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Article

Re-contextualising human resource management in the 4IR: Lessons for Lesotho

Mildred Mahapa*, Maletsoela Ellen Mahao, Lenyora Sesinyi

Department of Business Administration, National University of Lesotho, PO 180 Roma, Lesotho
*** Corresponding author:** Mildred Mahapa, mupandarem@gmail.com

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Abstract: Orientation: Indeed, the 4th industrial revolution (4IR) has redefined the world of work. A new set of skills needs to be defined and made available to organisations. Human resource management practices now operate in a complex, interconnected, unpredictable, and evolving environment. The question that one needs to answer is: how can HR align its functions to meet the demands of the fourth IR? It is prudent that human resource functions evolve quickly and adapt to changing demands. **Research purpose**: This paper seeks to unpack the changes that have been brought about by the 4IR and suggest ways in which HR professionals in Lesotho can align with this inevitable era of digitalisation. **Motivation for the study**: Due to the dynamics and transformations that have been brought about by the 4IR, this study was motivated by the need to understand the effects of the 4IR in small economies on the HR function and offer lessons to embrace change. **Research approach**: The research was qualitative in nature, and data was collected purposefully from journal articles, newspapers, and book chapters. Content analysis was used for the data analysis. **Research findings**: The effects of the 4IR through digitalisation disruptions have been felt across all corporate functions, and HR is no exception. It has had a massive influence on both the economy and the labour force and impacted employee roles in terms of health, mobility, working hours, personal life, and general administration. HR leaders play a critical role in ensuring that businesses are able to successfully adopt and deploy new technologies. **Contributions**: The research unpacks the effects of 4IR and gives practical lessons for HR professionals in Lesotho.

Keywords: 4IR; digitalisation; human resource; technology

1. Introduction

The 4IR is transforming global business and has changed the narrative of the management of human resources in general. Change management is becoming an essential part of human resources as organizations need to keep up with the new emerging era of industrial digitization and digitalization. Due to the extensive use of software, robotics, and data analytics, the demand for skilled workers in information technology (IT) is rising. Existing workers must transform their skills to respond to new IT integrations. As the whole ecosystem of human life is being changed, a collective response from the government, educational institutions, and companies is needed to adapt quickly to the demands of Industry 4.0, and Lesotho is no exception. HR professionals are also finding themselves on the front lines of helping their organizations and leaders drive technology absorption, foster innovation, enable new work models, and, ultimately, attract, retain, and develop the workforce of the future. Human resource practitioners play a central role in the 4IR, but most of the major changes that will be brought by the 4IR are not well known, nor are the opportunities thereof. Change comes with a lot of fear. To demystify the issue of 4IR and HRM, this

paper seeks to address the following questions:

What changes has 4IR brought to human resource management (HRM)?

What lesson can be drawn from 4IR to effectively manage human resources (HR)?

2. Conceptualisation and review of literature

Industry 4.0 also known as the Fourth Industrial Revolution, or 4IR, refers to developing an environment in which disruptive technologies and trends are changing the way we live and work. This section tracks and discusses the industrial revolution and how it changed the way work was carried out in factories over time.

2.1. Evolution of industrial revolutions

The 4IR involves the rise of data and connectivity, analytics, human-machine interactions, and improvements in robotics (Pandian, 2018). It can also be described as a world where people move between digital domains and offline reality through the utilization of connected technology to modify and manage their lives. The 4IR transforms all processes in an organisation from production, distribution, marketing, and human resource management.

The understanding behind the 4IR can be tracked throughout the industrialisation process and the development of technology over time. Technology is a concept that defines the evolution of scientific knowledge that impacts the way goods and services are produced. It also encompasses tools and techniques deployed in the industry to realize production and business goals. Over time, technology changed the skill sets of humans. When the capabilities of people were not enough to accelerate production, tools were developed to aid human efforts in industrialisation or people would be replaced. The word industry actually refers to the production of goods and services with the help of technology and new methods or standards.

The industrial revolution explains the period between the 1770s and the 1880s. This era was marked by technological developments and changes that saw a high level of industry mechanisation and electrification (Skilton, 2018). Sorroshian and Panigrahi (2019) talk about the 4th IR as a paradigm shift to the whole idea of industrialisation. It involves a wider vision of the industrialisation process than its predecessors. It encompasses the implementation of technologies such as cyber-physical systems, the internet, and the philosophy that sees as machines that fuse together human thinking in a smart way. In order to harness the potential found in the 4th industrial revolution, it will be important to assess the revolutions that came before it in order to track what was changing over time.

