HR Analytics and Achieving Competitive Advantage for Organizations Through Big Data: A Conceptual Paper

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In light of artificial intelligence and new technologies, organizations have to follow new ways of working with different skill sets to achieve strategic goals. Therefore, human resource analytics is the scientific solution that enables organizations to make important decisions related to human capital and strategic business and thus gain a competitive advantage. Through new technologies comes the role of big data, as it works to establish the reputation of human resources as a strategic business partner that makes decisions driven by analytics. Evidence-based decisions, therefore, all equal a significant competitive advantage. This conceptual paper aims to understand the relationship between human resource analytics and achieving a competitive advantage in the presence of big data. This study will use quantitative data through a survey list that will be distributed to middle managers and human resources employees of the telecommunications company sector in Egypt.

Keywords: HR analytics, competitive advantage, big data

INTRODUCTION

Through today's data-driven world and the trend towards digital transformation processes, human resource management strategies have changed to make more accurate decisions, as digitization helps the organization be more reliable when making decisions that depend on data. Thus, In the corporate setting, HR analytics has arisen as a new trend and challenge, with a focus on the strategic value of HR management. The rapid digital transformation has increased the requirements for the availability of human resource analytics solutions and services (Gurusinghe et al., 2019; Opatha, 2020).

Van den Heuvel& Bondarouk (2017) analyse the evolution of human resource analytics across time, from simple automation to the big data and artificial intelligence era of the digital age; Up to the last few years, when businesses started using the phrase "human resource analytics," the process of automation in human resources started in the 1980s with the automation of a few administrative processes and tasks.

Human resources analytics are frequently used to make better decisions, as well as change the rules of human resource management in the organization. Additionally, it encourages HR to use big data sets for data-driven research and operations, assisting this new kind of entrepreneurship in the organization's decision-making on costs and advantages. This supports talent acquisition, attrition risk management, and the predictive study of employee trends (Mohammed & Quddus, 2019; Madhavi Lakshmi & Siva Pratap,

2016). Referring to the importance of human resource analytics, we find that it has become a major transformation in institutions as it is considered the heart of business intelligence and a requirement for an organization's long-term success (Fred & Kinange, 2015), besides that, several other fields, including computing, engineering, science, and others, and analytics interact very well with each other (Lochab et al., 2018).

Also, based on the important roles that human resource analytics represent, and the vital role of the decision-making process for human resource professionals, Human resource professionals must utilise human resource analytics more frequently in order to improve their capacity for company modernization and the achievement of long-term societal goals. Organizations that use human resource analytics can gain a competitive advantage in the market (Fitz-Enz & John Mattox, 2014; Jensen-Eriksen, 2016; Abd Elsamea & Rashed, 2021).

Social media and digitization have also become features of the current decade. Where the initiative is to create data on social platforms, and this data can be used for various purposes. The digitization process has also led organizations to use this data as means to develop their strategies, which finds them more receptive to human resource analytics (Strong, 2015). The availability of big data and the use of data to support decision-making in human resource management present prospects for prospective expansion in the subject of human resource analytics (Milon, 2019).

Given the significance and dimensions of the relationship between big data and human resource analytics, the trend in human resource analytics research has been to support that relationship. This is because the presence of human resource analytics depends on the availability of data, which helps to improve decision-making. Therefore, many studies have concentrated on defining the significance of the relationship between human resource analytics and big data since the process of digital transformation has become one of the most significant factors and major trends that change the economy and business. Whereas, through the study (Dahlbom et al., 2020), focused on showing how the human resource function can benefit from human resource analytics, including big data, as well as going through the issues that prevent the use of data and the implementation of human resource analytics.

Despite the advancement and growing acknowledgment of the significance and utility of HR analytics in its influence on businesses, there is relatively little study on this subject that has produced substantial proof (Marler & Boudreau, 2017). To gain a competitive edge with the use of big data, this research aims to emphasize the significance of human resource analytics.

LITERATURE REVIEW

Human Resource Analytics

Some organizations have begun to use analytics by HR professionals to get data-driven decisions, thus many definitions of HR analytics have been addressed, where; Looking at all the different definitions offered, (Margherita, 2020; Sivathanu & Pillai, 2020) put forward the most comprehensive definition, stating that "HR analytics is the systematic identification and assessment of the human factors that influence business results.to improve decision-making. Equally important is the notion that these insights can be generated at varying levels of technological sophistication."

Kryscynski et al. (2018) identified another concept that describes human resource analytics as a concept that defines "Data, metrics, statistics, and scientific methods, with the utilization of technology, to assess how human capital management practices impact business objectives." Whereas Minbaeva (2018) defines HR Analytics as "a well-defined procedure for jotting down fresh concepts and using them to boost productivity." Human resource analytics refers to a range of data analysis techniques for exposing insights about individuals in businesses that speed up, improve accuracy, and boost confidence in corporate decision-making (Ekka, 2021).

Furthermore, the term "HR Analytics" is also "Workforce Science and Workforce Analytics, Talent Analytics, People Research, People Analytics, Human Capital Analytics, Talent Decision Science, Talent Engineering, Human Capital Metrics and Strategies, Human Resource Engineering and Metrics" (Xylia,

2018). From a big data approach, HR analytics is described as "the capability to deliver the most exact evidence-based analytical HR decisions to date" (Chattopadhyay et al., 2017; Sousa, 2018).

