate context of the relevant data reached over the literature review investigation. This is side by side with strengthening the results obtained by comparing them with those obtained by previous researchers concerning the topic investigated (Charles & Mertler, 2000).

3.8. Research population

"Study population" is shorthand for "the entire group researchers have want to determine" (Bhandari, 2020). "a group of people selected from the population as a whole whose share a shared trait, such as age, gender, interest, etc" (Sekaran, 2013) is another definition. Research populations tend to be very sizable, making it challenging to investigate and account for every relevant aspect of the population. Therefore, researchers use a smaller subset of this massive population, known as a sample (Holliday, 2007). The sample used in the study should be typical of the full population, with "the same qualities of the enormous number of people that allow researchers to carry conduct their research utilizing it within the context of the full community" (Bryman, 2008).

All current and former employees of Bahrain's Ministries of Works, City Affairs, & Urban Planning constitute the study's population. In other words, people consist of anybody who has an interest in or is affected by the subject matter. Human Resources at Bahrain's Ministry of is Effective, Municipality Affairs, along with Urban Planning employs a total of seventy people.

3.9. Sampling Technique

A researcher uses sampling as a technique to systematically choose a smaller group of representative objects or people from a pre-defined population to act as subjects for observation or experimentation in accordance with the goals of the study (Sharma, 2017). The sampling technique that the researcher selects is convenience sampling. Convenience sampling is "a non-probability sampling method, that is a non-numeric method, where the research relies on personal judgment when selecting the population members to partake in the study" (Casula, et al., 2020). The sample individuals are selected as they are convenient for the research. The sample is selected conveniently from the Ministry of Works, Municipality Affairs, and Urban Planning in Bahrain.

3.9. Research Sample:

Successful research relies heavily on selecting representative samples of the population of interest. It's crucial since the researcher can't hope to get the solutions to the inquiries without the participants' responses to the questionnaire. A "study sample" is "a limited (but hopefully representative) number of units from a population utilized to determine truths regarding the population" (Field, 2005). Additionally, it stands for "a portion or group of something bigger called a population." In this pattern, a representative sample "is like a toy version of the whole demographic that it is a part" (Fink, 2003), only smaller. To select the sample members of this research, the researcher did a quick survey and investigated the different methods of choosing the sample. Then, the researcher settled on choosing the "convenience sampling technique. "This method would be suitable because it allows the researcher to select the sample considering the research objectives conveniently. They are selected considering their knowledge and experience concerning the research topic. This wise and concise choice, in turn, enhances the value of the results reached, as the responses they give would be valuable and fruitful

because of their knowledge and experience. Theoretically, convenience sampling comprises the contribution of available persons who enthusiastically agree to participate in definite research "by responding to the surveys distributed to them" (Vithal, 2010). In this research, the sample consists of (60) respondents, the employees working in the Ministry of Works, Municipality Affairs, and Urban Planning in Bahrain as follows.

$$\text{Finite population: } n' = \frac{n}{1 + \frac{z^2 \times \hat{p}(1-\hat{p})}{\epsilon^2 N}}$$

where

z is the z score

ε is the margin of error

N is population size

p̂ is the population proportion

The population size is 70, the margin error is 5%, the confidence level is 95%, and the response distribution level is 50%. The sample will be 60.

3.10. Pilot Test:

Sometimes, the test pilot is necessary in research to ensure the researchers are heading in the right direction. This preliminary study serves as "a dress rehearsal for the research study, permitting scholars to test their investigation approach with only a handful of testers before conducting the majority of the research" (Flick, 2009). This is an extra step; however, it might prove useful in the result of the study. In other words, the researchers are "rehearsing" their methodologies on a smaller scale before applying them to the larger initiatives. The findings would inform the approach taken in the larger study. The purpose of this pilot study was to determine whether the application of artificial intelligence to the staff decision-making procedure in the Ministries of Works, Municipality Affairs, and Urban Planning in

Bahrain would have a significant impact. Early findings pointed to the existence of such an effect.

3.11. Research instrument:

The researcher used a "Likert scale five-point assessment survey" to collect the initial information from the research sample, keeping in mind the descriptive quality of the subject matter and the quantitative approach that was taken. The questionnaire is "a compilation of mimeographed or written items answered by or for an individual who responded to give his opinion." It represents a method for gathering primary quantitative data that is logical and consistent for analysis (Roopa & Rani, 2017). Using a questionnaire to gather information is not only cost-effective, but also saves the researcher valuable time and effort.

The Likert five-point items style is applied where each item has five responses ranked in the following order.

1	2	3	4	5
Strongly disagree	disagree	Neutral	Agree	Strongly agree

After ensuring its validity and trustworthiness, the researcher sent the completed questionnaire to Google forms. The researcher then personally met with each potential respondent from Bahrain's Minister of Works, Municipality Affairs, and Urban Planning to provide the survey's purpose and instructions. The researcher then forwarded them a link to a copy of the questionnaire via WhatsApp, asking them to complete it and reply to its many questions.

The questionnaire has two primary sections. In the first section, we learn about the demographics of the respondents who made up the sample, including their gender, age range, level of education, professional experience, and country of origin. The second section is split in half, with a total of 36 items detailing the research's questions and aims. Here are the breakdowns of this second part in tabular form:

3.11.1 sources of the questionnaire items

Table 1 sources of the questionnaire items

The independent variable (Artificial intelligence Applications in HR)		
1	Descriptive Algorithms	Source
No.	Item	(Bhardwaj, Singh, & Kumar, 2020)
1	Past data is analyzed to know how this data can affect the present.	
2	Data collected about the practices of HR is linked to each other.	
3	The HR data analysis includes descriptive analyses that use relatively simple statistics including means, standard deviations, correlations, or percent changes.	
4	The balanced scorecard represents a typical example of using descriptive algorithms in HR.	
5	The balanced scorecard can be used by HR as a tool for assessing employees' performance based on some indices as absences, turnover, and supervisor performance feedback.	
6	HR specialists use descriptive algorithms as a powerful tool that helps collect and data from different sources.	

7	moods
8	Descriptive algorithms are used to enable HR employees and managers to track employees' motivation
9	Through descriptive algorithms, employees' performance can be measured.
10	Descriptive algorithms are used by HR employees to generate profiles of desired job candidates.
2	Predictive algorithms
1	Predictive algorithms are employed to predict what might be the outcome of some past- or real-time observations on future situations in HR.
2	Through predictive algorithms , HR employees can determine what some HR outcomes (or situations) can be like.
3	Predictions in the HR profession can be made through regression techniques, machine-learning algorithms, and data-mining approaches.
4	Perfect predictive algorithms make use of a score that represents the possibility that an event to occur.
5	Fraud intentions in the HR departments can be predicted through predictive algorithms
6	Predictive algorithms can be used for hiring activities in some firms since it enables HR specialists to design a system to analyze data provided by applicants.
7	Suspicious employee behavior can be observed through reliance on predictive algorithms.

(Broussard, 2018)

8	Predictive analytics help HR managers recruit employees	
3	Prescriptive algorithms	
1	<i>Prescriptive algorithms</i> focus on determining what needs to be done based on different possible scenarios.	
2	Prescriptive algorithms suggest different courses of action for HR specialists to benefit from alternative scenarios and	
3	HR employees can make use of prescriptive algorithms since they have academic degrees.	
4	Simulations and scenario-based techniques can be used through	(El-Rayes , Fang , Smith,
5	Prescriptive algorithms are employed in HR to improve the efficiency of employees' behavior.	
6	Through prescriptive algorithms, HR employees can model complex strategic HR decisions.	
7	Prescriptive algorithms serve the functions of HR decision support and decision automation.	

As shown in the above table, the first section of part two of the questionnaire covers artificial intelligence applications in HR, divided into three dimensions or applications. The first dimension covers descriptive algorithms. To cover this dimension, the researcher used ten items. The research sample's responses to these ten items give the researcher a clear idea about applying the descriptive algorithms in Bahrain's Ministry of Works, Municipality Affairs, and Urban Planning.

The second section of part two of the questionnaire covers the predictive algorithms. To cover this dimension, the researcher used eight items. The research sample's responses to these eight items would give the researcher a clear idea about applying

the predictive algorithms in Bahrain's Ministry of Works, Municipality Affairs, and Urban Planning.

The third section of part two of the questionnaire covers the prescriptive algorithms. To cover this dimension, the researcher used seven items. The research sample's responses to these seven items give the researcher a clear idea about applying the prescriptive algorithms in Bahrain's Ministry of Works, Municipality Affairs, and Urban Planning.

These three dimensions allow the researcher to test the artificial intelligence Applications in HR, know how efficient this application is, and how useful it is for the Ministry of Works, Municipality Affairs, and Urban Planning in Bahrain.

Table 2 sources the items of HR decision-making.

No.	Item	Reference
1	Considering employing algorithms in the HR domain, effective HR decisions that are more transparent and efficient are created.	(Leicht-Deobald & al., 2019)
2	HR uses an algorithm-based decision-making technique that is both objective and unbiased.	
3	HR decision-making a scientific process that applies theory and artificial intelligence applications.	
4	Huge data is collected and analyzed for the sake of making effective HR decisions.	

5	When HR decisions are made alternatives are carefully evaluated.
6	Strategic thinking is applied to make transparent HR decisions.
7	HR decisions are made apart from moral dilemmas.
8	The right timing is a major pillar in which effective HR decisions are made.
9	HR decisions are linked to organizational goals.
10	The big picture must be cared for when HR decisions are made.
11	The negative influences of algorithm-based HR decision-making are when HR decisions are made.

3.13. Data analysis tools

For the process of data analysis, the researcher makes use of the SPSS version 28.0, which is the "Statistical Packages for the Social Science" This package can be defined as "that software package exploited for logical batched and non-batched statistical analysis" (Bryman & Bell, 2015). SPSS is the Statistical software most widely applied to reach statistical analyses for the collected data. Through this software, the researcher makes use of the following tests:

3.13.1. Descriptive data analysis

Frequency tables: Frequencies and percentages are used to present the respondents' demographic data features.

Mean computation: Mean score values are computed to identify the status of the implementation of the variable. Mean scores are considered central tendency measurements. The primary purpose behind using them is often to describe the center point of all responses or the average.

Standard deviation computation: Standard deviations are continuously computed to measure dispersion that is frequently employed to describe the extent to which participants' responses are dispersed from the mean value (the center of the responses).

Graphical representation: The researcher presents charts for the demographic variables.

3.13.2. Inferential data analysis

Inverse data analysis is used to verify the study hypothesis. The following list of statistical procedures might be used to extrapolate from this study's sample to the entire population being researched:

In statistics, bivariate evaluations of significance are used to examine whether one quantitative variable is different from another categorical variable.

The linear link between two numerical variables can be tested via a test called the correlation test.

In regression analysis, a linear line is estimated to represent the relationship between a dependent variable and one or more independent variables. The computed regression coefficient is the independent variable's impact on the variable in question.

3.14 Ethical issues

Ethical issues in a research influence and relates to various aspects of the research and helps researchers to conclude whether a field of study is ethically acceptable(Bhel et al', 1995). The ethical issues included in this research can be presented in the following points:

Confidentiality: In terms of confidentiality, the researcher made sure that confidentiality was granted where the responses given by the research sample individuals were private. No other person or party can get acknowledged with it. They were fully confidential. Therefore, the sample respondents could give their responses freely, which helps in the validity of the results obtained, as they come highly expressive of the research sample and the research population. Consequently, the results can be generalized.

Permission. The researcher got all the required permissions from the ministry to which the research was applied. Therefore, the application of the research was officially carried out.

Informed Consent: When carrying out the research, particularly at the stage of collecting the primary data from the research sample, the researcher informed them about every detail included and got their consent to respond to the questionnaire items.

Anonymity: The research ensured that the responses given by the sample participants were kept confidential, where the names of the respondents were never mentioned to assure privacy.

3.15. Summary:

This chapter has overviewed the methodology of this research. It has discussed the research philosophy that the researcher adopted in doing the research. It also presented the research approach where the researcher employed the quantitative approach to investigate the significance of artificial intelligence in the Human Resources Decision Making Process in the Ministry of Works, Municipality Affairs, and Urban Planning in Bahrain. Moreover, the chapter presented the research design that falls in the category of descriptive research. The descriptive approach is conclusive because of its quantitative nature. The researcher employed the two research design types, mainly the descriptive and exploratory types. In addition, the chapter presented the conceptual research model indicating the two research variables: "Artificial intelligence" as the independent variable and Human Resources (HR) decision-making as the dependent variable.

The chapter overviewed the data collection process, where the researcher used secondary and primary data sources to collect information and data for research purposes. Moreover, the chapter discusses the sampling technique that the researcher used to select the sample respondents. Besides, the researcher discusses the study population of the research and the study sample selected to give their responses to

the items of the questionnaire that the researcher devised to achieve its objectives. In detail, the chapter presented the research instrument and the questionnaire. This questionnaire represents the research instrument used to collect the primary data for this research purposes concerning "The Significance of Artificial Intelligence in the Human Resources Decision-Making Process: The case of the Ministry of Works, Municipality Affairs and Urban Planning in Bahrain.