The first industrial revolution as already highlighted above, is seen as the period that started in the period 1760–1840. It was the time for a shift from economies that focused on agrarian to mechanised economies. The industrialisation process began to see steam engines coming into the manufacturing processes. Mokyr (2022) explains this transition as "a set of transitions with technology as the main anchor of economic change." The steam engines relied on coal to get fired up.

The second industrial revolution was between the 1870s and 1969. The main economic activity of this industrialisation process focused on improving the production of steel and iron, with light bulbs included to provide energy. Production

in large numbers began around this time. Innovations such as electricity and assembly lines were at the core of this industrialisation. This suggests that manufacturing processes became electrified with conveyor belts being widely deployed in assembly lines.

The third industrial revolution started in 1969. The introduction of "programmable large controllers" paved the way for the programming of processes in the manufacturing industry. At the production level, activities became automated with electronics combined with the use of information and communication technology. The use of computers became prevalent. Networked environments with the use of computers at the core were deployed. In a nutshell, all manufacturing processes were subjected to heavy automation and integration into digital platforms.

The fourth industrial revolution is an ongoing revolution that is the culmination of all previous industrial revolutions. Skilton and Hovsepian (2018) see it as contributing more to the way industrialisation operates as it reshapes societies as well. According to them, it also combines "technologies across the physical, digital, and biological" domains. This is the revolution that is characterised by emerging technologies, which include but are not limited to artificial intelligence, the Internet of Things, and robotics. Data is the driving force throughout all processes used in shaping societies and the economy.

2.2. Elements of Industry 4.0

According to Puhovichova and Jankelova (2020), there are a number of technologies that have shaped the 4th industrial revolution. To mention, first, there is artificial intelligence (AI). AI models are data-driven and involve tasks that can be done by machines and emulate the intelligence of humans. For example, the branch of AI that is referred to as deep learning focuses on natural language processing, where computer-based models enable machines to speak as though they are humans through the use of chatbots.

Secondly, big data and analytics. In this category, computer models are deployed to capture vast heterogeneous formats of data coming from various sources and analyse such data in order to establish patterns that support decision-making in an economy. As mentioned earlier, the fourth industrial revolution is sometimes referred to as the information age due to the voluminous data that is coming from various processes, be it manufacturing, sensors, social media, etc. It is believed that the correct analysis of this data can provide insights into how products and services are created. Not only do products and services benefit, but also decision processes within companies require data. For example, carrying out the development needs of employees in an organisation requires correct data to determine appropriate skill utilisation in the organisation.

Thirdly, also known as a decentralised digital ledger (Invstopia.com), this technology uses cryptographic methods to store data. It is capable of creating transparency and trust in digital transactions. Participants in blockchain are machines referred to as nodes. They all hold similar digital ledgers. If any node wants to change something in the ledger, all other nodes must approve such a transition. With the DLT, there is no need for a middleman to conclude a transaction, as in the case of a bank. In

technological terms, there is no central server that acts on the requests of other computers in the network, all nodes approve what happens in the network. The technology has been hailed for its immutability and transparent behaviour.

Fourthly, as with the previous industrial revolutions, technology has made major changes in how economies operate, especially in manufacturing processes. The Internet of Things (IoT) is premised on the philosophy of connectedness between systems and physical objects and services to create a chain of coordinated ways of communication at work as well as data sharing. Everything that has a chip and can use a logical number, also known as an internet protocol address, can be connected. These include radio frequency identification (RFID), and the Internet of Things (IoT). The philosophy of IoT is connectedness, which includes systems, physical objects, and services to create a coordinated communication of work and data sharing.

The fifth element is biotechnology and genetic engineering. In the description of the 4th industrial revolution, the elements of biology and genetics are mentioned. This involves the fusion of technology in biological systems for medical and agricultural processes.

Lastly, there is cybersecurity. It is understood that all digitalisation processes involve heavy use of digital systems, automation activities, and the sharing of resources that happen over the internet. The internet, therefore, has become a risky area, and these risks need to be detected and mitigated. Therefore, security becomes important.