Another definition describes it as "a communication tool for painting a clear and actionable picture of the issue as it is and what the results will be in the future" (Reddy & Lakshmikeerthi, 2017). Thus, instead of just dealing with HR data or communicating HR outcomes, HR analytics is a special combination of gaining insights from data and the capacity to evaluate events using these discoveries to address issues. This is what Kapoor & Sherif (2012) indicated in their study as "the processes of collecting, transforming and managing key data and documents related to human resources; analyzing the information collected using business analytics models, and disseminating the results of the analysis to decision-makers to make smart decisions."

Marler & Boudreau (2017) establish business effect and facilitate informed decision-making, HR analytics is defined as "IT-enabled HR practices that utilize descriptive, visual, and statistical analysis of data relevant to HR operations, human capital, organizational performance, and external economic benchmarks." To date, and through this definition, where he concentrated on how decisions on human resources affect company outcomes." Moreover, he emphasises how decisions made on human resources play a strategic influence in overall organisational performance.

Mohammed & Quddus (2019) looked at human resource analytics as "an application of advanced statistical tools to evaluate human resource data and making sustainable decisions related to human resource concerns based on evidence". Fernandez & Gallardo (2020) came to offer another, more comprehensive definition. From his point of view, HR analytics is as follows: "a set of concepts and methodologies that handle a strategic business challenge and involve data collection, analysis, and reporting to enhance people-related choices. By its very nature, HR analytics is strategic and should extend beyond the HR department's horizon.

Based on a more systematic definition, it was found that there are three types of analysis: descriptive analysis, predictive analysis, and prescriptive analysis, where; Descriptive analytics is the most commonly used tool because it collects data on past trends to study the answer to "why" the past trend occurred and "how" it will affect future interventions made by predictive analysis. As for prescriptive analysis, it is not common for organizations, and if used it would be designed to address current mainstream issues (Angrave et al., 2016).

From another point of view, Kiran et al. (2018) presented human resource analytics as "supplying a data-driven framework for resolving business issues by utilising current data to produce fresh insights Making wise selections is possible thanks to a variety of tools, software, and approaches that apply statistical models to data from the business world and help managers of human resources."

Moreover, it has been observed that HR analytics is strategically important since it gives enterprises the data, knowledge, and insights they need to successfully make data-driven choices (Huselid, 2018; Minbaeva, 2018). Hence, according to (van den Heuvel & Bondarouk, 2017) HR analytics is the "systematic identification and evaluation of the human factors influencing business results to improve decision-making." The notion that these insights may be produced at various technological development stages is crucial and should not be overlooked. (Margherita, 2022; Sivathanu & Pillai, 2019).

Through many of the definitions that were dealt with in previous studies, it became possible for the researcher to adopt a definition proportionate to the nature of the study, as this study adopts the definition of human resource analytics proposed by Marler and Boudreau (2017), wherein human resource analytics is "An HR practice made possible by information technology that employs statistical, graphical, and descriptive analyses of data on organizational performance, human capital, and external economic benchmarks to determine the business effect and enable data-driven decision-making."

With this concept in consideration, this study applies the human capital analytics paradigm to human resource analytics, which is comprised of three dimensions: high-quality data, analytical competence, and strategic ability to act (Minbaeva, 2018). Therefore, this study will adopt the "framework of human capital analysis" to suit the nature of the study. The dimensions are as follows:

High-Quality Data

Organizations have a large amount of data that is challenging to gather, process, and preserve, which presents problems for HR analytics. Because workers did not supply accurate data, the data obtained may include missing or incorrect characteristics. Additionally, duplicate data may be available or data may be impacted during the transfer from one source to another. The HR analytics tool produces findings based on the available data, but if the data is of poor quality, the outcome could not be what was anticipated. (Tomar & Gaur, 2020).

Whereas, the high-quality data component of the Human Capital Analytics framework specifies that analytics is used with data should be accurate, consistent, timely, and thorough. For instance, Companies must ensure that the data used for HR analytics is accurate. Without accurate data, analytics insights won't be dependable and won't be of any use to the firm. (Minbaeva, 2018; Wamba et al., 2019; Peeters et al., 2020). Alternatively, misleading data may force the adoption of solutions that fail to address the real problems facing the company.

Analytical Competence

The competence of the analytics team to use statistical analysis and procedures on workforce data to transform data into insightful information is another requirement for HR analytics that calls for a high level of analytical skill. (McCartney et al., 2020). For instance, the analytics team must formulate relevant research questions and respond to them by creating causal models and carrying out complex statistical analyses. (Minbaeva, 2018). The team must also transform the learned insights into an engaging analytical tale or story. (Andersen, 2017; Minbaeva, 2018; McCartney et al. 2020).

Strategic Ability to Act

Finally, the strategic ability to act refers to obtaining the administrative support necessary to execute solutions and make decisions based on data, information, and insights obtained through human resource analytics. (McCartney & Fu, 2022).

Big Data

In the late 1970s, organizations began to realize the importance of databases, as what is known as the "database machine" appeared, which is a technology used specifically for storing and analyzing data. As the amount of data increases, the storage and processing capacity of a single central computer system becomes insufficient. Looking back to the 1980s, people suggested "share anything," a parallel database system, to meet the demand for the increasing amount of data (DeWitt & Gray, 1992).

Moving to the end of the eighties, the concept of "data mining" was formulated. The origin of this term is similar to the process of extraction techniques, where a valuable material (knowledge) is extracted from the inventory, meaning (data bank) in addition to the data mining process. It is the most popular and widely used term to refer to this type of analysis among a group of similar expressions (Han, Kamber, & Pei, 2006).