"Moreover, the chapter presents the components of the questionnaire sections. Finally, this chapter overviews the validity and reliability of the questionnaire items with some statistical descriptions of their measurement. Then, the chapter ended by presenting some ethical issues associated with the research.

Chapter Four: Data analysis and Findings

Chapter Four: Data Analysis and Findings

4.1. Introduction

The data analysis process for the present research is conducted in the fourth chapter, which the researcher regards as the most significant among all the other chapters due to its contribution to guiding the researcher toward reaching the study results. The data is collected from a questionnaire quoted from previous research papers that discussed the same research variables but in other contexts. The questionnaire comprises four sections and includes 36 items categorized into four sections.

The targeted sample was contacted through SMS, WhatsApp messages, emails, and other social media platforms. A link was sent that directed them to the questionnaire on Google Forms. They were reported in a short message about the value of their contribution to fulfilling this questionnaire and the required completion duration, in addition to a "thank you" statement.

The collected responses were decoded and transformed from raw data to numerical data. This numerical data was uploaded on an SPSS sheet to be addressed statistically. Several statistical tests are conducted to reach answers to the research questions, test the hypotheses, and identify the overall conclusions of the research.

This chapter consists of the following sub-sections:

- Statistical treatment
- Reliability and validity of the questionnaire
- Demographics
- Descriptive statistics

- Inferential Analysis

4.2. Statistical Treatment

4.2.1. Statistical software

The data collected by the present research instrument is addressed by the user-friendly statistical software -IBM SPSS version 26.0. There is an agreement that SPSS V26 is user-friendly.

4.2.2. Data

The primary data related to this research is collected by a questionnaire form circulated to the employees of the Department of Human Resources Management in the Ministry of Works, Municipality Affairs, and Urban Planning in the kingdom of Bahrain. The Ministry is concerned with "Achieving balanced urban development through setting up an integrated business infrastructure to apply the kingdom's National Planning and Development Strategies that satisfies the kingdom's hopes as well as the 2030 Economic Vision". The Ministry always tackles that it adheres to the principles and values of justice, competitiveness, and fairness concerning the services it delivers to the Bahrainis and its residents. The Ministry is also committed to its corporate social responsibility (MUN, 2022). The questionnaire was circulated to the HR employees whose total number is (70), and whose selected sample is decided to be (60). The targeted sample individuals were contacted by a link to (Google Forms) on which the questionnaire is uploaded. Due to its small number, all the targeted sample individuals responded and sent back their complete responses due to how the form was designed so that every point could be discarded. The responses were all retained and then exported through an Excel sheet. This data was codified according to the Likert five-point items decoding system (strongly agree responses were given 5; the agree responses were given 4; the neutral responses were

given 3; the disagree responses were given 2; and the strongly disagree responses were given 1). The codified data was imported into an IBM SPSS sheet.

4.2.3. Codebook

The researcher produced a codebook to document data on the research variables, including the level of measuring, the numeric codes employed, and the related category labels they introduced. The codebook is essential for interpreting the statistical results.

4.3. Reliability and validity of the questionnaire

4.3.1. Research validity

Research validity is defined as "how well a test measures what it is purported to measure" (Lambert, 2022). Generally, the validity is tested and acknowledged by reviewing the relevance of the questionnaire's items that the researcher composed considering the research questions and hypotheses formed beforehand. Two types of validity can be assessed: external and internal validity. Regarding external validity, the instrument is validated by reviewing the questionnaire items by the research supervisor or a faculty committee in the same university. Testing external validity proves that the questionnaire items are related to the variables they are expected to measure. The research supervisor reviewed the questionnaire and made specific amendments, including deleting some items and amending others. Of the questionnaire items were forty; four were recommended to delete, and twelve items were amended. The final form of the questionnaire included 36 items. This shows that the external validity of the questionnaire proves that the questionnaire items are approved and can measure what they are mainly intended to measure.

The primary purpose behind implementing this type of validity (Flake, 2022) is to avoid ambiguous items and biased statements, which have been indeed achieved.

4.3.2. Research Reliability

The research reliability represents the internal consistency among the items of the questionnaire. To measure the internal consistency of the questionnaire, the researcher employed Alpha Cronbach. In other words, the researcher measures the existence of internal consistency among the questionnaire items considering the value of alpha Cronbach.

There is an agreement that in statistics, internal consistency refers to "a measure based on the correlations between different items on the same test" (Cofresí, 2022). The critical factor for employing internal consistency is to evaluate whether the instrument can be used to assess the same general construct and produce close scores. There is evidence that the value of alpha increases when the intercorrelations between the statements jump up. The standard accepted value for Alpha Cronbach's internal consistency is (0.7) (Zhang, 2021). The following table shows how values of alpha are interpreted.

Table 3 Reliability assessment results using Alpha Cronbach's method.

Composite variable	Total number of items in the composite variable	Excluded items to improve reliability (if any)	Final Alpha Cronbach's coefficient of reliability (after excluding items)	Reliability level
Descriptive Algorithms	10	-	.889	Reliable
Predictive algorithms	8	-	.905	Reliable
Prescriptive algorithms	7	-	.923	Reliable

HR decision making	11	-	.872	Reliable
All the questionnaire items	60	-	.913	Reliable

According to the outcomes of the Alpha Cronbach values in the table above, it is recognized that the level of internal consistency between the items that make up each section of the questionnaire is high and above 70% (Cronbach, 1990). The first section of the questionnaire casts light on “Descriptive Algorithms” and comprises ten items. The internal consistency level between the ten independent Descriptive Algorithms items is 88.9% (0.889). The eight items that make up the independent variable “Predictive algorithms” reflect a high level of internal consistency as the alpha Cronbach value reached 90.5% (0.905). The value of Alpha value for the seven items that make up the independent variable “Prescriptive algorithms” is 92.3% (0.923).

Concerning the internal consistency level for the eleven items that make up the dependent variable “HR decision making,” it is identified as a high level of 87.2% (0.872). This means there is a high internal consistency between the 11 items.

All the questionnaire items that are 36 have been found to have a high level of internal consistency amongst them. This is recognized considering the alpha Cronbach value for these 11 items, which is 91.3% (0.913).

According to (Lightfoot, 2021), the high level of internal reliability among the items of the questionnaire variables (AI in HRM and HRM decision making) represents evidence that there will be a significant influence for AI in HRM and HRM decision making. Likewise, it is anticipated that there will be a significant

influence on descriptive algorithms, predictive algorithms, prescriptive algorithms, and HR decision-making.

4.4. Normality Assumption Testing

One of the most significant tests that can be conducted before stepping towards the different descriptive statistical tests and inferential tests is the “Normality Assumption Testing.” The normality paves the route to conducting parametric inferential tests. This means that identifying the possibility that the assumption is verified is a means for guiding the inferential analysis concerning the adequate method.

The present study used the basic Kolmogorov-Smirnov test to examine the Normality assumption. The normality of the data in the variable is the starting point for the test. Results from the tests of the normalcy assumption are presented in Table 4-17. All variables passed a 1% the threshold for significance Kolmogorov-Smirnov test of normality. As a result, it became clear that none of the composite variables followed a normal distribution. Because the normalcy assumption cannot be made in this study, non-parametric inferential approaches will be used.

Table 4 Normality assumption check using the Kolmogorov-Smirnov test.

	Kolmogorov-Smirnov Normality test ^a		
	Statistic	df	p-value
Descriptive Algorithms	.104	60	.000**
Predictive algorithms	.123	60	.000**

Prescriptive algorithms	.074	60	.000**
HR decision making	.083	60	.000**
a. Lilliefors Significance Correction			

* A p-value of less than 0.05 indicates statistical significance; a p-value of less than 0.01 indicates statistical significance.

Data preparation for inferential analysis is facilitated by normality testing. For the mathematical inferential tests, it is suggested that normality be assumed. This is because once the method has been validated, the examiner will have a clear indication of whether it is the optimal choice.

The univariate the Kolmogorov test is used to check for normality. This test's null hypothesis assumes the data in question have a normal distribution. Table 2 above presents the results of the normalcy assumption test. At the 1% level of significance, the Kolmogorov-Smirnov normality test is significant for all variables. As a result, we know that no composite variable follows a normal distribution. In this study, we use non-parametric inferential methods since they do not rely on the normalcy assumption of parametric methods.

4.4.1. Skewness and kurtosis normality:

Another means through which data normality is evaluated is the skewness and kurtosis normality test. George & Mallery, (2010) ensure that the accepted values for kurtosis range from -2 to +2. When the kurtosis value is within this range, it is evident that normal univariate distribution is proved. Concerning Skewness, Byrne (2010) claims that the accepted values range from (-7 to +7). When values of Skewness are within this range, the data is normally distributed. The values of

Skewness (0.309) and kurtosis are (00.608) for the research variables. This means that normal univariate distribution is proved.

4.5. Demographic data:

Through this section, the researcher uses the frequencies and percentages to analyze the data collected about the respondents' personal/ demographic data. These personal/ demographic data are collected regarding specific variables that involve gender, age, education level, position, years of experience, and nationality.

Connelly (2013) agrees that respondents' demographics can be considered as "those features of sample individuals which are categorized in light of distinct criteria—such as age, gender, and income—to study the attributes of a particular group."

To be clear, researchers tend to present the respondents' demographics to their instrument as the collected data about these variables are of great essentiality. They provide evidence that the sample individuals are compliant with the purpose of the research, and they provide reliable responses that reinforce the research outcomes. In addition, analysis of the respondents' demographics identifies any differences in the respondents' attitudes toward the variables' relationship.

Some critical decisions are made by the data collected and analyzed about the research demographics. Some government agencies make use of the outcomes of the research and relate these outcomes to the demographics of the participants. Research recommendations can also be established on these demographics. Some research papers enable private sector organizations to set up their policies and strategies according to the respondents' demographic data.

There is a universal agreement that identifying demographics and their statistical possibilities is crucial for the different types of stakeholders of the research organization: public or private (Lazar & Hochheise, 2017).

4.5.1. Rate of return:

The calculated sample number is sixty; the returned questionnaire forms were sixty. This means that the return rate was 100%.

Table 5 Gender analysis

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	MALE	39	63.9	65.0	100.0
	FEMALE	21	34.4	35.0	35.0
	Total	60	98.4	100.0	
Missing	System	1	1.6		
Total		61	100.0		

In the gender section, the respondents must select the option that fits their gender. This enables the researcher to determine the proportion of each gender in the Ministry of Works, Municipality Affairs, and Urban Planning in Bahrain. This guides us to find whether there is a gender imbalance in the research organization.

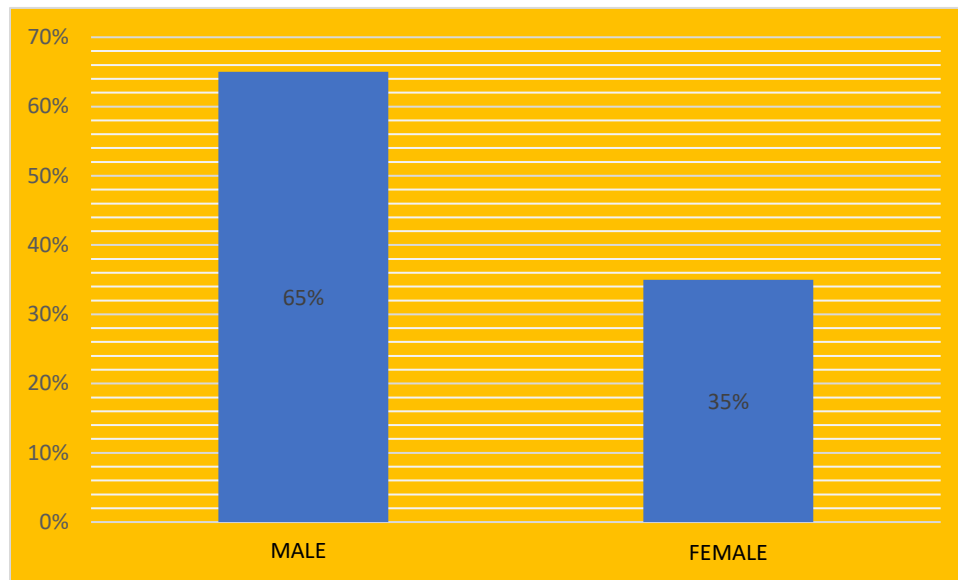


Figure 3 Gender analysis

Based on the analysis of the gender variable in the table (3) above, male respondents represent 65% while female respondents represent 35%. This shows that male employees outnumber female employees in the ministry.

Table 6 Age Analysis

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Below 25	17	27.9	28.3	28.3
	26 - 30 years	27	44.3	45.0	73.3
	31 - 44 years	10	16.4	16.7	90.0
	45 -59 years	4	6.6	6.7	96.7
	60 years or more	2	3.3	3.3	100.0
	Total	60	98.4	100.0	
Missing	System	1	1.6		
Total		61	100.0		

In this section, the respondents are required to select the age area in which they fall. This helps to evaluate the extent to which the organization is youthful.