2.3. Human resource management

Van der Westhuizen (2021) argues that HRM is a practice and also an area of study that focuses on addressing matters related to decisions, principles, strategies, operations, practices, functions, steps, approaches, and procedures that affect employees. HRM is constantly aligned with changes in the environment in which all these exist. Employees are regarded as the most important assets and require empowerment towards their progression in their careers and ensuring that they are secured in their jobs. The field of HRM is seen as the starting point for carrying out all activities associated with employees, including how they are recruited, as well as the termination of their working career. The 4th industrial revolution has brought with it changes that seem to affect employees in the industries in which they work. According to Puhovichova and Jankelova (2020), it is through human resources that the goals of any company and action plans are realised and executed. According to Rangaiah (2020), Human Resource (HR) management functions have changed. **Figure 1** shows the changes that have taken place as follows:

Figure 1. The journey of data-driven human resource management.
Source: Rangaiah, 2020.

HRM has evolved significantly over the past two decades, allowing it to play an

even more critical role in today's dynamic business environment, especially in the 4th industrial revolution.

2.4. Effects of 41R on human resource management

This section explores in detail the role of human resources in the 4th IR to determine how Industry 4.0 has affected its functions. To achieve this, technologies that have shaped the role of HR are discussed. First, Artificial Intelligence (AI). According to Balas et al. (2021), AI is "an ultimate intelligent system that is an adaptable logical agent that recognises its environment and takes measures that maximise its chance of accomplishment of a goal." AI encourages dependencies to be forged between one machine and another or between humans and machines instead of among humans. With this understanding, some HR practices can be automated and machine-driven. Even labor-centered activities can be adapted through the use of AI, a technology that is more information-driven and ultimately reduces pressure on the work of employees. This intervention of AI in HR processes is therefore recognised as a way to strengthen HR practices especially when it comes to quick decision-making. Some of the examples that have seen AI automating HR practices include a scenario where AI has been used to screen candidates for interviews, analysing the developmental and career needs of employees.

On the one hand, there is Big Data. According to Garcial-Arroyo and Osca (2019), big data has become the most valuable resource for companies. There is an interconnection between big data, AI, and the Internet of Things (IoT) as they relate to HR. With the spread of technology on almost everything, which is the term referred to as IoT, it has become easy to collect and transmit information for analysis over the internet. IoT simply implies that data is generated, collected, and transmitted through various technologies connected together by a network or the internet. In the context of HR, in the wake of the 4th IR, information about prospective candidates is gathered from various sources, which include but are not limited to social media portals, email, and the internet. Skills required are mostly searched for on the internet using algorithms or AI-powered tools. Once this information is collected, it has to be analysed using automated AI tools. This information that is generated through various sources on the internet is big data. Big data implies that the sources from which data is collected are heterogeneous, the data is unstructured, voluminous, and beyond human comprehension using traditional methods of analysis. This is the reason it requires AI models to help analyse it.

Figure 2 below is a generic model for an AI life cycle. It starts with a process of sorting and organising data, or curation of data. This is big data. This data comes from various sources of HR practices or from the internet for use in making decisions. For example, if data is from social networks and is going to be used to profile candidates for a job, automated HR processes will provide analysis and help make decision-making easier. The AI algorithms are trained with this data to be able to help in predicting the outcome. The model becomes more intelligent as it gets fed more data to make predictions, reducing the pressure on the employees to do this by themselves. **Figure 2** below is the representation of the model.

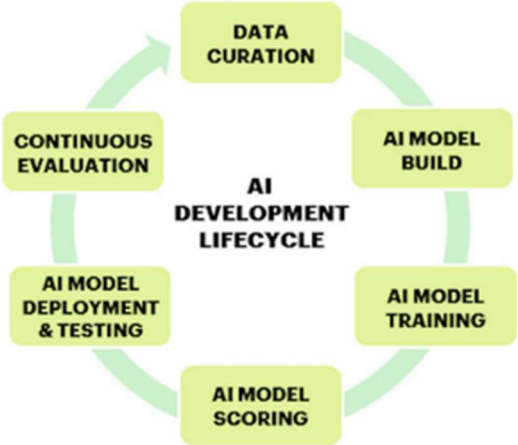

Figure 2. AI development life cycle.

Source: Solanki and Pathak, 2019.

Figure 3 below shows connected sources of information that can affect how HR receives data for screening and perhaps from its automated processes.

