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WELCOME TO THE DAWN OF THE FOURTH INDUSTRIAL REVOLUTION: ARE HR PROFESSIONALS PREPARED FOR THE IMPACT OF FUTURE OF WORK?

Abstract

Propelled by the socio-economic disturbances and the COVID-19 pandemic, advanced technologies such as artificial intelligence (AI), Internet of Things (IoT), robotics, and Web3, which are characteristic of the Fourth Industrial Revolution (FIR), have gained significant ground globally, including the developing countries. As organizations face the array of opportunities and challenges of adopting these technologies, human resource (HR) professionals are tasked with trailblazing the digital transformation of workplaces. Yet, a gap in scientific research regarding the preparedness of HR professionals for this task exists, especially in developing countries like North Macedonia. With this research, the authors aim at addressing this gap and exploring the impact of FIR-related technologies on Macedonian workplaces, employees, their skills, and jobs, as well as, the level of readiness of HR professionals to step up in line with these advanced technologies. The authors build upon a review of the existing literature and use a quantitative online survey distributed to a selected group of HR professionals, operating on the territory of North Macedonia. The findings will contribute to a better understanding of the preparedness of HR professionals to steer organizations in the direction of working in the new era of automation and digital transformation.

Keywords: Fourth Industrial Revolution, human resource management, digital transformation

1. INTRODUCTION

While we can say we are living in the days of the Fourth Industrial Revolution (FIR) theoretically speaking, the impending impact of its related technologies like machine learning, robotics, Internet of Things (IoT), artificial intelligence (AI), and similar, is yet to be seen. It carries with it an array of positive and negative changes in the entire society, and in many of its pores like jobs, skills, workplaces, and the like. Theories, practices, roles, and functions of contemporary human resource management (HRM) will most likely be meaningfully transformed as a result of FIR technologies

(Johnson et al., 2016). Moreover, it is up to human resource (HR) professionals to lead the process of building the employees' capacities, abilities, skills, and attitudes toward utilizing the new technologies to accelerate the organizations' competitiveness, performance, and efficiency in the knowledge economy. Among other things, predictions point the finger at AI and machine learning as the technologies, which are most likely to affect how HR plans, recruits, selects, develops, rewards, and attracts employees (Vrontis et al., 2022).

As a high integration remains between these HR functions, the necessity for HR professionals to research, analyze, develop, and implement plans for FIR and the future of work plays an active role in managing internal jobs, job design, and skills (Nankervis et al., 2021). Not only that but HR professionals are also tasked with keeping an eye on the external environment and the changes happening in the labor market and the skills gaps to meet the HR demands of tomorrow (Nankervis et al., 2021). Even though automation hasn't fully replaced crucial HR activities and there is a lack of a comprehensive AI system for HR, a plethora of individual tasks can be solved with digitalization; examples of machine learning algorithms and AI chatbots can be seen in practice (Brynjolfsson & Mitchell, 2017; Kuzior et al., 2022).

To better understand the current situation of HR professionals and their preparedness for welcoming FIR-related technologies in the workplace and the future of work in general, this study aims to answer the research question:

RQ1: How prepared are Macedonian HR professionals for the effects of FIR technologies on their respective organizations and the way they perform their work?

This is one of the first studies of this kind performed in North Macedonia among HR professionals, thus addressing the research gap for the context of the country in particular as well as the similar contexts of other Western Balkan countries, where the level of HR development and technology adoption is comparable. Besides just the academic contribution, the study's practical contribution can be seen in the fact that the findings and suggestions can be useful for managers and practitioners to understand the current level of preparedness for the future of work of their workforce and what HR professionals predict will most likely happen with the adoption of FIR technologies. Moreover, the study represents a catalyst for future research in the field.

Before outlining the findings, we review the existing relevant literature on FIR, contemporary HR, and FIR's impact on HR. Furthermore, we present the research methodology and analysis of the gathered quantitative data and finish with the findings, concluding remarks, and implications.