With the help of this particular data mining application, we can also describe how the concept of data science came to be. The phrase was also used at the start of the millennium to describe a suggested evaluation of significant technical areas in statistics (Cleveland, 2014). Its objective was to adapt these fields to the emerging data analysis methods at the time, particularly with the expansion of data mining and its use in many corporate settings as well as with the ongoing computerization of data gathering and analysis.

Moreover, the concept of data science has evolved to bring about an integration between different disciplines such as (statistics, mathematics, computer science, and the basics of a specific field of application) that support the modern practice of data analysis and guide the extraction of knowledge from data. Thus, we can understand the process of data mining as the extraction itself of this knowledge using tools and techniques that integrate these principles of data science (Provost & Fawcett, 2013). Then, over the past 20 years, data has increased widely in various fields (Chen, Mao & Liu, 2014), wherein the total volume of data created and copied in the world was (ZB≈1021IB1.8). Which has increased by nearly nine times within five years (Gantz & Reinsel, 2011).

As a result, big data-related terminology like "business intelligence," which is the descriptive analysis of data using data gathered from multiple business indicators and queried and aggregated to provide a picture of what has happened and is occurring in the organization, became common. Data mining, which focuses on predictive analysis, is the process of extracting knowledge (patterns, trends, and patterns) from data banks. Similar ground is covered by the concept of knowledge discovery in databases (KDD). Although both words are frequently used interchangeably, data mining is sometimes used to refer specifically to the analytics step (Niño & Illarramendi, 2015).

Data science is an expression of a collection of fundamentals and principles, both scientific and practical, which direct the extraction of knowledge from data and serve as the foundation for data mining tools, strategies, and procedures. Until the concept of "big data" appeared and began to be interpreted as "a set of specific technologies, among those used in data mining or business intelligence, that facilitate data processing and analysis when its volume or complexity of processing exceeds the computational capabilities of conventional computers" (Niño & Illarramendi, 2015).

Then, organizations began to enhance their business by using their data banks, where the amount of data can be processed using the tools and capabilities provided by traditional computers, but in the case of large technological organizations, the large amounts of data that need to be analyzed make it practically impossible to process them through traditional technologies. It was in those years that he began the process of analyzing the volume, velocity, and diversity of data, a model later known as the "V_3" as key aspects of any strategy for the optimal management of data in business contexts (Ghasemaghaei & Calic, 2020).

In 2011 Science also launched a special issue on the key techniques of "data manipulation" in big data. And in 2012, the European Research Consortium for Informatics and Mathematics published a special issue on Big Data. According to research given at the Davos Forum in Switzerland, big data has become a new type of economic asset just like currency or gold. Big data has also received a lot of interest from several national governments, including the United States. The "Big Data Study and Development Plan," the second-largest scientific and technology development program after the Information Superhighway, received a US$200 million investment from the Obama administration in March 2012 (Chen et al., 2014).

In the past few years, a variety of sources, such as sensors that collect climate information, energy meter readings, social media sites, videos, digital photos, and traffic data, have been responsible for the rapid growth of big data. Due to the rapid growth of data, its sheer volume is a central issue today. About 90% of the data in 2012 was produced in the last two years (Data, I. W. I. B.,2012 As a result, the phrase "big data" is now frequently used to refer to a wide variety of ideas, from analyzing and collecting enormous amounts of data to a wide range of cutting-edge digital tools intended to find patterns in human behavior. Despite its broad usage, the word still carries a lot of conceptual ambiguity (Favaretto et al., 2020), hence several big data ideas have been proposed to find the most thorough and correct notion.

De Mauro et al. (2016) defined it as "the information origin that is characterized by the large volume, speed, and diversity that requires specific technical and analytical methods to convert it into value." As explained by (Rabhi et al., 2019), it refers to "the large group of data with a diverse and complex structure that cannot be managed through traditional data processing methods and techniques."

Fairhurst (2014) defined big data as "it is information assets of large volume, high speed, and/or high diversity that requires new forms of processing to enable improved decision-making, insight discovery, and improvement of operations." That is, we need new tools and technology because it is very large, rapidly changing, and potentially unstructured.

Big data is the tremendous volume of data produced in real-time from several digital sources, such as sensors, smartphones, social media, and other devices. Also, this data may contain a variety of media, including music, video, photos, text, etc. (Memon et al., 2017). Moreover, it is described as "a new architecture comprising of methodologies and technologies that enable finding of values not evident in massive databases, requiring new formats for large-scale integration of very complicated and highly varied information" (Hashem et al., 2015). The research (Shi & Gursoy, 2022) considers the attribute-oriented and process-oriented viewpoints based on the definitions of big data in various literature and suggests the working definition of big data as "big data." (Favaretto et al., 2020) came in their study classified the definition of big data from two aspects, either in terms of features (Vs) or in terms of operations, which

include (data collection and data processing), but this study was not the only one that used the features The basic definition of big data There is a growing consensus on identifying BD as data characterized by high values of volume, velocity, variety, veracity, and value, constituting the so-called 5 Vs (Cappa et al., 2021).

As more data became accessible in the years that followed, new definitions of big data emerged, and the 4Vs—variety, speed, scale, and value—came into being (Dijcks, 2012; Forrester, 2012), and then the 5V's: volume, speed, variety, value, and credibility (White, 2012). But some disagreed with those who took the traditional Vs definition of big data appropriately, as several researchers preferred a more practical definition. Big data was defined as "a multidisciplinary sector where initiatives are implemented that fully use the systemic changes that big data brings to the academic environment and include the connecting of several fields and varied research talents" (Hu & Zhang, 2017).