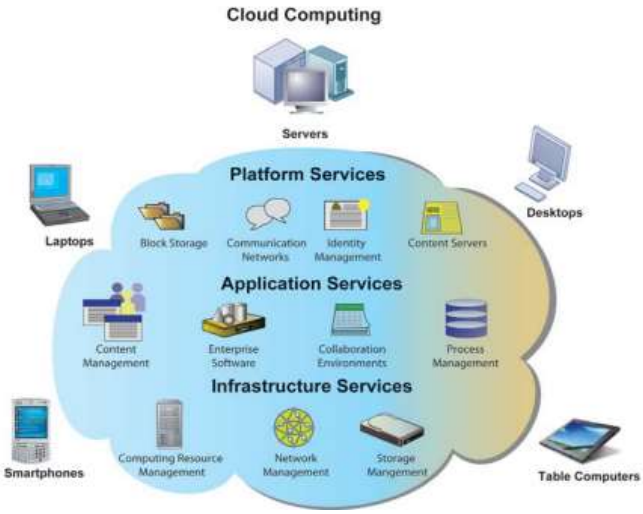

Figure 3. Source of information.

Source: Laudon and Laudon, 2013.

2.5. How HR will use 4th IR technologies to develop and solve problems in the future

There has to be a paradigm shift in the way HR practices are being carried out today. This paradigm requires HR practices to be data-driven. Automation of HR practices will bring this reality into play. The 4th IR economy is already characterised by the extensive generation of information from various sources. Algorithms, or AI models, are deployed in every system to reduce the burden on employees to analyse and predict the future. Humans get tired, and their intelligence is subject to human conditions. Big data, as explained in the above sections, has to do with the unprecedented generation of data that is coming from various sources and activities that need to be analysed to make correct decisions. Humans are limited when it comes to this.

AI systems are built over these platforms as algorithms that are able to use data and computing resources to learn a certain behaviour that emulates human intelligence (Laudon and Laudon, 2013). Machines can be effective in predicting outcomes and making HR decisions more accurate and faster.

The labour activities of employees are also automated. In the 4th IR, cyber-physical systems (CPS) combine all processes of manufacturing that are physical with computing resources and communication capabilities. The physical elements in production are connected to the digital resources using IoT (Xu et al., 2018). The interconnectedness of systems is made possible by the IoT. This suggests that all manufacturing systems lean on each other for coordinated work. In the process, they generate a lot of data between processes that no human can handle with their mind. That is why these efforts of employees will be replaced by intelligent systems to avoid errors such as inaccurate decision-making. So, AI models take over, as machines never get tired. According to Bayraktar and Atar (2018), all these CPS systems begin to perform monitoring and control using smart means.

Furthermore, when it comes to manufacturing patterns of products or designs, 3D printing technology is utilised. 3D stands for 3-dimensional representation of objects using digital files. The process is such that materials are designed through this technology (Cerika and Maksumic, 2017). There is no waste in using this technology.

Big Data enabled decision-making may also be referred to as HR analytics. It is a data-driven method of decision-making that provides insights into how hiring, compensation, training, and development within an HR function can take place (Marker and Boudreau, 2017).

The Future Jobs Survey by the World Economic Forum in 2018 depicts that human labour statistics will go down from 71% to 58% by 2025. In the same report, it is indicated that organisations worldwide should expect far fewer numbers due to digitalisation and automation of most functions done by the workforce. It will either be that the human component in the work environment is eliminated, substituted, reinvented, or transformed. This serves to create more opportunities in the tech space than on the side of personnel needed. This suggests that new skills will be required or investments will be made to reskill the current workforce which might seem expensive.

The use of AI, big data, and IoT will be very crucial. The 4th IR technology developments changed the landscape of the way recruitment is done. Recruitment will be subjected to algorithms that can do the hiring. The same is true with screening applicants, sorting, and making schedules for interviews. They make all these go fast with the reliability that is expected. The use of AI tools such as Chabot's is already in place to answer questions related to recruitment.

In research conducted by Cerika and Maksumic (2017), on "the effects of new emerging technologies," they highlighted that these technological inventions have a bearing on the performance of employees. They used a method called Deductive qualitative analysis (DQA), which provided insight into the positive things that are revealed by the effects of the implementation of new technologies. According to Whysall et al. (2019), the 4th IR acts as a connector of current skill sets with future skills to combat any challenges in the innovative technology space. To bridge the gap,

organisations may incorporate new ways of acquiring talent.