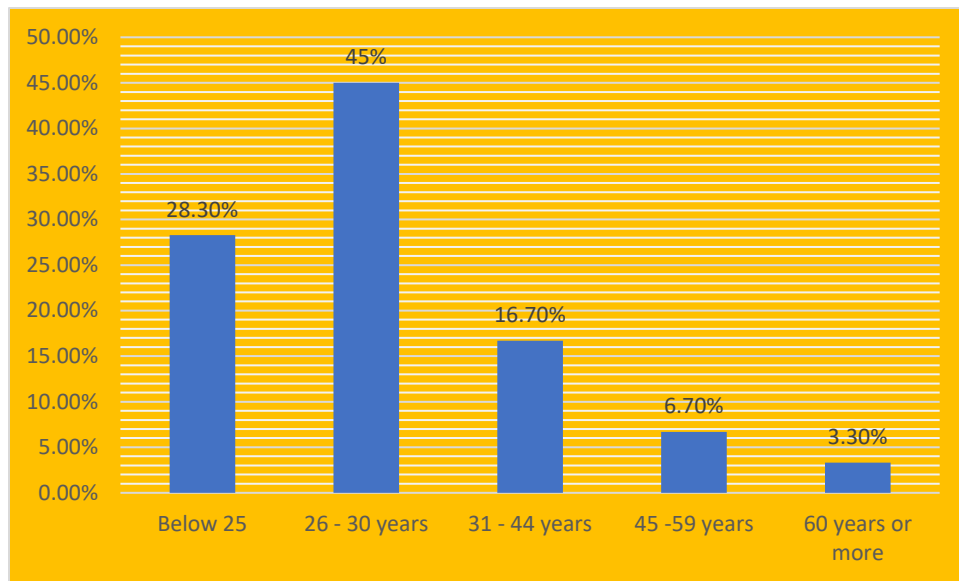


Figure 4 Age Analysis

Based on the outcomes of the age analysis, it is evident that. The most significant segment, 45%, is for employees who are 26 to 30 years old. This is followed by the segment of those below 25 years old, representing 27.9%. Then the HR employees who are 31 to 44 years old represent 16.4%. The HR employees who are 45 to 59 represent 6.7%. The smallest segment, 3.3%, is for HR employees who are 60 years or more.

Table 7 Education Analysis

	Frequency	Percent	Valid Percent	Cumulative Percent

Valid	BA/ BSC	42	68.9	70.0	83.3
	Diploma	6	9.8	10.0	13.3
	Master's degree	6	9.8	10.0	13.3
	Ph.D. Degree	2	3.3	3.3	3.3
	Total	60	98.4	100.0	
Missing	System	1	1.6		
Total		61	100.0		

In this section, the respondents are required to select the education level that they have. This helps to evaluate the extent to which the organization is a learning one.

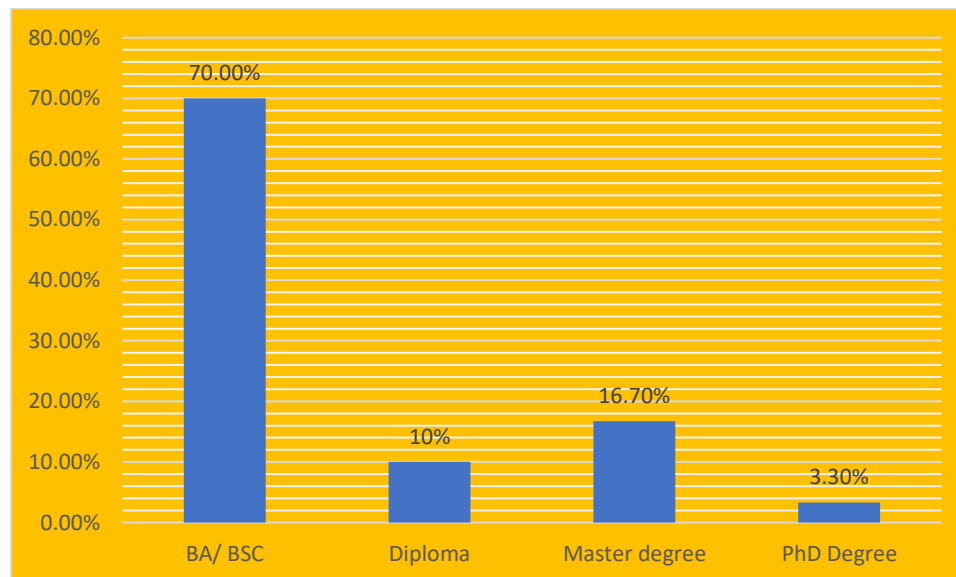


Figure 5 Age Analysis

Based on the outcomes of the education level analysis, it is evident that the respondents who hold bachelor's degrees represent the most significant segment, 70%. Those who hold master's degrees represent 16.7%. Holders of diploma degrees represent 10%. A minor proportion, 3.3%, belongs to those with Ph.D. degrees. These results illustrate that Bahrain's Ministry of Works, Municipality Affairs, and Urban Planning is a learning organization.

Table 8 Position Analysis

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Supervisory positions	18	29.5	30.0	30.0
	Non-Supervisory positions	42	68.9	70.0	100.0
	Total	60	98.4	100.0	
Missing	System	1	1.6		
Total		61	100.0		

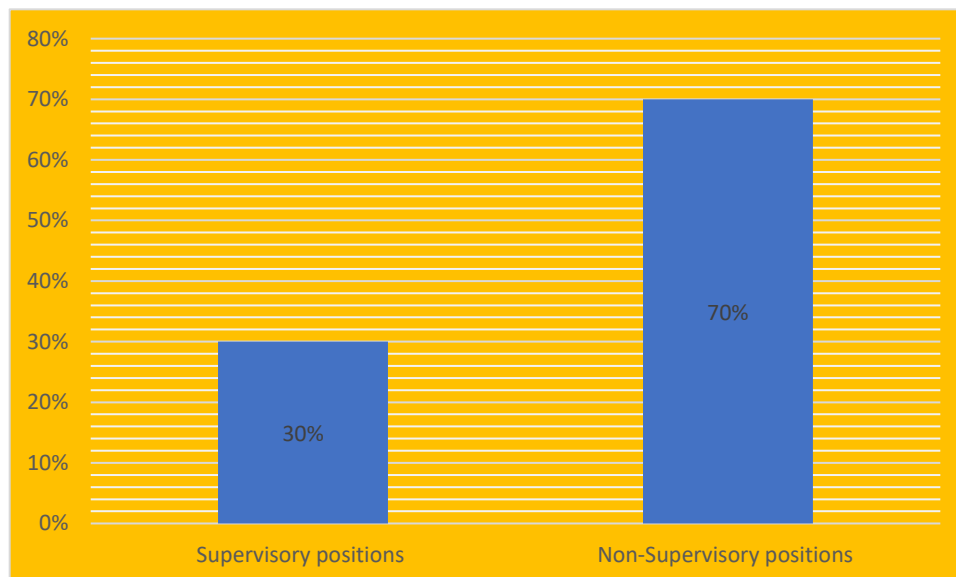


Figure 6 Position Analysis

In this section, the respondents are expected to select their position type in the HR department in the Ministry of Works, Municipality Affairs, and Urban Planning in Bahrain.

Data about HR employees' positions in the Ministry of Works, Municipality Affairs, and Urban Planning in Bahrain indicate that those who hold non-supervisory positions represent 70%, while those who hold supervisory positions represent 30%.

Table 9 Years of Experience analysis

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Below 5 years	14	23.0	23.3	23.3
	6-10 years	23	37.7	38.3	61.7
	11- 19 years	12	19.7	20.0	81.7
	20 years or more	11	18.0	18.3	100.0
	Total	60	98.4	100.0	
Missing	System	1	1.6		
Total		61	100.0		

In this section, the respondents have to tick the number of years of their experience in the HR department in the Ministry of Works, Municipality Affairs and, Urban Planning in Bahrain.

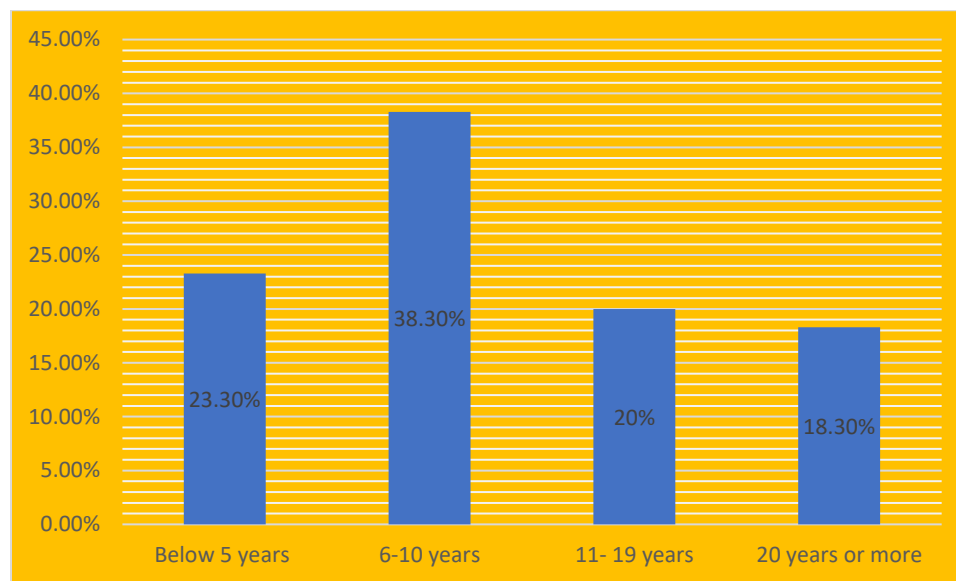


Figure 7 Years of Experience analysis

Data on the respondents' years of experience show that those whose years of experience range from 6 to 10 years represent the highest proportion, 38.3%. Those whose years of experience range from below five years represent 23.3%. The respondents whose years of experience range from 20 years or more represent 20%. The respondents whose years of experience range from 20 years or more represent 18.3%

Table 10 Analysis of Nationality

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Bahraini	54	88.5	90.0	90.0

	Non-Bahraini	6	9.8	10.0	100.0
	Total	60	98.4	100.0	
Missing	System	1	1.6		
Total		61	100.0		

In this section, the respondents must select their nationality from either Bahraini or non-Bahraini.

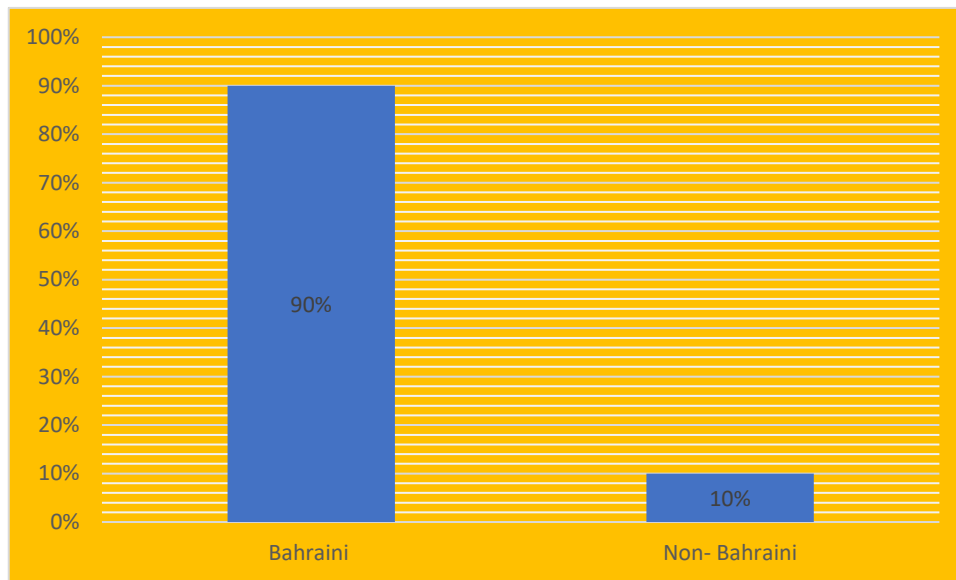


Figure 8 Analysis of Nationality

Statistics suggest that ninety per cent of the sample are citizens of Bahrain and 10% are citizens of other countries. This points to the umbrella of the ministry of Functions, City Affairs, and Urban Affairs as the agency responsible for carrying out the policy in Bahrain.

4.6. Descriptive Statistics:

Descriptive statistics is one of the most critical tests when analyzing data from two or more variables. One of the most used definitions for descriptive

statistics is the one presented by Satake (2015), who referred to it as "Brief descriptive coefficients that summarize a given data set, which can be either a representation of the entire population or a sample of it." Descriptive statistics enable researchers to provide descriptions and make the best understanding of the characteristics of a particular data set.

In this section, the researcher depends on the values mentioned in table (9) that focus on "Likert scale ranges and interpretations."

There are two variables: the independent variable (Artificial intelligence Applications in HR). This variable is categorized into three sub-variables (descriptive algorithms, predictive algorithms, and prescriptive algorithms). This variable includes 25 items. The dependent variable is (HR decision-making). This variable includes 11 items.

The researcher depends on the mean scores and standard deviations in applying descriptive statistics.