Through the previous definitions of big data, the researcher relied on the following definition: (De Mauro et al., 2016) defined it as "the origin of information that is characterized by the large volume, speed, and diversity, which requires specific analytical techniques and methods to convert it into value."

The Importance of Big Data for Human Resource Management

Data has become a valuable resource for organizations because it provides the information needed for decision-making based on data rather than intuition. So, the HR department started dealing with the data collected from the employees and using more predictive analytics for it. This indicates that big data and data analysis is the most important decision-making step in human resource management and human resources departments can benefit from them.

Thus, the study of Garcia-Arroyo & Osca (2021) focused on showing the importance of big data for the human resources department in organizations, through the application of big data within human resource practices, for example, selection and recruitment, as well as evaluation and development as practices The mission of human resources management is also to enhance research in the areas of information, learning, knowledge, strategy, efficiency, and performance, with more designs applied to specific topics such as learning, knowledge management or decision making.

A model for the indicators is created during the implementation process, and it is shown as a dashboard that offers a real-time view of the completed processes. These metrics may be utilized for efficiency-boosting activities including hiring and selection, organizational growth, knowledge management, behavior analysis, health and well-being, and others. (Halaweh & El Massry, 2017).

Where through the recruitment and selection process, it was explained how the characteristics of V3 big data affect the employee selection process, as the volume, velocity, and diversity of data expand and diversify the set of potential talent through which future employees can be attracted and the costs associated with talent selection can be significantly reduced. Due to the abundance of easily accessible information that they give, social networks like Twitter, Facebook, and LinkedIn also play an increasingly significant role in hiring and selection. Many companies rely on these platforms before making decisions. (Hausknecht & Li, 2015; Illingworth et al., 2015; Landers & Schmidt, 2016; Morrison & Abraham, 2015).

Another innovative approach is the electronic interview process (Chamorro-Premuzic et al., 2017), which converts photos of the interviewees' verbal and nonverbal responses into psychological profiles that enable predictions and lessen the bias of unskilled interviewers. Such procedures involve risks since, in most circumstances, these non-traditional sources of information may produce unsystematic and narrative material, particularly if people accessing the data have not obtained the necessary training.

King (2016) claims that the hardest asset to value is human capital. Big data may be used to evaluate talent management and find ways to better manage human resources. For instance, some cutting-edge talent assessment applications (Chamorro-Premuzic et al., 2017) use machine learning algorithms to transform a person's digital records (for instance, their social network footprint) into a psychological profile that can be used to predict future performance or potential leadership or counterproductive behaviours. Video game-based evaluations can provide new ways to measure crucial psychological qualities of employee abilities, such as outgoing intellect, honesty, and curiosity. Motivation is a recent invention that provides a technique to gather a lot of information about employees' skills or competencies.

Studies on the management of information, knowledge, and learning have emphasized the advantages of big data for knowledge management and decision-making. (Smith, Jr., 2018). Information (data) management is also necessary for systems and operations based on big data; Where it is emphasized that data volume management, storage, and error correction are priorities for extracting knowledge and learning from data (Mari & Masini, 2017). Also, according to Calvard (2016), for effective learning, big data analytics should be viewed in terms of simplicity in the use of interdisciplinary processes, thinking about learning ideologies and knowledge production while taking into account the theoretical and practical implications.

Additionally, mobile applications have been used to gather evidence of deliveries or services rendered, with objective and subjective information about the relationship with customers and their level of satisfaction; to control inventories in real-time and know when products and materials need to be replenished; to help control employee safety through direct contact and provide information about unexpected changes or emergencies (Karlskind, 2014).

Competitive Advantage

Competitive advantage is one of the goals pursued by most organizations to maintain work. Once the company can achieve a competitive advantage, it can increase value and improve the company's performance. Competitive advantages also refer to the meaning of the company obtaining an excellent position compared to its competitors (Novita & Husna, 2020).

Dustin et al. (2014) indicated that competitive advantage is defined as "a condition that enables a company to operate in a more efficient or higher quality manner than the companies in which it operates. Compete with him and that leads to the benefits for that company."

As defined by Russell & Millar (2014), "competitive advantage is the extent to which an organization can create a defensive position over its competitors" (Hosseini et al., 2018). Also, a competitive advantage is the ability to exploit a consistent and workable strategy developed through the involvement of organizational personnel around whom all company plans are designed. Other factors also include the pivotal quality of qualified and skilled human resources, organization and optimum utilization of human forces, effective and continuous presence in global markets, and special interest in study projects.

Moreover, Grant (1991) defines competitive advantage as the company's ability to use its unique resources and capabilities and achieve consistently higher profits than competitors. From the resource-based viewpoint (RBV), Barney points out that competitive advantage is viewed as the organization's ability to implement a value-creating strategy that other organizations do not. In other words, other companies should not be able to replicate what the organization does; its resources are fixed, valuable, and scarce (Barney, 1999).

From another point of view, Khatab et al. (2019) explained that competitive advantage means a unique and distinct advantage in which the company excels over other competitors, as defined as "the organization can achieve consumer needs or the value that the consumer desires to obtain products, such as high quality, low price, or offering distinctive advantages in the product/service compared to competitors" (Huang et al., 2019). Also, the competitive advantage "is the organization's ability to formulate and implement policies to improve the organization's position against other organizations engaged in the same activity" (Sadq et al, 2019). Whereas (Lesniewski, 2019) "Positive features of the human form: humanity, behavioral, and personal culture, including organizational culture" was used to describe it.