3. Methodology

The study was qualitative in nature and used secondary data, which was selected purposively. Secondary data refers to data gathered for the second time and already obtainable from other sources. Using data that is already available offered the researchers adequate time to conduct the research by accessing quality research. The study was exposed to a wide array of data available in databases whose availability would have been costly and inconceivable if the study had opted for primary research. The researchers adhered to Bowen's (2009) recommendation that for document analysis researchers should check whether the selected documents to be analysed are accurate, credible, authentic, representative, and relevant to the research problem. The researchers adhered to these principles. The researchers prioritised recent publications on the 4IR and Human Resource Management discourse. In addition, content checks and the sources of the documents were also employed to determine the accuracy, credibility, authenticity, and relevance of the chosen written documents. The researchers consulted journal articles, books, seminar papers, and online sources related to the integration of 4IR and HRM. The data was also analysed using thematic classification and content analysis.

4. Results and discussion

4.1. Lessons for Lesotho

In the context of Lesotho, many lessons can be drawn to understand the role of the 4th IR in relation to HR professionals. This may not be a straightforward path to arrive there and there, is no quick way to fully shift to a fully automated and efficient environment. Implementing these technologies requires resources such as money and skills. For example, implementing artificial intelligence and deploying robotic technology to run HR operations may not be that easy. On the one hand, there is a necessity for doing things much quicker to solve problems and make decisions.

The constraints that underlie the current activities of HR include recruiting and retaining employees. There is a need to replace human factors and improve productivity within a company. It is necessary that employees be reskilled to meet the requirements presented by the 4th IR technological developments or to be in harmony with them (Sung, 2018). Robotics in the industry is a growing phenomenon that will later supersede human intelligence. Looking at sectors such as agriculture and manufacturing, this might grow faster than anticipated as the focus in these sectors is more on production. Therefore, there is a need for rigorous skills training programs for the 4th IR era.

4.1.1 Application of AI in HR

Recruitment and selection: the use of AI makes recruitment processes easier and quicker. To seek a suitable candidate for employment may be a tedious process but AI can assist in making the process quick and more effective.

Employee retention: With the use of AI and machine learning processes, data can

be analysed and models developed to analyse staff retention or turnover issues.

Performance management: AI-enabled models can be developed through data to help in analysing the performance of HR professionals. These intelligent programmes can rely on AI methods to make assessments for the HR staff to help in making decisions about their career progress or requirements for training or development and even a reward system.

4.1.2. Application of big data in HR

Selecting and hiring: Finding skilled talents is a prolonged process and requires a lot of effort. Big data is now being used to make this process easier and quicker. Big data supports sorting numerous resumes and picking the desired ones. According to Rangaiah (2020), big data can be used to reduce the number of days between advertising and filling a post. Big data calculation tools could streamline the process. The OECD (2019) also highlights that bad data hiring is a costly mistake and big data reduces the possibility of that mistake. Having hired employees, retention becomes a critical aspect. Guiles (2020) indicates that big data helps to spot employees who are likely to walk out of the company by going through their job performance, employment history, payroll data, profile updates, and other online activities. Algorithms can then be designed and used to spot and retain talented employees.

Performance and compensation: A substantial amount of data is to be collected for each employee to construct a performance management system in order to reward them individually. HR Analytics recommends some tools that can be used to make compensation plans for employees linked to their individual performances.

Enhance learning and development: Many organizations are using HR analytics to forecast the future needs of employee development and teaching.

Performance management: The assessment of employee performance permits the analysis of the strengths and weaknesses of individual employees. Organizations plan to enhance the competencies and expertise of employees. That is how it contributes to enhancing the skills and competencies of employees (Huselid, 2018). More so, big data helps predict the performance of individuals before hiring them.HR departments can build data sets of high-performing employees to outline talent pools.

Legal and ethical issues: Big data can be used by the HR department as a technique for risk management (Foster, 2021). Given that governments find themselves operating in the digital space, there is a need for information to be used transparently and responsibly. Data is seen as being instrumental in dealing with challenging policy issues and consequently needs to be used strategically to promote the needs of the citizenry (Ulbaldi et al., 2019). **Figure 4** below shows a summary of the benefits of big data in HRM.

Figure 4. Advantages of big data in human resource management.
Source: Foster, 2021.

5. Practical implications

HR professionals are better equipped with current trends in managing employees.

6. Conclusion

With the advent of large volumes of data and new technology, it can be noted that it has become imperative to manage and use the technology to improve efficiency in organisations. Evidence indicates that HR offices across the globe are striving to embrace technology in the management of their human capital. Lessons can be drawn that can help in managing talent, improving decision-making around HR, and retaining competent staff.

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