The outcomes of descriptive statistics, especially mean scores, are interpreted considering the following table that provides a criterion for understanding what mean scores are:

Table 11 Likert Scale Ranges and Interpretations

Scale	Range	Interpretation	Description
1	1.00 – 1.79	Strongly Disagree	The respondent strongly disagrees with the statement
2	1.80 – 2.59	Disagree	The respondent disagrees with the statement

3	2. 60 – 3. 39	Neutral	The respondent is neutral toward the statement
4	3. 4 – 4.19	Agree	The respondent agrees with the statement
5	4. 20 – 5. 00	Strongly Agree	The respondent strongly agrees with the statement

4.6.1. Descriptive Statistics for the independent variable (Artificial intelligence Applications in HR)

The independent variable (Artificial intelligence Applications in HR) comprises 25 items. Three components (sub-variables) represent the mechanisms of AI applications in HR. They are descriptive algorithms, predictive algorithms, and prescriptive algorithms). In this section, the researcher represents the descriptive statistics that show the status of AI applications in HR in the Ministry of Works, Municipality Affairs, and Urban Planning in Bahrain in four tables (10-11-12-13).

Table 12 Descriptive Statistics for the descriptive algorithms

	N	Mean	STD	Interpretation	Rank
1. Past data is analyzed to know how this data can affect the present.	60	4.62	.691	Strongly agree	1
2. Data collected about practices HR is linked to each other.	60	4.05	1.064	Agree	2
3. The HR data analysis includes descriptive analyses that use relatively simple statistics including means,	60	3.68	1.321	Agree	6

standard deviations, correlations, or percent changes.					
4. The balanced scorecard represents a typical example of using descriptive algorithms in HR.	60	3.57	1.370	Agree	9
5. The balanced scorecard can be used by HR as a tool for assessing employees' performance based on some indices such as turnover, and supervisor performance feedback.	60	3.63	1.073	Agree	7
6. HR specialists use descriptive algorithms as a powerful tool that helps collect and data from different sources.	60	3.72	1.166	Agree	5
7. Making use of algorithm-based HR decision-making applications permits users to analyze the employee's emotions and track employee's moods	60	3.78	1.010	Agree	4
8. Descriptive algorithms are used to enable HR employees and managers to track employees' motivation	60	3.92	.962	Agree	3
9. Through descriptive algorithms employees' performance can be measured.	60	3.42	1.139	Agree	10

10. Descriptive algorithms are used by HR employees to generate profiles of desired job candidates.	60	3.60	1.077	Agree	8
Valid N (listwise)	60	3.79	1.08	Agree	

Descriptive statistics for the independent "descriptive algorithms" show that the HR department in the ministry effectively applies descriptive algorithms in their operations and functions. This is recognized considering the average mean score for the ten items that comprise this variable. The average mean score for these ten items is (3.79) out of (5.00). This high average mean score falls in the category of (3.40 to 4.19).

The item with the highest mean score (4.62) is the first. This indicates that the respondents strongly agree with the content saying, "Past data is analyzed to know how this data can affect the present." The item with the lowest mean score (3.60) is the 9th. This indicates that the respondents agree on the item's content, saying, "Through descriptive algorithms, employees' performance can be measured."

Table 13 Descriptive Statistics for the predictive algorithms

	N	Mean	STD	Interpretation	Rank
1. Predictive algorithms are employed to predict what might be the outcome of some past- or real-time observations on future situations in HR.	60	3.22	1.075	Neutral	7
2. Through predictive algorithms, HR employees can	60	4.15	1.055	Agree	1

determine what some HR outcomes (or situations) can be like.					
3. Predictions in the HR profession can be made through regression techniques, machine-learning algorithms, and data mining approaches.	60	3.53	1.081	Agree	3
4. Perfect predictive algorithms make use of a score that represents the possibility that an event to occur.	60	3.32	1.172	neutral	6
5. Fraud intentions in the HR departments can be predicted through predictive algorithms	60	3.43	1.155	Agree	5
6. Predictive algorithms can be used for hiring activities in some firms since it enables HR specialists to design a system to analyze data provided by applicants.	60	3.50	1.142	Agree	4
7. Suspicious employee behavior can be observed through reliance on predictive algorithms.	60	3.67	1.068	Agree	2
8. Predictive analytics help HR managers recruit employees	60	3.08	1.211	neutral	8
Valid N (listwise)	60	3.48	1.11	Agree	

Descriptive statistics for the independent “predictive algorithms” show that the HR department in the ministry effectively applies predictive algorithms in their operations and functions. This is recognized considering the average mean score for the ten items that comprise this variable. The average mean score for these ten items is (3.48) out of (5.00). This high average mean score falls in the category of (3.40 to 4.19).

The item with the highest mean score (4.15) is the second. This indicates that the respondents agree with the content saying of the item, saying, “Through predictive algorithms, HR employees can determine what some HR outcomes (or situations) can be like.” The item with the lowest mean score (3.08) is the 8th. This indicates that the respondents agree with the item's content, saying, “Predictive analytics help HR managers recruit employees.”

Table 14 Descriptive Statistics for the prescriptive algorithms

	N	Mean	STD	Interpretation	Rank
1. Prescriptive algorithms focus on determining what needs to be done based on different possible scenarios.	60	3.38	1.151	Neutral	1
2. Prescriptive algorithms suggest different courses of action for HR specialists to benefit from alternative scenarios and demonstrate the consequences of each possible decision.	60	3.35	1.176	neutral	2

3. HR employees can make use of prescriptive algorithms since they have academic degrees.	60	3.27	1.274	neutral	3
4. Simulations and scenario-based techniques can be used through	60	3.02	1.282	neutral	6
5. Prescriptive algorithms are employed in HR to improve the efficiency of employees' behavior.	60	3.25	1.159	neutral	4
6. Through prescriptive algorithms, HR employees can model complex strategic HR decisions.	60	3.25	1.144	neutral	5
7. Prescriptive algorithms serve the functions of HR decision support and decision automation.	60	2.95	1.156	neutral	7
Valid N (listwise)	60	3.21	1.19	Agree	

Descriptive statistics for the independent "prescriptive algorithms" show that the HR department in the ministry moderately applies prescriptive algorithms in their operations and functions. This is recognized considering the average mean score for the ten items that comprise this variable. The average mean score for these ten items is (3.21) out of (5.00). This is a moderate average mean score that falls in the category of (2.60 to 3.39).

The item with the highest mean score (3.38) is the first. This indicates that the respondents have a neutral attitude toward the item's content, saying, "Prescriptive algorithms focus on determining what needs to be done based on different possible

scenarios." The item with the lowest mean score (2.95) is the 7th. This indicates that the respondents have a neutral attitude towards the item, saying, "Prescriptive algorithms serve the functions of HR decision support and decision automation."

Table 15 Summary for the status of Artificial intelligence Applications in HR in the Ministry of Works, Municipality Affairs and Urban Planning in Bahrain

Variable	Number of items	Average mean score	Interpretation
Descriptive algorithms	10	3.79	High effectiveness of implementation
Predictive algorithms	8	3.48	High effectiveness of implementation
Prescriptive algorithms	7	3.21	moderate effectiveness of implementation
Total	25	3.49	High effectiveness of implementation

The descriptive statistics for the status of Artificial intelligence Applications in HR in the Ministry of Works, Municipality Affairs, and Urban Planning in Bahrain in general, as per table (13), indicate a practical implementation of Artificial intelligence applications in the HR of the Ministry. This is attributed to the average mean score for all the 25 items making up this variable's three sections, which is found to be (3.49) out of (5.00). The most effective component is (descriptive algorithms) whose average mean score (is 3.79). This is followed by (Predictive algorithms) whose average mean score is (3.48). The lowest average mean score (3.21) is for the independent (Prescriptive algorithms).

4.6.2. Descriptive Statistics for the dependent variable (HR decision making)

The dependent variable (HR decision-making) is made up of 11 items. In this section, the researcher represents the descriptive statistics that show the status of HR decision-making in HR of the Ministry of Works, Municipality Affairs, and Urban Planning in Bahrain in one table (14).

	N	Mean	STD	Interpretation	Rank
1. Considering employing algorithms in the HR domain, effective HR decisions that are more transparent and efficient are created.	60	2.97	1.149	Neutral	10
2. HR uses an algorithm-based decision-making technique that is both objective and unbiased.	60	2.75	1.271	Neutral	11
3. HR decision-making is a scientific process that applies theory and artificial intelligence applications.	60	3.55	.982	Agree	6
4. Huge data is collected and analyzed for the sake of making effective HR decisions.	60	3.50	1.097	Agree	7
5. When HR decisions are made alternatives are carefully evaluated.	60	3.17	1.167	Neutral	8
6. Strategic thinking is applied to make transparent HR decisions.	60	3.67	1.422	Agree	4

7. HR decisions are made apart from moral dilemmas.	60	3.00	1.150	Neutral	9
8. The right timing is a major pillar on which effective HR decisions are made.	60	3.79	1.095	Agree	1
9. HR decisions are linked to organizational goals.	60	3.76	1.079	Agree	3
10. The big picture must be cared for when HR decisions are made.	60	3.65	1.071	Agree	5
11. The negative influences of algorithm-based HR decision-making are avoided when HR decisions are made.	60	3.77	1.095	Agree	2
Valid N (listwise)	60	3.41	1.14	Agree	

Descriptive statistics for the dependent “HR decision-making” show that the HR department in the ministry effectively makes decisions. In other words, HR decision-making is conducted effectively. This is recognized considering the average mean score for the ten items that comprise this variable. The average mean score for these eleven items is (3.41) out of (5.00). This high average mean score falls in the category of (3.40 to 4.19).

The item with the highest mean score (3.79) is the 8th. This indicates that the respondents agree with the item’s content, saying, “The right timing is a major pillar on which effective HR decisions are made.”. The item with the lowest mean score (2.75) is the 2nd. This indicates that the respondents have a neutral attitude towards the item, saying, “HR uses an algorithm-based decision-making technique which is both objective and unbiased.”

4.7. Inferential statistics:

In this section, the researcher uses the necessary statistical tests to infer the relationship between the research variables. This enables the researcher to test the research hypotheses.

4.7.1. Testing the first hypothesis (H1)

To test the first hypotheses of the research, the following tests are applied: Pearson Correlation, simple regression, and multiple regression.

Table 16 Pearson Correlation

		Des Alg	Pre Alg	T3 Pres Alg	HRDM
Des Alg	Pearson Correlation	1	.567**	.320*	.283*
	Sig. (2-tailed)		<.001	.013	.028
	N	60	60	60	60
Pre Alg	Pearson Correlation	.567**	1	.722**	.641**
	Sig. (2-tailed)	<.001		<.001	<.001
	N	60	60	60	60
Pres Alg	Pearson Correlation	.320*	.722**	1	.825**
	Sig. (2-tailed)	.013	<.001		<.001
	N	60	60	60	60
HRDM	Pearson Correlation	.283*	.641**	.825**	1
	Sig. (2-tailed)	.028	<.001	<.001	
	N	60	60	60	60
**. Correlation is significant at the 0.01 level (2-tailed).					
*. Correlation is significant at the 0.05 level (2-tailed).					

The table above shows the Pearson Correlation test that evaluates the correlation between the research variables. The following variables are abbreviated in the table above as follows:

Des Alg = Descriptive Algorithms

Pre Alg= Predictive algorithms

Pres Alg= Prescriptive algorithms

HRDM= HR decision making

Based on the outcomes of the Pearson correlation, it is found that all the independent variables of Artificial intelligence Applications in HR, which are (Descriptive Algorithms, Predictive algorithms, and Prescriptive algorithms) are significantly correlated with (HR decision-making) as the sig values are all below 0.05. The variable that has the strongest correlation (.825**) with (HR decision-making) is (Prescriptive algorithms). This is followed by the correlation between (Predictive algorithms) and (HR decision-making) is (Prescriptive algorithms) as the value of the correlation is (.641**). The lowest correlation value is (.238*) between

(Descriptive algorithms) and (HR decision-making). All the correlations are found to be strong and positive correlations.

Table 17 Regression model Summary

Model	R	R Square	Adjusted R Square	T	Sig
1	.679 ^a	.461	.452	7.043	0.001
a. Predictors: (Constant), HR decision making					

The results of the regression model summary for the first hypothesis as per table (15) above show that the value of R square is (0.461). According to this value, it can be inferred that applying artificial intelligence algorithms is responsible for 46.1% of this change whenever HR decision-making witnesses any shifts. The other remaining percentage, which is 53.9%, is the responsibility of any other factor focused on in this research. The value of adjusted R square, which is (0.452), indicates that each one-unit change in applying artificial intelligence algorithms is met with 0.452 unit of change in HR decision making. Based on the T-value (7.043), the impact of applying artificial intelligence algorithms on HR decision-making in The Ministry of Works, Municipality Affairs, and Urban Planning in Bahrain is positive.