Through the previous definitions of the competitive advantage, the researcher adopted the following definition, which represents the dimensions of the study for the competitive advantage that has been relied on, which are (innovation - quality - cost - differentiation) where: "The competitive advantage is that ability to exploit the organization's strategies and the ability to apply them And that is by relying on the human resources, its expertise, and its ability to achieve innovation and differentiation, which means producing products or providing less expensive services and of better quality compared to those manufactured by competitors."

In the light of this definition, several dimensions are clarified that are relied upon through this study, as follows:

Innovation

For a business to develop its competitive advantage, innovation has a strategic role (Hutomo & Pudjiarti, 2021). According to some researchers (Silva et al., 2014), innovation has a positive and important impact on the organization's competitive advantage. These previous studies supported the idea that an organization's capacity for innovation may lead to the kind of long-term competitive advantage that every business aspires to. Under this context, research (Suprapto, 2021) shows that organizational innovation significantly and favorably affects an organization's capacity to compete. Further supporting the same themes, the empirical results of a study by (Dang and Wang,2022) show that innovation has a favorable impact on the competitive advantage of hotel businesses.

Quality

The capacity of an organization to produce high-quality, high-performing goods that add value for consumers is referred to as quality (Sadq et al., 2016). Porter's Competition Strategies also point out: Quality improvement strategy is the primary focus on product improvement and/or services. Improving quality often means changing production processes in ways that require workers to be more engaged and flexible.

The research revealed that quality has a substantial impact on competitive advantage (Yangailo,2023). Rashid (2019) looked at the components of service quality and how they affected competitive advantage in the banking industry in Iraq. The study discovered that quality has a substantial influence on competitiveness. A company's overall competitive advantage includes quality. Consumers of today are particularly concerned about a product's or service's quality. Hence it was suggested that quality affects competitive advantage.

Differentiation

The individuals we need to promote to another role—whether it be a promotion or a lateral transfer with different/complex/higher responsibilities—are prioritized through a differentiation strategy. Where the organization's practice of rewarding employees is further enhanced, and more differentiation in incentives for outstanding performance is driven based on the findings of the data analysis. Based on what is known as data points, algorithms are analyzed and created to create a list of priorities to achieve fairness in promotion (Dubey & Wadia, 2017).

As (Ulrich, 2005) points out that "the confirmed fact that personnel management is the existence of differentiation between employees, and its need in the management of employees." It works to increase the return on investment (ROI) and allows employees to be subject to different management strategies efficiently and effectively (Huselid et al., 2005). Moreover, as a critical task of strategic talent management, differentiation can help organizations to adequately fill pivotal or strategic positions in the organization with highly qualified employees to ensure their commitment to the organization and then create a sustainable competitive advantage (Becker et al., 2009; Collings & Mellahi, 2009).

Marescaux et al. (2013) indicate that when differentiation in human resources causes some employees to perceive a certain degree of positive approval while others feel somewhat frustrated, the organization may gain among the first group in terms of effective organizational commitment but may lose more among last employees compared to a situation where employees feel like they are treated as equals. As such, differentiating HR practices among employees may not be overtly helpful.

Mitroulis & Kitsios (2017) pointed out another focal point the costs of pursuing differentiation cannot be too high. Companies seeking differentiation must control expenditures to offset higher costs in key activities. The business cost structure that underpins the differentiation strategy still needs to be managed consciously. Also (Slami et al., 2020) explained in their study the misunderstanding that managers, strategists, and academics suffer from in analyzing the relationship between the value chain, differentiation strategy and competitive advantage. This is done by establishing a differentiation strategy business model that helps managers of organizations achieve sustainable competitive advantage and improve organizational performance.

Cost

Organizations that follow a cost leadership strategy emphasize cost control and efficiency to be able to offer lower prices to their customers (Porter, 1980). An important factor in controlling costs is reducing labor costs. When employees are seen as a 'cost' they are treated as a factor of production. They tend to be closely monitored and given little latitude in their jobs (Hyman & Mason, 1995). The time required to engage staff, exchange information, and solicit opinions, will also be considered a cost to the organization (Cabrera et al., 2001).

Tracey & Hinkin (2008) indicated that several costs must be led by the management, such as the cost of employee turnover, as the rate of employee turnover may affect the quality of customer service, which leads to direct damage to revenues and profitability. Besides, employees who plan to leave may not be motivated to perform at appropriate levels, and it takes time for new employees to acquire the knowledge and skills necessary to be proficient in their essential duties and responsibilities. In addition to the fact that recruiting expenses differ widely depending on the position, they also mentioned the cost of hiring when management decides to replace the leaving employee. The price of training new hires once they are chosen; these individuals frequently come with many of the competencies required for success. Nonetheless, practically everyone needs formal or informal training of some type in order to comprehend the protocols of a certain firm. Several businesses run in-depth orientation sessions to introduce new hires to the business, their divisions, and their positions. The time of the participants is included in the upfront costs of mentoring and training, just like with the prior activities.

Evolution of Conceptual Model

Many motivating factors led to the development of the study model, where the focus was on developing the model through the interrelationships between the variables and concepts of the study, through which the research gap was identified, which in turn led to the development of the current study model. The importance of the study also lies in the idea that analytics is a center of attention and very important for organizations due to the fact that it is well recognised that things cannot be improved if they are not measured from the start. Human resource analytics has also become a vital tool for success by using current data to predict the future return on investment, thus giving organizations a competitive advantage (Boudreau & Ramstad, 2007; Zeidan & Etani, 2020).