Most importantly, it is the value of sig (0.001). This value is below the standardized value of 0.01. The regression model summary outcomes guide the researcher to infer that the independent variable (applying artificial intelligence algorithms) significantly and positively impacts the dependent variable (HR decision-making in The Ministry of Works, Municipality Affairs and Urban Planning in Bahrain). Thus, the first alternative hypothesis is accepted, and the null is rejected. This means, **"There is a significant effect for applying artificial intelligence algorithms on the HR decision-making process in The Ministry of Works, Municipality Affairs and Urban Planning in Bahrain."**

4.7.1. Testing the second, third, and fourth hypotheses:

To test the second, third, and fourth hypotheses, the researcher makes use of the multiple regression coefficients.

Table 18 Multiple regression Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.841	.345		2.437	.018
	T1	-.022	.102	-.020	-.215	.831
	T2	.111	.127	.110	.871	.387
	T3	.719	.105	.752	6.853	0.000
a. Dependent Variable: HR decision making						

Based on the outcomes of the multiple regression coefficients in table (16) above, it is inferred that:

The second hypothesis saying, "There is a significant effect for applying descriptive algorithms on the process of HR decision making in The Ministry of Works, Municipality Affairs and Urban Planning in Bahrain," is rejected as the sig value is (0.831), which is above 0.05. The value is also (-.215). This indicates that the independent variable (applying descriptive algorithms) negatively and insignificantly influences the dependent (process of HR decision-making).

The third hypothesis saying, "There is a significant effect for applying predictive algorithms on the process of HR decision making in The Ministry of Works, Municipality Affairs and Urban Planning in Bahrain," is rejected as the sig value is (0.387), which is above 0.05. The T-value is also (.871). This indicates that the independent variable (applying predictive algorithms) positively and insignificantly influences the dependent (process of HR decision-making).

The fourth hypothesis, "There is a significant effect for applying prescriptive algorithms on the process of HR decision making in The Ministry of Works, Municipality Affairs and Urban Planning in Bahrain," is accepted as the sig

value is (0.000), which is below 0.01. The T-value is also (.6.853). This indicates that the independent variable (applying prescriptive algorithms) positively and significantly influences the dependent (process of HR decision-making).

4.8. Summary

The fourth chapter has been dedicated to presenting the researcher with the outcomes of the data analysis process. This has been considered the most significant phase of all the research chapters. This chapter has processed the collected data from the sample individuals through statistical software, SPSS version 28.0. The processed data is interpreted adequately so the readers can understand what the figures mean. The chapters included seven sections in addition to the summary. It started with presenting the validity and reliability of the instrument. Then the demographic data is presented. Descriptive statistics are presented to make the readers recognize the status of the variables in the research organization. A presentation of the relationship between the research variables via simple and multiple regression followed this. The results reached in this chapter pave the route for the researcher to introduce conclusions, recommendations, applications, and limitations of the research in the fifth chapter.

Chapter Five

Discussions & Recommendation

Chapter Five: Discussions & Recommendation

5.1. Introduction:

This final chapter is dedicated to introducing the readers to the fundamental research's essence. Through this chapter, the results reached in chapter four and discussed and compared to the findings reached through previous research. The readers are provided with recommendations for all the stakeholders likely to benefit from this research. There are also some implications and future research suggestions. The limitations of the research are placed by the end of this chapter.

5.2. Discussion of the research conclusions

The HR department in the Ministry of Works, Municipality Affairs, and Urban Planning in Bahrain employs Artificial Intelligence implementations in the functions and operations of the department in an effective manner. Implementing AI applications in HR is one part of the transformation toward digitalization in many countries. The attitude toward transforming organization functions to be digitalized is consistent with the Bahraini 2030 Economic Vision, which calls for making use of the latest technologies in Bahraini organizations (Abdeldayem & Aldulaimi, 2020). The overall effectiveness of Artificial intelligence Applications in HR stems from the effectiveness of all the components (sub-variables) making it up. Today's organizations, including the ministry, depend on algorithm-based HR decision-making for various purposes. One of these is to monitor their employees. This attitude is reinforced by the technology industry claiming that its decision-making instruments are efficient and objective, downplaying their potential biases (Leicht-Deobald ,2022).

Concerning descriptive algorithms, the HR department implements this type of algorithm for various purposes. The first is to analyze past data to determine the

impact of this past data on the present HR department in the ministry (Bhardwaj, Singh, & Kumar, 2020). In addition, descriptive algorithms enable the HR department to find out the associations between the practices of the HR department (Fix, 2018). Moreover, employees' motivation is tracked in the HR department. Employees' emotions towards the department are also analyzed through reliance on descriptive algorithms in the HR department in the ministry (El-Rayes , Fang , Smith, & Taylor , 2020). This ensures that the HR department in the ministry makes use of simple statistics that enable them to find out accurate results about the practices they undertake and how they are correlated. One of the examples of statistical analyses employed in the HR department in the ministry is the balanced scorecard.

The Kingdom of Bahrain has recently experienced a significant breakthrough in technology (Adel Ismail AL-ALAWI, 2020). Predictive algorithms are effectively applied in the HR department in the Ministry of Works, Municipality Affairs, and Urban Planning in Bahrain for a variety of reasons. The most important issue for implementing predictive algorithms is ensuring forecasts concerning the consequences of specific past- or real-time observations on future outcomes (Fuad, Al-Hashimi, & Hamdan , The impact of innovative technology on the aviation industry and customer preference. , 2021). When predictive algorithms are applied, HR employees are more likely to understand what some HR outcomes (or situations) look like. Through increased reliance on predictive algorithms, some of the suspicious behaviors adopted by the HR employee can be monitored (Gupta, 2022). Predictive algorithms implementation occurs through advanced regression techniques, machine-learning algorithms, and data mining approaches (Khera & Divya, 2018).

Prescriptive algorithms are moderately applied in the HR department in the ministry. There is an agreement that the primary purpose for which prescriptive algorithms are employed is to delineate what should be done based on different possible scenarios. This is the case in the HR department of the ministry (Berhil, Benlahmar, & Laban, 2020). Implementing prescriptive algorithms leads to various courses of action for HR specialists to benefit from alternative scenarios and demonstrate the consequences of each possible decision. What enhances the opportunities of employing prescriptive algorithms adequately in the HR department in the ministry is that HR employees hold academic degrees (Leong, 2018).

Despite being a complicated process, the HR decision-making process in the HR department is made effective. The effectiveness of the HR decision-making process in the department stems from the fact that the employees concentrate on making the decisions at the right time. Timing of the decision supports the department in making the right decision that serves the essential purposes (WirePiazza, 2018). The increased dependence on algorithm-based HR decision-making and the attempt to avoid any negative influences support the quality of HR decisions (Abdeldayem & Aldulaimi, 2020). A thing that adds more value to the HR decisions in the ministry is that the department exerts great efforts to link the HR decisions to the organization's goals. When HR practitioners relate the department's objectives with the organization's overall goals, many strategic goals are achieved, including enhancing the performance and productivity of the organization (Albert E. , 2019).

The correlation between descriptive, predictive, and prescriptive algorithms and the HR decision-making processes in the ministry that supports the effective implementation of the three algorithms. It is found that descriptive, predictive, and prescriptive algorithms are positively and significantly correlated with the HR

decision-making processes in the ministry. This is supported by the conclusions of various previous research that indicate that algorithm-based decision-making can support human sense-making as it can enable HR practitioners to make decisions that are distinguished by being highly rational, highly fact-driven, and extremely reliable. Prescriptive algorithms increase the amount of information, usually without stipulating interpretation patterns (Gupta, 2022).

The focus of the HR department is on enhancing the implementation of AI in HR practices by finding out that There is a significant effect of applying artificial intelligence algorithms on the process of HR decision-making in The Ministry of Works, Municipality Affairs and Urban Planning in Bahrain. In addition, it is found that the descriptive, predictive, and prescriptive algorithms, in addition to the non-stop focus on HR decisions, all led to generating a positive and significant impact for applying artificial intelligence algorithms on the process of HR decision-making in The Ministry of Works, Municipality Affairs and Urban Planning in Bahrain. This is found to comply with the conclusions of (Bhalgat , 2019) and (Sheila , Steven , had , & Mayank , 201).

While applying prescriptive algorithms significantly and positively impacts the process of HR decision-making in The Ministry of Works, Municipality Affairs, and Urban Planning in Bahrain, it is found that descriptive algorithms and predictive algorithms produce an insignificant impact on the process of HR decision-making in the ministry. This is inconsistent with the conclusions of (Wicks, 2022)

5.3. Recommendations

Good recommendations for this research are elicited both from the theoretical and practical sections of this research. The recommendations are categorized into the following:

- Recommendations for HR Management
- Recommendations for The Ministry of Works, Municipality Affairs, and Urban Planning in Bahrain.
- Recommendations for Future Researchers

5.3.1. Recommendations for HR Management

1- HR managers are recommended to search for more knowledge sources that explain how AI applications can be integrated into HR practices in public sector organizations. This knowledge is considered a means to understand and improve the HRM practices in the ministry. Employees in the HR department can be encouraged to conduct research by themselves about this knowledge domain.

2- HR managers in the ministry can concentrate on employees who lack the required experience to deal with AI applications and how to integrate them into their work correctly.

3- HR managers in the public sector can exert more effort to devise better methods and opportunities to integrate AI applications in HR practices and improve the quality of the integration.

5.3.2. Recommendations for Ministry of Works, Municipality Affairs, and Urban Planning in Bahrain:

1- The Ministry of Works, Municipality Affairs, and Urban Planning in Bahrain is required to concentrate on AI implications in all ministry practices.

2- Improved opportunities must be sought to train and develop employees in the Ministry of Works, Municipality Affairs, and Urban Planning in Bahrain concerning the improvements in the algorithm-based decision-making process in the HR sector.

3- Seeking highly qualified and competent employees is a significant concern for the HRM in Bahrain's Ministry of Works, Municipality Affairs, and Urban Planning. Competent and highly qualified employees generate better opportunities for the integration of AI in the practices of the ministry.

5.3.3. Recommendations for future researchers:

- 1- More research can be conducted about integrating AI applications in the government sector in Bahrain.
- 2- Future research has been carried out to explore the influence of algorithm-based HR decision-making on the effectiveness of HRM in the public sector.
- 3- Future research can be conducted to explore the influence of algorithm-based HR decision-making on organization agility in the public sector.

5.4. Implications

5.4.1 Theoretical implications

The theoretical implications of the present research can be observed through the researcher's ability to present to introduce all the theories and models that explain the influence of AI applications on the HR decision-making process. The presentation of these theories facilitates the readers' recognition of the two variables and how they can be correlated. This provides an opportunity for future researchers to get them collected in one study in this knowledge domain.

A better theoretical background about the research variables and the link between them is provided in this research through the second chapter. This facilitates collecting related literature about this topic and these variables for future researchers.

5.4.2. Practical implications

The conclusions reached through this research can be implemented by the Bahrain government bodies linked to HRM in the Ministry of Works, Municipality Affairs, and Urban Planning in Bahrain, including the Ministry of Interior, Ministry of Housing, and ministry of Investment, industry, and Tourism.

Many private sector organizations that deal with the Ministry of Works, Municipality Affairs, and Urban Planning in Bahrain will likely use the present research's conclusions.

Furthermore, HRM practitioners are more likely to exploit the research findings to know more about the significance of AI applications in the HR profession.

5.5. Research Limitations

The fact is that no research is perfect. Therefore, there is a research limitation that is associated with this research.

This research is geographically limited to Bahrain and the Ministry of Works, Municipality Affairs, and Urban Planning in Bahrain. This created a limited sample on which the research instrument was circulated. Accordingly, the results and findings of this research might be generalized to only a few other hospitals.

A third limitation apparent through the implementation of the research instrument is that it was based on a self-reporting and self-administered questionnaire. Such type of instrument is usually associated with sampling bias risk and accuracy risk and is limited to the understanding ability of the respondent. There could be some triangulation in which interviews could have been incorporated with the questionnaire.

References list

- Eubanks, B. (2022). *Artificial intelligence for HR: Use AI to support and develop a successful workforce.* . Kogan Page Publishers.
- Chowdhury, S. (2022). "Unlocking the value of artificial intelligence in human resource management through AI capability framework.. *Human Resource Management Review*, 100899.
- Renkema, M. (2022). Consequences of artificial intelligence in human resource management." *Handbook of Research on Artificial Intelligence . Human Resource Management.*
- Poole, D., & Mackworth, A. (2017). *Artificial Intelligence: Foundations of Computational Agents (2nd ed.)* . Cambridge , UK: Cambridge University Press.
- Raj , M., & Seamans, R. (2019). Primer on artificial intelligence and robotics. *Journal of Organization Design*, 8(11), 2-4.
- Broussard, M. (2018). Artificial unintelligence: how computers misunderstand the world. *MIT Press, Cambridge.*
- Rich, E., & Knight, K. (1991). Artificial Intelligence. *McGraw-Hill Education.*
- Crowder, J., & Friess, S. (2013). Artificial Psychology: The Psychology of AI. *Systemics, Cybernetics and Informatics*, 11(8), 1690-4524.
- Aparna , V., & Ramachandran, K. (2019). Reconnoitring Artificial Intelligence in Knowledge Management. *International Journal of Innovative Technology and Exploring Engineering (IJITEE)*, 8(7), 2278-3075.
- Wang, X., Lin, X., & Shao, B. (2022). How does artificial intelligence create business agility? Evidence from chatbots. *International Journal of Information Management*, 66(2022).
- Gupta, S. (2022). Artificial intelligence for decision support systems in the field of operations research: review and future scope of research." . *Annals of Operations Research*, 308(1), 215-274.
- Berhil, S., Benlahmar, H., & Laban, N. (2020). A review paper on artificial intelligence at the service of human resources management. *Indonesian Journal of Electrical Engineering and Computer Science*, 18(1), 32-42.
- Jatoba, M., Gutierri, I., Fernandes, P., Paula, O., Teixeira, J., & Moscon, D. (2019). Artificial intelligence in the recrutment & selection: innovation and impacts for the human resources management. *In 43rd International Scientific Conference on Economics and Social Development*, (pp. 96-104). Aveiro.
- Albert, E. (2019). AI in talent acquisition: a review of AI-applications used in recruitment and selection. *Strategic HR Review*, 18(5), 215-221.
- Leicht-Deobald, U., Busch, T., Schank, C., Weibel, A., Schafheitle, S., & Wildhaber, I. (2019). The Challenges of Algorithm-Based HR Decision-Making for Personal Integrity. *Journal of Business Ethics*, 160(2019), 377–392.

- Reddy, P., & Lakshmikeerthi, P. (2017). 'HR Analytics' - An Effective Evidence Based HRM Tool. *International Journal of Business and Management Invention*, 6(7).
- Bharti, A. (2017). Human resource analytics. *South Asian Journal of Marketing & Management Research*, 7(5), 68-77.
- Sivathanu, B., & Pillai, R. (2019). Technology and talent analytics for talent management—a game-changer for organizational performance. *Int J Organ Anal* 28(2):457–473.
- Bhalgat, K. (2019). An exploration of how Artificial Intelligence is impacting Recruitment and Selection process. *Doctoral dissertation, Dublin Business School*.
- Erixon, F. (2018). Recipe. Retrieved from the economic benefits of globalization for business and consumers.
- Stanley, D., & Aggarwal, V. (2019). Impact of disruptive technology on human resource management practices. *International Journal of Business Continuity and Risk Management*, 9(4), 350-361.
- Vinichenko, M., & et al. (2019). Rybakova, M. V., Chulanova, O. L., Kuznetsova, I. V., Makushkin, S. A., & Lobacheva, A. S. (2019). Using natural and artificial intelligence in the talent management system. *International Journal of Recent Technology and Engineering*, 8(3), 7417-7423.
- Delle Donne, B. (2017). Guiding talent acquisition technology into the future 2017 State of Talent Acquisition Technology. *New York: Talent Tech Labs.*, (pp. 5–23).
- Prem, E. (2019). Artificial intelligence for innovation in Austria. . *Technol Innov Manag Rev* 9(12):5–15.
- WirePiazza, L. (2018). How Can Artificial Intelligence Work for HR? . *SHRM*.
- Nawaz, N., & Gomes, A. (2019). Artificial intelligence chatbots are new recruiters. *Int J Adv Comput Sci Appl*.
- StarMeUp, O. (2018). Re: the-power-and-possibilities-of-ai-in-talent-management.
- Srivastava, S. (2021). Top 10 Countries leading the artificial intelligence race. *Analyticsinsight.net*.
- Aspan, H. (2020). Individual characteristics and job characteristics on work effectiveness in the state-owned company: the moderating effect of emotional intelligence. *Int J Innov Creat Chang (IJICC)* 13(6):761– 774.
- Seaver, N. (2017). Algorithms as culture: Some tactics for the ethnography of algorithmic systems. *Big Data & Society*, 4(2), 2053951717738104.
- Thomas, S., Nafus, D., & Sherman, J. (2018). Algorithms as fetish: Faith and possibility in algorithmic work. *Big Data & Society*, 5(1), 2053951717751552.
- Iwamoto, T. (2019). Development of the HR tech market in Japan. In: *2019 Portland international conference on management of engineering and technology (PICMET)*. IEEE, pp 1–4.
- Davenport, T., & Ronanki, R. (2018). Artificial intelligence for the real world. . *Harvard Business Review*, January-February(3), 1-10.

- Olushola, T., & Abiola, J. (2017). The efficacy of technology acceptance model: A review of applicable theoretical models in information technology researches. *Journal of Research in Business and Management*, 4(11), 70–83.
- Mesko, B. (2017). The role of artificial intelligence in precision medicine. *Expert Rev Precis Med Drug Dev*. 2017:1–3.
- Berhil, S., Benlahmar, H., & Labani, N. (2020). A review paper on artificial intelligence at the service of human resources management. . *Indones J Electr Eng Comput Sci* 18(1):32–40.
- Lou, F., & Li, Y. (2017). Integrating innovation diffusion theory and the technology acceptance model: The adoption of blockchain technology from business managers perspective. In: *Proceedings of The 17th International Conference on Electronic Business*, pp: 293–296. ICEB, Dubai, UAE, December 4–8.
- Keding, C. (2021). Understanding the interplay of artificial intelligence and strategic management: four decades of research in review. *Manag Rev Q* 71:91–134.
- Anagnoste, S. (2018). Robotic automation process– the operating system for the digital enterprise. In: *Proceedings of the International Conference on Business Excellence* 12(5):54– 69.
- Bucher, T. (2017). The algorithmic imaginary: Exploring the ordinary affects of facebook algorithms. *Information, Communication & Society*, 20(1), 30–44.
- Liang, T., & Liu, Y. (2018). Research landscape of business intelligence and big data analytics: a bibliometrics study. *Expert Syst Appl* 111:2–10.
- Dubey, R., Gunasekaran, A., & Childe, S. (2019). Big data analytics capability in supply chain agility. . *Manag Decis* 57(8):2092–2112.
- Möhlmann, M., & Zalmanson, L. (2017). Hands on the wheel: Navigating algorithmic management and uber drivers' autonomy. In *International conference on information systems (ICIS 2017)*, Seoul, South Korea, December 10–13, 2017.
- Oracle. (2019). Report of the 2019 state of artificial intelligence in talent acquisition.
- Ananny, M., & Crawford, K. (2018). Seeing without knowing: Limitations of the transparency ideal and its application to algorithmic accountability. *New Media & Society*, 20(3), 973–989.
- Willson, M. (2017). Algorithms (and the) everyday. *Information, Communication & Society*, 20(1), 137–150.
- Neyland, D., & Möllers, N. (2017). Algorithmic if ... then rules and the conditions and consequences of power. *Information, Communication & Society*, 20(1), 45–62.
- Bersin, J. (2018). Talent trends technology disruptions for 2018.
- MMH, B. (2019). Re: employee-retention/talent-retention-using-artificial-intelligence.
- Dabirian, A. (2019). Employer branding in the IT industry: AN employer view. *2019 IEEE 43rd annual computer software and applications conference (COMPSAC)*, vol 1, pp 548–548. IEEE.

- Tursunbayeva , A. (2019). Human resource technology disruptions and their implications for human resources management in healthcare organizations. . *BMC Health Serv Res* 19(1):268.
- Khera , S., & Divya. (2018). Predictive modelling of employee turnover in Indian IT industry using machine learning techniques. . *Vision* 23(1):12–21.
- Mohamed, I. (2017). Some Issues in The Institutional Theory: A Critical Analysis,. *International Journal of Scientific & Technology Research*, 6(9), 150-155.
- Marler , J., & Boudreau , J. (2017). An evidence-based review of HR Analytics. *Int J Hum Resour Manag* 28(1):3–26.
- Liu , J., Wang , T., Li , J., Huang , J., Yao , F., & He , R. (2019). A data-driven analysis of employee promotion: the role of the position of organization. . In: *2019 IEEE international conference on systems, man and cybernetics (SMC)*. IEEE, pp 4056–4062.
- Donne, B. D. (2017). Guiding talent acquisition technology into the future 2017 State of Talent Acquisition Technology (pp. 5–23). *New York: Talent Tech Labs*.
- Cançado, L. V., Vendramine, F. C., Oliveira,, A. D., Elizângela, J., & Castro. , P. D. (2017). Revisiting the Four Faces of Human Resource Management. In: *ANPAD Meetings – Enanpad, 2017. São Paulo/SP – 1 -4*.
- Castriotta , M., Loi , M., Marku , E., & Naitana , L. (2019). What’s in a name? Exploring the conceptual structure of emerging organizations. *Scientometrics* 118(2):407–437.
- Liu, G. (2017). 71. Research on Human Resource Intelligence System Based on Knowledge. . *Boletín Técnico, ISSN: 0376-723X*, 55(19).
- ASDO, G., & RCL, D. (2020). A Process for human resource performance evaluation using computational intelligence: an approach using a combination of rule-based classifiers and supervised learning algorithms. . *IEEE Access* 8:39403–39419. .
- Boon, C., Den Hartog, D., & Lepak, D. (2019). A Systematic Review of Human Resource Management Systems and Their Measurement. *Journal of Management*, 45(6), 2498-2537.
- Zehir , C., Karaboğa , T., & Başar , D. (2020). The transformation of human resource management and its impact on overall business performance: big data analytics and AI technologies in strategic HRM. In: *Digital business strategies in blockchain ecosystems*. Springer, Cham, pp 265–279.
- Sharma, D. (2021). Analysis Of Challenges Facing Human Resources Management In Current Scenario. *International Journal of Innovative Technology and Exploring Engineering* 8(6s2):159-161.
- Mayrhofer, W., Gooderham, P., & Brewster, C. (n.d.). Context and HRM: Theory, Evidence, and Proposals.
- Nijjer , S., Singh, J., & Raj , S. (2019). Developing HRIS for predictive attrition and retention management of Indian IT engineers-using ANN. *ANOVA and Smart PLS*.

- Brockmann , P., Schuhbauer , H., & Hinze , A. (2019). Diversity as an Advantage: An Analysis of Career Competencies for IT Students. . *16th international conference cognition and exploratory learning in digital age, CELDA*, pp 209–216.
- O'Donovan , D. (2019). HRM in the organization: AN overview. In: Machado C, Davim J (eds) *Management science management and industrial engineering. Springer, Cham*, pp 75–110.
- Bernstein, E. (2017). Making transparency transparent: The evolution of observation in management theory. *Academy of Management Annals*,11(1), 217–266.
- Ajunwa, I., Crawford, K., & Schultz, J. (2017). Limitless worker surveillance. *California Law Review*,105, 735–776.
- Mahmoud , A., Shawabkeh , T., Salameh , W., & Al Amro , I. (2019). Performance predicting in hiring process and performance appraisals using machine learning. In: *2019 10th international conference on information and communication systems (ICICS). IEEE*, pp110–115.
- Albert , E. (2019). AI in talent acquisition: a review of AI-applications used in recruitment and selection. *Strateg. HR Rev.* 18(5):215– 221.
- Nascimento, M. A., & Queiroz, M. A. (2017). Overview of research on Artificial Intelligence in Administration in Brazil.” . In: *ANPAD Meetings – Enanpad, 2017. São Paulo/SP – 1 -4*.
- Kamble, S. (2021). The Impact Of Artificial Intelligence In Human Resource Decision Making Processes. *Inc42 Plus*.
- Esch , V. P., Black, J., & Ferolie, J. (2019). Marketing AI recruitment: the next phase in job application and selection. *Comput Human Behav* 90:215–222.
- Kaplan, A., & Haenlein, M. (2019). Siri, Siri, in my hand: Who’s the fairest in the land? On the interpretations, illustrations, and implications of artificial intelligence. . *Business Horizons*, 62(1), 15-25.
- Pillai , R., & Sivathanu , B. (2020). Adoption of artificial intelligence (AI) for talent acquisition in IT/ITeS organizations. *Benchmarking Int J* 27(9):2599–2629.
- Galanaki , E., Lazazzara , A., & Parry , E. (2019). A cross-national analysis of E-HRM configurations: integrating the information technology and HRM perspectives. In: Lazazzara A, Nacamulli R, Rossignoli C Za S (eds) *Organizing for digital innovation. Lecture notes in information systems and organisation, vol 27. Springer, Cham*, pp 261–276. .
- IBM. (2018). Power your candidate experience with AI. <https://twitter.com/IBMWatsonTalent?lang=en>.
- Why, M. (2018). 4 reasons why an automated hiring process will help your company. *Select International, a psi business (Vol. 2018). Pittsburg, PA: Select International*.
- Mariana , J., Juliana , S., Gutierrez, I., Mosconb, D., Fernandes, P., & Teixeira, J. (2019). Evolution of Artificial Intelligence Research in Human Resources. *Procedia Computer Science* 164 (2019) 137–142.