Through this study, many factors that led to the development of the current conceptual model that was presented were clarified. In terms of the emergence and development of human resource analytics, went through several stages starting from the period 1985–2012, in which it was limited to managing individuals, recruitment processes, etc. until it reached the stage of predicting data and building analytical models that are concerned with predicting future results, this is still the case. The field lacks more studies and attention, as we are still in the early stages of interest, study, and focus, especially in practical and professional terms, and this is a major shortcoming compared to the importance of human resource analysis (Marler & Boudreau, 2017).

Many studies have also highlighted the importance of technology in the field of human resource management. Where it has been experimentally proven that companies that have human resources analytics should capture, store and make The data that can be accessed through the company's functions where human resources analytics depend on information technology and can be a huge factor and an assistant to them, In theory, E-HRM and HRM IT should serve as an assistant that captures and stores data that can be accessed through company functions, besides producing reports, dashboard availability, and results in records, but, given the reality of the state of information technology's human resources management capabilities, there are major obstacles to the implementation of this (Aral et al., 2012).

The review of previous studies also indicates that even though human resource analytics is a very important topic among human resource professionals, focusing on the peer-reviewed research in the listed scientific journals reveals a very small number of scientific studies, which are dominated by studying qualitative situations. On the other hand, we find that the available evidence indicates that human resource analysis has positive effects, but the adoption process has been very slow (Marler & Boudreau, 2017).

HR analytics' Cumulative Group of Quantitative Empirical Research is insufficient to make meta-analysis currently possible. As we see, there are very few empirical studies, and only about 16% of organizations report using HR analytics (Marler & Boudreau, 2017).

The lack of high-quality analytics software has also been noted in the HR analytics literature, which indicates that many firms have difficulty using workforce data that only offers basic reporting and descriptive statistics. (Angrave et al., 2016; King, 2016; Andersen, 2017; Green, 2017; Levenson & Fink, 2017; Minbaeva, 2018). As a result, effective HR analytics software is hard to find nowadays. Regarding the tradition of human resource analytics, according to Minbaeva (2018), Organizations require high-quality data, analytical capabilities, and strategic business ability to act and conduct value-added human resource analytics. However, due to low levels of technology, poor data quality, a lack of resources, a lack of analytical competencies, and a lack of support from senior management, it is challenging for HR departments to own all three (Andersen, 2017). Last but not least, HR analytics is a stand-alone discipline, thus there are no alternatives that can yield equivalent insights (Falletta & Combs, 2020). As a result, HR analytics satisfies the criteria outlined by RBV, demonstrating that HR analytics and the data, information, and insights it produces are significant tools for organizations with the potential to gain a competitive advantage.

In addition to the previous, this study applies the suggested theoretical framework by Minbaeva (2018) and adopts questions from the particular measurements to reflect the theoretical definition that was adopted in this current study due to the lack of a valid measure for measuring human resources analytics.

On the other hand, big data was chosen for this current study because it has been dealt with in many previous studies because of the enormous importance that data represents through its use, whether at the organizational or individual level, and because of its return on increasing the ability of organizations and individuals to make decisions. Vitality and strategy, as well as its ability to achieve a competitive advantage (Ghasemaghaei & Calic, 2020; Angrave et al., 2016; Côrte-Real et al., 2017; Akter et al., 2016).

In addition, through many studies that have proven the importance of big data in the field of human resource analytics, including Rabhi et al. (2019), the number of studies is still very limited, as is the knowledge of how to integrate big data and its ability to adopt human resource analytics. Many limitations that hinder this field were also mentioned (Angrave et al., 2016).

Vargas (2015) focused his research on determining what prevents human resource professionals from implementing human resource analytics using big data and adopting this innovation. He put forward models that achieved positive results, such as Google, SAP, Xerox, and PepsiCo.

On the other hand, many studies have confirmed the extent to which human resource analytics and big data can achieve a competitive advantage (Gurusinghe et al., 2021; Ghasemaghaei & Calic, 2020). However, both variables were not dealt with together in one study, and the extent of their influence on the occurrence of a competitive advantage when relying on them was not shown, whether for the individual or the organization thus:

The current study model, which consists of multiple variables that deal with human resource analytics, competitive advantage, and big data, was put forward to show their ability to make a huge change and impact through different contexts, with a focus on the dimensions that were also addressed in this current study, which are still to be done. It had only been dealt with in relative rarity in a few previous studies.

Both academics and practitioners must realize the need to invest in this development if human resources are not to lose their power. The importance of HR analytics is gradually being recognized, and organizations are starting to invest in data metrics and analytics in HR, but they still need to make sure that it will work. (Marler & Boudreau, 2017).

Hypotheses Development

Based on the previous presentation of previous studies related to the variables of the current study, the study hypotheses are developed, as the development of hypotheses requires a detailed and clear explanation to indicate the relationship between the variables that were dealt with in the current study. Therefore, an accurate explanation must be provided for the subject under study to enrich knowledge and highlight the standards included in the current study model.

Human Resources Analytics and Competitive Advantage

Whereas many studies have been conducted on human resource analysis and its relationship to achieving competitive advantage, such as (Opatha, 2020; Bose & Jose, 2017; Barney, 1991; Jiang, and Messersmith, 2018; Arfaoui et al., 2019) On the extent to which human resource analytics can achieve a competitive advantage, As organisations that adopt human resource analytics can gain a competitive advantage in the market, human resource professionals must increase their use of human resource analytics to improve their capacity to modernise business. Human resource analytics also plays a crucial role in the decision-making process of human resource professionals. (Ben-Gal, 2019; Fitz-Enz & John Mattox, 2014; Jensen-Eriksen, 2016).