- IEEE. (2017). Prioritizing human well-being in the age of artificial intelligence. *Piscataway, NJ: IEEE-Standards Association*.
- Bhardwaj, G., Singh, S., & Kumar, V. (2020). An empirical study of artificial intelligence and its impact on human resource functions. *Proceedings of International Conference on Computation, Automation and Knowledge Management, ICCAKM 2020, 47-51*.
- Mahmood, M. (2018). The role of ICT in the transformation of government and citizen trust.
- Hamdan, A., Hassanien, A., Khamis, R., Alareeni, B., Razzaque, A., & Awwad, B. (2021). Applications of Artificial Intelligence in Business, Education and Healthcare. *Studies in Computational Intelligence Volume 954*.
- Fakhro, A. (2017). Down the road to "Bahrain 2030" internship programs and graduates' employability. . *British Journal of Education, 5(7), 15–25*.
- Radhi, F. H. (2019). Bahrain data protection overview. . Retrieved from HASSAN RADHI & ASSOCIATES.
- Upadhyay, A., & Khandelwal, K. (2018). Applying artificial intelligence: implications for recruitment. . *Strategic HR Review, 17(5), 255-258. doi: 10.1108/SHR-07-2018-0051*.
- Fadhul, S., & Hamdan, A. (2020). The role of "fintech" on banking performance. *Proceedings of the European Conference on Innovation and Entrepreneurship, ECIE2020-September, pp. 911–914*.
- Razzaque, A., & Hamdan, A. (2020). Role of financial technology fintech: A survey. . *Advances in Intelligent Systems and Computing, 1153 AISC, pp. 112–117*.
- Abdeldayem, M., & Aldulaimi, S. (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*.
- Fuad, A., Al-Hashimi, M., & Hamdan, A. (2021). The impact of innovative technology on the aviation industry and on customers preference. . *Studies in Computational Intelligence, 2021, 935, pp. 57–*.
- Chakraborty, S., Giri, A., Aich, A., & Biswas, S. (2020). Evaluating influence of artificial intelligence on human resource management using PLS-SEM (Partial least squares-structural equation modeling). *International Journal of Scientific and Technology Research, 9(3), 5876-5880*.
- Mesquita, L. D. (2018). The "Artificial" Consumer: Approaches between Artificial Intelligence and Marketing. In: *ANPAD Meetings –Enanpad, 2018. Curitiba/PR – 3-6*.
- Suen, H., Hung, K., & Lin, C. (2020). Intelligent video interview agent used to predict communication skill and perceived personality traits. . *Human-Centric Comput Inf Sci 10(1):1–12*.
- Harris, C. (2018). Making Better Job Hiring Decisions using "Human in the Loop" Techniques. *USA: University of Northern Colorado, Greeley, CO*.
- Nawaz, N. (2020). Exploring artificial intelligence applications in human resource management. *Journal of management Information and Decision Sciences, 23(5), 552-563*.

- Pillai, R., & Sivathanu, B. (2020). Adoption of artificial intelligence (AI) for talent acquisition in IT/ITeS organizations. *Benchmarking*, 27(9), 2599-2629.
- Nicastro, D. (2018). 7 Ways Artificial Intelligence is Reinventing Human Resources.CMS.
- Markopoulos, E., Kirane, I., Balaj, D., & Vanharanta, H. (2019). Artificial Intelligence and Blockchain Technology Adaptation for Human Resources Democratic Ergonomization on Team Management. *Human Systems Engineering and Design II pp 445-455*.
- Baldegger, R., Caon , M., Sadiku, K., Ransbotham, S., Gerbert, P., Reeves, M., & Spira, M. (2017). Introduction and Background/Context Correlation between Entrepreneurial Orientation and Implementation of AI in Human Resource Management (HRM). 10(4), 72–79.
- Thelwall , M. (2018). Gender bias in machine learning for sentiment analysis. *Online Information Review*,42(3), 343–354.
- Randstad . (2020). How will artificial intelligence affect your talent acquisition strategy.
- Lee, M. (2018). Understanding perception of algorithmic decisions: Fairness, trust, and emotion in response to algorithmic management. *Big Data & Society*,5(1), 2053951718756684.
- Beer , D. (2017). The social power of algorithms. *Information, Communication & Society*,20(1), 1–13.
- Tutt , A. (2017). An FDA for algorithms. *Administrative Law Review* (83); 2017.
- Kitchin , R. (2017). Thinking critically about and researching algorithms. *Information, Communication & Society*,20(1), 14–29.
- Kaushal, N., Kaurav, R. P., Sivathanu, B., & Kaushik, N. (2020). Artificial intelligence and HRM: identifying future research Agenda using systematic literature review and bibliometric analysis. *Management Review Quarterl*.
- Lowrie, I. (2017). Algorithmic rationality: Epistemology and efficiency in the data sciences. *Big Data & Society*,4(1), 2053951717700925.
- Norikumo , S. (2019). Changes in organizations due to management mechanization (case studies of life insurance companies in Japan). *In: Intelligent decision technologies 2019. Springer, Singapore, pp 249–257*.
- Frisk , J., & Bannister , F. (2017). Improving the use of analytics and big data by changing the decision-making culture. *Manag Decis* 55(10):2074–2088.
- Shilton, K., & Anderson, S. (2017). Blended, not bossy: Ethics roles, responsibilities and expertise in design. *Interacting with Computers*. 29(1),, 71–79.
- Martin, K. (2018). Ethical implications and accountability of algorithms. *Journal of Business Ethics*.
- Noble, S. (2018). Algorithms of oppression: How search engines reinforce racism. *New York: New York University Press*.
- Sheila , L., Steven , G., Chad , M., & Mayank , G. (2018). The new age: artificial intelligence for human resource opportunities and functions. . *Ernst & Young LLP* 1–8.

- Leicht-Deobald, U., & al., e. (2019). The Challenges of Algorithm-Based HR Decision-Making for Personal Integrity. *Journal of Business Ethics* volume 160, pages377–392.
- Leclercq-Vandelannoitte, A. (2017). An ethical perspective on emerging forms of ubiquitous it-based control. *Journal of Business Ethics*,142(1), 139–154.
- Devlin, H. (2017). AI programs exhibit racial and gender biases, research reveals.
- Khalifa, M., Al Baz, M., & Muttar, A. K. (2022). The Impact of Applying Artificial Intelligence on Human Resources Crisis Management: An Analytical Study on COVID19. *International Journal of Thin Film Science and Technology*.
- Creswell, J. (2012). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research*. Upper Saddle River, NJ: Prentice Hall.
- Ahuja, R. (2010). *Research Methodology*. New Delhi: Rawat Publication, p. 121.
- Ary, D. (2018). *Introduction to research in education*. Cengage Learning.
- Roni, S., & Margaret, K. (2020). *Conducting quantitative research in education..* Germany: Springer.
- Mcmaster, C., & Cook, R. (2019). The contribution of intersectionality to quantitative research into educational inequalities. *Review of Education* , 7(2), 271-292.
- Boeren, E. (2018). The methodological underdog: A review of quantitative research in the key adult education journal. *Adult Education Quarterly*, 68(1), 63-79.
- Vaus , D. (2011). *Research Design in Social Research*. New Delhi: Sage Publication.
- Kothari, C. R. (2010). *Research Methodology: Methods and Technique*. New Delhi, India: New Age International Publishers.
- Shields, P., & Rangarjan, N. (2013). *A Playbook for Research Methods: Integrating Conceptual Frameworks and Project Management*. Stillwater: New Forums Press.
- Mustafa, A. (2010). *Research Methodology*. Delhi, India: A.I.T.B.S Publishers.
- Jackson, S. (2009). *Research Methods and Statistics: A Critical Thinking Approach 3rd edition*. , s.l. Belmont, CA: Wadsworth..
- Ajayi, O. V. (2017). Distinguish between primary sources of data and secondary sources of data. *Benue State University, Makurdi Faculty of Education, Department of Curriculum and Teaching*.
- Sparrow , P. (2015). *Primary Research Advantages And Disadvantages*. Retrieved from <http://www.ianswer4u.com/2012/02/primary-research-advantages-and.html#axzz4U7ajay60>.
- Charles, C., & Mertler, C. (2000). *Introduction to educational research (4th ed.)*. Boston: Allyn & Bacon.
- Bhandari, P. (2020, June Tuesday). *Population vs sample: what's the difference?* Retrieved from Scribbr: <https://www.scribbr.com/methodology/population-vs-sample/>
- Roopa, S., & Rani, M. S. (2017). Questionnaire Designing for a Survey. *The Journal of Indian Orthodontic Society*, 273-274.

- El-Rayes , N., Fang , M., Smith, M., & Taylor , S. (2020). Predicting employee attrition using tree-based models.
- Bryman , A., & Bell, E. (2015). *Business Research Methods* (4th ed.). Oxford: Oxford University Press.
- MUN. (2022, November 1). *About the Ministry* . Retrieved from MUN:
<https://www.mun.gov.bh/manama/indexEn.jsp>
- Lambert, M. (2022). Remission in schizophrenia: validity, frequency, predictors, and patients' perspective 5 years later. *Dialogues in clinical neuroscience*.
- Flake, J. (2022). Construct validity and the validity of replication studies: A systematic review. *American Psychologist*.
- Cofresí, R. (2022). Internal consistency and test–retest reliability of the P3 event-related potential (ERP) elicited by alcoholic and non-alcoholic beverage picture. *Psychophysiology*, 59(2).
- Zhang, C. (2021). Reliability, validity, and measurement invariance of the general anxiety disorder scale among chinese medical university students. *Frontiers in psychiatry*, 12(2021).
- Cronbach, L. (1990). *Essentials of psychological testing*. . New York.: Harper & Row.
- Lightfoot, C. (2021). Reliability and validity of the patient activation measure in kidney disease: results of rasch analysis.. *Clinical Journal of the American Society of Nephrology* , 16(6), 880-888.
- Lazar, J., & Hochheise, H. (2017). *r, in Research Methods in Human Computer Interaction (Second Edition),*. Sage.
- Fix, B. (2018). The Trouble with Human Capital Theory, Real-World Economics Review,. *World Economics Association, Bristol, Issue no. 86, Pp. 15-32*.
- Fuad, A., Al-Hashimi, M., & Hamdan , A. (2021). The impact of innovative technology on the aviation industry and on customers preference. . *Studies in Computational Intelligence*, 2021, 935, pp. 57–69.
- Leong, C. (2018). Technology & recruiting 101: how it works and where it's going. *Strategic HR Review*, 17(1), 50-53.
- Wicks, D. (2022, January 12). *The Advantages of HR Decision Making in International Business Operation*. Retrieved February 20, 2022, from Chron: <https://smallbusiness.chron.com/>
- Chwastek, R. (2017). Cognitive systems in human resources: international conference on behaviora. *Economic, Socio-Cultural Computing (BESC)*, 1-5.
- Cresswell, A. (2018, April 27). *Can AI bridge the confidence gap for women in senior positions?* Retrieved October 4, 2021, from personnel today: www.personneltoday.com/hr/can-ai-bridge-the-confidence-gapfor-women-in-senior-positions/
- Niehueser , W., & Boak, G. (2020). Introducing artificial intelligence into a human resources function. *Industrial and Commercial training Journal*, 52(20), 121-130.

- Ananny, M., & Crawford, K. (2018). Seeing without knowing: Limitations of the transparency ideal and its application to algorithmic accountability. <https://doi.org/10.1177/1461444816676645>. *New Media & Society Journal*, 20(3), 973–989.
- Mohammed, A. (2019). HR ANALYTICS: A MODERN TOOL IN HR FOR PREDICTIVE DECISION MAKING. *Journal of Management (JOM)*, 6(3), 51-63.
- Schmidhuber, J. (2015). Deep Learning in Neural Networks: An Overview. *Neural Networks*, 61(2015), 85–117.
- Souza, G. (2014). Supply chain analytics. *Business Horizons*, 57(5), 595–605.
- Krumeich, J., Werth, D., & Loos, P. (2016). Prescriptive control of business processes. *Business & Information Systems Engineering*, 58(4), 261–280.
- Burrell, J. (2016). How the machine ‘thinks’: Understanding opacity in machine learning algorithms. *Big Data & Society*, 3(1).
- Bido, D., & Da Silva, D. (2019). Smart PLS 3: Specification, Estimation, Evaluation, and reporting. *Administração Ensino e Pesquisa*, 20(2), 465-513.
- Jia , Q., Guo , Y., Li , R., Li , Y., & Chen , Y. (2018). A conceptual artificial intelligence application framework in human resource management. . In: *Proceedings of the international conference on electronic business*, pp 106–114.
- Bhardwaj , G., Singh , S., & Kumar , V. (2020). An empirical study of artificial intelligence and its impact on human resource functions. In: *2020 International Conference on Computation, Automation and Knowledge Management*.
- Liu , C., Li , Z., Zhou, D., & Shi , Y. (2019). Organizational innovation of Sci-Tech societies in the era of intelligence: a case study in China. In: *2019 Portland international conference on management of engineering and technology (PICMET)*. IEEE, pp 1–7.
- Mikhaylov , S., Esteve , M., & Campion , A. (2018). Artificial intelligence for the public sector: opportunities and challenges of cross-sector collaboration. *Philos Trans R Soc Math Phys Eng Sci* 376(2128):20170357.
- Strozzi , F., Colicchia , C., Creazza , A., & Noè , C. (2017). Literature review on the ‘Smart Factory’ concept using bibliometric tools. *Int J Prod Res* 55(22):6572–6591.
- Berhil , S., Benlahmar , H., & Labani , N. (2020). A review paper on artificial intelligence at the service of human resources management. . *Indones J Electr Eng Comput Sci* 18(1):32–40.
- Jia, Q., Guo, Y., Li, R., Li, Y., & Chen, Y. (2018). A Conceptual Artificial Intelligence Application Framework in Human Resource Management. *8th International Conference on Electronic Business*, 106-114.
- Moyo , S., Doan , T., Yun , J., & Tshuma , N. (2018). Application of machine learning models in predicting length of stay among healthcare workers in underserved communities in South Africa. . *Hum Resour Health* 16(1):68.

- Prentice , C., Lopes , S., & Wang , X. (2020). Emotional intelligence or artificial intelligence—an employee perspective. *J Hosp Mark Manag* 29(4):377–403.
- McDonald , K., Fisher , S., & Connelly , C. (2017). e-HRM systems in support of “smart” workforce management: An exploratory case study of system success. *Electronic HRM in the smart era*, 87–108.
- Al kurdi, O. (2021). A critical comparative review of emergency and disaster management in the arab world. . *Journal of Business and Socio-economic Development*, 1(1), 24–46.
- Nawaz, N. (2019). Artificial intelligence is transforming recruitment effectiveness in CMMI level companies. *International Journal of Advanced Trends in Computer Science and Engineering* 8(6), 3017-3021.
- Nawaz, N. (2020). Artificial intelligence applications for face recognition in recruitment process. . *Journal of management Information and Decision Sciences*, 23(S1), 499-509.
- Nawaz, N., & Gomes, A. (2019). Artificial intelligence chatbots are new recruiters. *International Journal of Advanced Computer Science and Applications*, 10(9), 1-5.
- Upadhyay, A., & Khandelwal, K. (2018). Applying artificial intelligence: implications for recruitment. *Strategic HR Review*, 17(5), 255-258.
- Brynjolfsson , E., & Mitchell , T. (2017). What can machine learning do? *Workforce implications*. *Science* 358:1530–1534.
- Chiradeep, M. B. (2019). Re: how-ai-identifies-fight-risk-and-helps-retain-high-value-employees.
- Nawaz , N. (2019). Artificial intelligence interchange human intervention in the recruitment process in Indian software industry. . *Int J Adv Trends Comput Sci Eng*.
- Pillai , R., & Sivathanu , B. (2021). Measure what matters: descriptive and predictive metrics of HRM pathway toward organizational performance. *Int J Prod Perf Manag*.
- Reddy , A., Rani , R., & Chaudhary , V. (2019). Technology for sustainable HRM: an empirical research of health care sector. *Int J Innovative Technol Exploring Eng* 9(1):2919–2924.
- Upadhyay , A., & Khandelwal , K. (2018). Applying artificial intelligence: implications for recruitment. *Strateg HR Rev* 17(5):255–258. .
- Wang , X., & Wang , C. (2017). Research on intelligent evaluation system of human resources based on knowledge perspective. *Boletin Tecnico/tech Bull* 55:656–663.
- Scott , W., & O'Connor . (2020). Artificial Intelligence in Human Resource Management. *Northeastern University*.
- Kamble, S. (2021). The Impact Of Artificial Intelligence In Human Resource Decision Making Processes.
- Singh, A., & Shaurya, A. (2021). Impact of Artificial Intelligence on HR practices in the UAE. *HUMANITIES AND SOCIAL SCIENCES COMMUNICATIONS* .

- Kaushal , N., & et al. (2021). Artificial intelligence and HRM: identifying future research Agenda using systematic literature review and bibliometric Analysis.
- Wamba , S. (2022). Impact of artificial intelligence assimilation on firm performance: The mediating effects of organizational agility and customer agility. *International Journal of Information Management*, 67(2022).
- Al-Hawamdeh., M., & Aisher, S. (2022). "Artificial Intelligence Applications as a Modern Trend to Achieve Organizational Innovation in Jordanian Commercial Banks." *The Journal of Asian Finance, Economics and Business* , 9(3), 257-263.
- Winer, B., Brown, D., & Michels, K. (1991). *Statistical Principles in Experimental Design, Third Edition*. (Third ed.). New York: McGraw-Hill.
- George, D., & Mallery, M. (2010). (2010). *SPSS for Windows Step by Step: A Simple Guide and Reference, 17.0 update (10a ed.)* . Boston: Pearson.
- Byrne, B. (2010). *Structural equation modeling with AMOS: Basic concepts, applications, and programming*. New York: Routledge.
- Connelly, L. (2013). Demographic data in research studies. *MedSurg Nursing*, 22(4), 269.
- Leicht-Deobald, U. (2022). The challenges of algorithm-based HR decision-making for personal integrity. *Business and the Ethical Implications of Technology*, 71-86.
- A. I. Al-Alawi, M. Naureen, E. I. AlAlawi and A. A. Naser Al-Hadad, "The Role of Artificial Intelligence in Recruitment Process Decision-Making," 2021 International Conference on Decision Aid Sciences and Application (DASA), Sakheer, Bahrain, 2021, pp. 197-203, doi: 10.1109/DASA53625.2021.9682320.
- A. I. Al-Alawi, Customer Relationship management in the kingdom of Bahrain.
https://www.researchgate.net/profile/Adel-Al-Alawi/publication/311518611_CUSTOMER_RELATIONSHIP_MANAGEMENT_IN_THE_KINGDOM_OF_BAHRAIN/links/584a8dd908ae4a7a6917c4e7/CUSTOMER-RELATIONSHIP-MANAGEMENT-IN-THE-KINGDOM-OF-BAHRAIN.pdf
- Adel Ismail Al-Alawi(2005) Motivating factors on information technology employees in Bahrain hotel industry.
<https://iacis.org/iis/2005/AlAlawi.pdf>
- A. I. Al-Alawi, S. K. Sanosi and A. H. Althawadi, "Effects of Technology and Digital Innovations on the Human Resources Ecosystem," 2021 International Conference on Decision Aid Sciences and Application (DASA), Sakheer, Bahrain, 2021, pp. 502-510, doi: 10.1109/DASA53625.2021.9682279.
- Adel I. Al-Alawi(2005) , The practice and challenges of knowledge management in financial sectors in Bahrain, *Asian Journal of information systems*,
https://scholar.google.com/citations?view_op=view_citation&hl=en&user=v8l-C1oAAAJ&citation_for_view=v8l-C1oAAAJ:d1gkVwhDpl0C
- Adel Ismail Al-Alawi (2016) Status of Bahraini women in the banking and financial sector: challenges and opportunities, *Journal of International Women's Studies*

Adel Ismail AL-ALAWI(2020), Customer Relationship Management: The Application of Data Mining Techniques in the Telecommunications Sector

Adel Ismail Alalawi (2021) Knowledge Management Processes and Service Innovation: Key Insights from Saudi International Airports <https://doi.org/10.1142/S0219877021500140>

Bajpai, N. (2011) "Business Research Methods" Pearson Education India

Allen, M. (2017). *The SAGE encyclopedia of communication research methods* (Vols. 1-4). Thousand Oaks, CA: SAGE Publications, Inc doi: 10.4135/9781483381411

Surbhi S (2017) Difference Between Exploratory and Descriptive Research, <https://keydifferences.com/difference-between-exploratory-and-descriptive-research.html>

Deeraj, n.d. Data Collection, <https://www.wallstreetmojo.com/data-collection/>

Rabianski, J. S. (2003). Primary and secondary data: Concepts, concerns, errors, and issues. *The Appraisal Journal*, 71(1), 43-55.

Ajayi, V. O. (2017). Primary sources of data and secondary sources of data. *Benue State University*, 1(1), 1-6.

Sharma, G. (2017). Pros and cons of different sampling techniques. *International journal of applied research*, 3(7), 749-752.

Behi, R., & Nolan, M. (1995). Ethical issues in research. *British journal of nursing*, 4(12), 712-716.

Dulock, H. L. (1993). Research design: Descriptive research. *Journal of Pediatric Oncology Nursing*, 10(4), 154-157.

Appendices

The Significance of Artificial Intelligence in the Human Resources Decision Making Process: The case of the ministry of Ministry of Works, Municipality Affairs and Urban Planning in Bahrain

Questionnaire form

Dear Participant,

*The undersigned is a student in the master's program at Bahrain University. This questionnaire is conducted to fulfill the requirements of the master's degree. As a researcher, I intend to reach the key objective of this research: "**To assess the impact of artificial intelligence algorithms on the process of HR decision-making in The Ministry of Works, Municipality Affairs and Urban Planning in Bahrain.**". Your contribution by filling out this questionnaire will be highly appreciated. Thank you in advance for taking the time to participate in this survey. Your feedback is crucial, and all responses will remain completely confidential.*

Please feel accessible to if you have any inquiries or concerns about the survey, do not hesitate to contact me.

Regards,

The researcher

Part I- Demographic Data

Please indicate your particulars by ticking the appropriate place

Gender	Male	Female
Age	Below 25 ☐	26 - 30 ☐
	31 -44 ☐	45 -59 ☐
	60 or more ☐	
Education	BA/ BSC ☐	Diploma ☐
	Master's degree ☐	PhD Degree ☐
Years of experience	Below 5 ☐	6-10 ☐
	11- 19 ☐	20 or more ☐
Position	supervisory position ☐	non- supervisory position ☐
Nationality	Bahraini ☐	Non-Bahraini ☐

Part II- Research Variables

Using the key below, please indicate the extent to which you agree with each statement.

1= Strongly Disagree 2=Disagree 3=Neutral 4=Agree 5= Strongly Agree

The independent variable (Artificial intelligence Applications in HR)						
(1) Descriptive Algorithms		1	2	3	4	5
1	Past data is analyzed to know how this data can affect the present.					
2	Data collected about practices of HR is linked to each other.					
3	The HR data analysis includes descriptive analyses that use on relatively simple statistics including means, standard deviations, correlations, or percent changes.					
4	The balanced scorecard represents a typical example of using descriptive algorithms in HR.					
5	The balanced scorecard can be used by the HR as a tool for assessing employees' performance based on some indices as absences, turnover, and supervisor performance feedback.					

6	HR specialists use descriptive algorithms as a powerful tool that helps collect and data from different sources.					
7	Making use of algorithm-based HR decision-making applications permits users to analyze the employees' emotions and to track employee's mood.					
8	Descriptive algorithms are used to enable HR employees and managers track employees' motivation					
9	Through descriptive algorithms employees' performance can be measured.					
10	Descriptive algorithms are used by HR employees to generate profiles of desired job candidates.					
(2) Predictive algorithms						
1	Predictive algorithms are employed to predict what might be the outcome of some past- or real-time observations on future situations in the HR.					
2	Through predictive algorithms, HR employees can determine how some HR outcomes (or situations) can be like.					

3	Predictions in the HR profession can be made through regression techniques, machine-learning algorithms, and data-mining approaches.					
4	Perfect predictive algorithms make use of a score that represents the possibility that an event to occur.					
5	Fraud intentions in the HR departments can be predicted through predictive algorithms					
6	Predictive algorithms can be used for hiring activities in some firms since it enables HR specialists to design a system to analyze data provided by applicants.					
7	Suspicious employee behavior can be observed through reliance on predictive algorithms.					
8	Predictive analytics help HR managers recruit employees					
(3) Prescriptive algorithms						
1	<i>Prescriptive algorithms</i> focus on determining what needs be done based on different possible scenarios.					

2	Prescriptive algorithms suggest different courses of action for HR specialists to benefit from alternative scenarios and demonstrating the consequences of each possible decision.					
3	HR employees can make use of prescriptive algorithms since they have academic degrees.					
4	Simulations and scenario-based techniques can be used through					
5	Prescriptive algorithms are employed in HR to improve the efficiency of employees' behavior.					
6	Through prescriptive algorithms, HR employees can model complex strategic HR decisions.					
7	Prescriptive algorithms serve the functions of HR decision support and decision automation.					

No	Item	1	2	3	4	5
HR decision making						
1	In light of employing algorithms in the HR domain, effective HR decisions that are more transparent and efficient are created.					

2	HR uses an algorithm-based decision-making technique that is both objective and unbiased.					
3	HR decision-making became a scientific process that applies theory and artificial intelligence applications.					
4	Huge data is collected and analyzed for the sake of making effective HR decisions.					
5	When HR decisions are made alternatives are carefully evaluated.					
6	Strategic thinking is applied to make transparent HR decisions.					
7	HR decisions are made apart from moral dilemmas.					
8	The right timing is a major pillar in which effective HR decisions are made.					
9	HR decisions are linked to organizational goals.					
10	The big picture must be cared for when HR decisions are made.					
11	The negative influences of algorithm-based HR decision-making are avoided when HR decisions are made.					



جامعة البحرين
كلية إدارة الأعمال
قسم الإدارة والتسويق

أهمية الذكاء الاصطناعي في عملية صنع القرار في الموارد البشرية

أطروحة مقدمة كجزء من متطلبات الحصول على درجة الماجستير في إدارة الموارد البشرية

إعداد

عبدالله جلال السعد

202000001

إشراف

د. علي بن خليفة

مملكة البحرين

2022