Whereas, through the resource-based view (RBV), human resource analytics is defined as "the use of research methodologies and sophisticated statistical tools to analyse data on human resources in order to find answers or make long-term choices about such issues in order to gain an advantage." "Competitiveness of the organization," and it was also determined that the contribution of human resource analytics to achieving the competitive advantage of the organization is very large from a resource-based point of view (Opatha, 2020). This is consistent with many other studies, such as Bose & Jose's (2017), Barney's (1991), Jiang & Messersmith's (2018), and Arfaoui et al.'s (2019), where the relationship between human resources analysis and their ability to achieve competitive advantage was addressed through the perspective of a resource-based view (RBV).

And through the importance of adopting human resource analytics in achieving the competitive advantage of organizations and by focusing on the cost element, (Setiawan& Hartanto, 2020) proved that through human resource analytics, the cost can be reduced as an employee is one of the most important assets in today's knowledge-based industry, and employee attrition can become a serious problem due to the effects on an organization's competitive advantage. Staff attrition can also become costly to the organization, and the cost of staff attrition will be associated with the life cycle of human resources, lost knowledge, employee morale, and organizational culture.

As well as its ability to achieve competitive advantage through efficiency and effectiveness, as Lakshmi and Pratap (2016) indicated, human resource analytics is an evidence-based strategy for enhancing individual and organizational performance via improved workplace decision-making. Human resource analytics can certainly enhance the credibility of the human resource function by improving the effectiveness and efficiency of human resource policies and practices, which leads to achieving a competitive advantage for organizations. As such, HR professionals develop new skills and capabilities so they can effectively partner with, lead, and finance IT on HR analytics initiatives.

Accordingly, the following hypothesis can be concluded:

H₁: There is a direct significant positive relationship between human resources analysis and competitive advantage.

Big Data and Competitive Advantage

By moving to the relationship between big data and its ability to achieve a competitive advantage, we find many previous studies that dealt with this relationship, where; The competitive landscape of global market environments has imposed a significant and continuous shift in information technology contents. This is mainly through the introduction of new tools and technologies that are developing rapidly, including many previous studies that focused on the ability of big data to achieve competitive advantage (Casarotto et al., 2021; Wamba et al., 2017; Galindo, 2017; Barham, 2017).

Where companies can achieve a market differentiation strategy by using big data resources combined with a service-oriented manufacturing model Mastering advanced technology combined with a service-oriented model can effectively increase the competitive advantage of companies (Zhang et al., 2017). Big data and its ability to analyze and make use of increasingly complex data sets are also the most important source of competitive advantage. Big data has enormous potential to improve internal and external efficiency, as well as organizational profitability and competitiveness (Alharthi et al., 2017).

In addition, the relationship between big data and competitive advantage was addressed through the resource-based point of view (RBV) (Casarotto et al., 2021; Galindo, 2017; Barham, 2017). That the competitive advantage is explained by internal company factors such as resources and competencies (the resource-based view, or RBV), and dynamic capabilities, as innovation in information technology to create a competitive advantage using big data is dependent on specific resources and internal company capabilities to create information storage, processing, and management. The resource-based view also shows that some companies show better competitive performance by distinguishing between their ability and their resources.

Previous studies on the competitive advantage associated with big data are important due to the development of information technology, which is commonly applied to create a competitive advantage. In addition, by taking a holistic approach to data management, processing, and analysis, big data enables value creation, performance measurement, and competitive advantage building (Wamba et al., 2017).

Accordingly, the following hypothesis can be concluded:

H_2: There is a direct significant positive relationship between big data and competitive advantage.

Human Resource Analytics and Big Data

Based on the relationship between human resource analytics and big data, given that the existence of human resource analytics depends on the availability of data, the tendency in human resource analytics research has been to support the interaction between human resource analytics and big data, which works to enhance decision-making since digitization or the process of digital transformation has become one of the most important factors and major trends that change the economy and business. Therefore, many studies have focused on clarifying the importance of the relationship between human resource analytics and big data. whereas, the study (Dahlbom et al., 2020), focused on showing how the human resource function can benefit from human resource analytics, including big data, as well as discussing the factors that hinder the adoption of human resource analytics and the use of data.

Attempts to define big data in many studies are also relevant from an HR analytics perspective. Many of the adjectives and features that appear in the definitions of big data are very similar to those used to describe HR analytics. Therefore, it can be said that the recent interest in big data, which is fueled by the ongoing digitization process, which in turn affects various business processes and societies in general (Hajkowicz, 2015), is providing new opportunities for HR analytics as well.

Human resource analytics and big data also fall within the broader concept of electronic human resource management, defined by Bondarouk and Rul (2009) as a comprehensive term that "covers all possible integration mechanisms and contents between human resource management and information technology, to create value within and across organizations for targeted employees as well as management."

Henneman (2013) & Rafter (2013) explained, "What prevents human resource professionals from adopting human resource analytics through the use of big data and adopting this innovation?" This is according to the positive results achieved by some large companies, for example, Google, Xerox, and SAP, through this adoption. Xerox has revolutionized the screening of candidates for their contact centers through the use of big data and predictive analytics.

The proof of the relationship between human resource analytics and big data is interpreted using the innovation theory, and the performance of innovative organizations is improved (Ghasemaghae & Calic, 2020; Gurusinghe, 2021; Du et al., 2016). Big data is the "next frontier for innovation, competition, and productivity." Advances in technology have enabled individuals and companies to collect large amounts of data (structured and unstructured) from various sources like never before. Consumers, the Internet, healthcare, manufacturing, supply chain, financial institutions, and sensors in a big way. Thus, it shows how big data moves and its impact on innovation and competitive advantage (Shahid et al., 2021). So is the potential for big data to change the landscape of innovation by increasing the match between consumer preferences and product characteristics (Günther et al., 2017; Johnson et al., 2017).

Big data, HR analytics, and the resource-based view (RBV) are being linked through innovation. Some studies indicate that human resource analytics and big data may lead to innovation (Gurusinghe, 2021; Kwon et al., 2014; Du et al., 2016; Vargas, 2015&2018), and the efficiency of big data can be developed

when companies clearly define operations critical business that is affected by big data and that enables planned new data services, and then skillfully applies appropriate big data assets for innovations (Du et al., 2016).

Previous research also indicated how important it is for organizations to introduce new technology to influence users' intentions to adopt it. Whereas, considering big data and human resource analytics as one of the most important new digital and technological technologies, the Unified Theory of Technology Acceptance and Use (UTAUT) proposed by (Venkatesh et al.,2003) the most important new digital and technological technologies, the Unified Theory of Technology Acceptance and Use (UTAUT) proposed by Venkatesh et al. (2003) was chosen as a basic theoretical framework because it takes into account factors and contingencies related to predicting technology acceptance and intention to use in predominantly organizational contexts.

In addition, new data sources, such as those derived from targeted technology, email, and calendars, provide chances to understand employee behavior and boost productivity in ways that weren't previously supposed to be achievable. Because of the benefits given by big data for HR and the ongoing need to boost productivity and effectiveness, there is now a greater need for more analytical human resource management (Fink & Sturman, 2017).

H₃: There is a direct significant positive relationship between human resource analytics and big data.

Many previous studies that dealt with the relationship between human resource analytics and big data have already been mentioned. They have also been dealt with through several theories and models that show the extent of their relationship as well as the implementation of each of them. Whereas, through the Unified Theory of Technology Acceptance and Use (UTAUT), previous research indicated the importance of organizations introducing new technology to influence the intention of users to adopt it. Considering big data and human resource analytics as one of the most important new digital and technological technologies (Venkatesh et al., 2003), it has also become a basic theoretical framework because it takes into account factors and contingencies related to predicting technology acceptance and intention of use primarily in organizational contexts.

Also, depending on the resource-based viewpoint (RBV), which indicates that organizations can achieve a competitive advantage by adopting human resource analytics as well as big data (Barney, 1991; Truss, 2001; Jiang & Messersmith, 2018; Casarotto et al., 2021; Wamba et al., 2017; Galindo, 2017; Barham, 2017; Arfaoui et al., 2019),

Human resource analytics can achieve this through a set of statements directed towards achieving this goal (Davenport, 2018) through the DELTA PLUS framework. Big data also achieve a competitive advantage through volume, variety, and velocity (Chen, Chiang, & Storey, 2012; Kwon, Lee, & Shin, 2014). This is supported by the VRIO framework.

Big data, HR analytics, and the resource-based view (RBV) are being linked through innovation. Some studies indicate that human resources analytics and big data may lead to innovation (Gurusinghe, 2021; Kwon et al., 2014; Du et al., 2016; Vargas, 2015, and 2018), and the efficiency of big data can be developed when companies clearly define critical business processes affected by big data that enable planned new data services and then skillfully apply appropriate big data assets for innovations (Du et al., 2016).

Accordingly, previous studies have shown the relationship between human resource analytics and big data, and other studies have dealt with the extent to which human resource analytics can achieve the competitive advantage of the organization. As well as big data and achieving a competitive advantage. However, the relationship of human resource analytics with competitive advantage was not addressed in the presence of big data as a mediating variable. The link between implementing human resource analytics and gaining a competitive advantage through big data will be investigated in light of the aforementioned. In light of this, it is possible to draw the following conclusion:

H₄: There is an indirect positive relationship between human resource analytics and achieving competitive advantage through big data as a mediating variable.

METHODOLOGY

This study aims to test hypotheses related to the banking sector in Egypt. The questionnaire will be distributed to all managers and HR professionals. The collected data will be analyzed using structure-equation modeling (SEM), which estimates multiple, interdependent dependencies in a single analysis. All scales undergo reliability testing through the validity of Cronbach's alpha and cross; building validity; convergent validity; and discriminatory validity. A T-test will also be performed to test whether a sample that is an estimate of the population mean differs significantly from the given population mean, and an F-test will be performed to determine the within-sample variance.

CONCLUSİON

The significance of technology in the area of human resource management has been emphasized in several studies. Where it has been experimentally proven that companies that have human resources analytics depend on information technology, which can be a huge factor and an assistant to them, in theory, E-HRM and HRM IT as an assistant should capture, store, and make the data that can be accessed through the company's functions, the production of reports, the dashboard, and the results record, but in the reality of the current capabilities of human resources management in information technology, there are major obstacles to implementing this (Aral et al., 2012).

While peer-reviewed research in the listed scientific journals focuses on human resource analytics, which is a highly significant issue among human resource professionals, it exposes a relatively little quantity of scientific inquiry, which is dominated by studies of the Qualitative situation. Yet, even though the research suggests that human resource analysis offers benefits, the adoption process has been incredibly sluggish (Marler & Boudreau, 2017).

If human resources don't want to lose their strength, researchers and practitioners should also feel compelled to invest in this growth. Organizations are beginning to invest in data metrics and HR analytics as the relevance of these tools is being realized, but they must first ensure that they will be effective (Boudreau & Marler, 2017).

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