2. LITERATURE REVIEW

2.1. FIR-Related Technologies

The Fourth Industrial Revolution (FIR, 4IR) got the world's attention when it was announced as the main theme of the 2016 World Economic Forum in Davos, pioneered by Professor Klaus Schwab (2015). He explained the context of this Industrial Revolution – a symbiosis of physical and cyber technologies creating an intelligent digital transformation – as occurring at the moment when billions of people can connect between each other and access unlimited data and knowledge aided by technologies like AI, big data, IoT, 3D printing, biotech, robotics, quantum computers, autonomous cars, and the like (Schwab, 2015). The FIR is characterized by: 1) homo sapiens becoming 'phono sapiens' due to the smartphone dominance (a term coined by The Economist); 2) creating unlimited knowledge with big data; 3) AI competing with human intelligence, 4) the launch of personalized and custom-tailored products on a mass level (Hyun Park et al., 2017).

2.2. FIR-Related Technologies Enter the Workplace and HRM

Accelerated by the global COVID-19 pandemic and other disruptions, technology has changed managerial and HR processes, the nature of workplaces, job relationships, and entire

communication systems (Collings et al., 2021). The number of employees working hybrid or fully online or as part of virtual teams grows by the day (Popovici & Popovici, 2020).

With that being said, as the FIR knocks on the door of offices worldwide, traditional HR is expected to change in the course of this decade as a result of new technological discoveries and adoption, as well as, the workforce's changing nature and preferences. For managers to gain real-time HR-related advice, AI, machine learning, and robotics can adapt to new situations and perceive certain patterns in workforce-related data (Russell & Norvig, 2014). Expecting that future employees will most likely heavily rely on these technologies, the roles, skills, tasks, and responsibilities of HR professionals would be susceptible to change to continue adding value to the organizations and their processes (Ulrich & Dulebohn, 2015). With that in mind, it is expected of HR professionals to raise their awareness and understanding of the current and future possibilities and challenges in the workplace, the jobs and skills of today and tomorrow, and even know how to act in a way that addresses these challenges effectively (Ulrich & Dulebohn, 2015). Regardless of the positive or negative impacts of FIR in the workplace (Xu et al., 2018), HR professionals should mitigate the harmful consequences, and maximize the benefits. Thus, identifying and exploring the level of readiness of both organizations and HR professionals working in these organizations to efficiently manage FIR-induced changes becomes important.

Researchers are unyielding about seeing AI's potential in planning, turnover, cost-cutting, recruitment, employee rostering, data mining, HR sentiment analysis, keyword searching from CVs, and self-service systems, thus infiltrating an aspect in almost every HR function (Strohmeier & Piazza, 2015). While the relationship between people and automation varies based on the task and function at hand (Parasuraman et al., 2000), it is unlikely for people to be completely removed from the equation and for entire jobs to be fully digitalized and automated (Janssen et al., 2019). Yet, when FIR technologies enter the game, this may result in more complex tasks needing additional training and development of employees or simplification of present jobs due to partial automatization (Wang & Siau, 2019).

The focal point of FIR technologies is data, influencing HR in the way it collects and analyzes data. FIR-associated technologies, and AI in particular, have the potential to restructure and ease the decision-making processes when hiring through keyword and data extraction from job applications, training, and practicing job rotation, enhance payroll systems and performance appraisals, help in attracting and retaining skilled and professional workforce (Yawalkar, 2019). Essentially, recruiters and HR professionals, in general, would have more time to spend on strategic, value-adding activities, rather than manually reviewing all applications and performing repetitive tasks. This may lead to cutting down labor costs, reskilling and upskilling some of the employees, saving time, fostering innovation, and enhancing efficiency and productivity (Nankervis et al., 2021).

HRM can benefit from adopting machine learning technologies and AI. From the beginning of a new employee's journey, AI and machine learning can streamline the recruitment process through cognitive technology that uses multiple data sources, going beyond the data for past experience, to correctly determine the suitability of the candidate (Upadhyay & Khandelwal, 2018). Managers and team leaders can plan training sessions per AI- and machine-learning-mediated assessments of skills gaps and afterward track the progress with the same technology (Yawalkar, 2019). When it comes to performance management, FIR-associated technologies can analyze employee data, performance ratings, and professional history and present top performers, head count, and transactions for benefits and rewards with the use of specialized chatbots (Vrontis et al., 2022). The roles of HR professionals and their primary activities due to FIR-associated technologies in the workplace are presented in Figure 1.
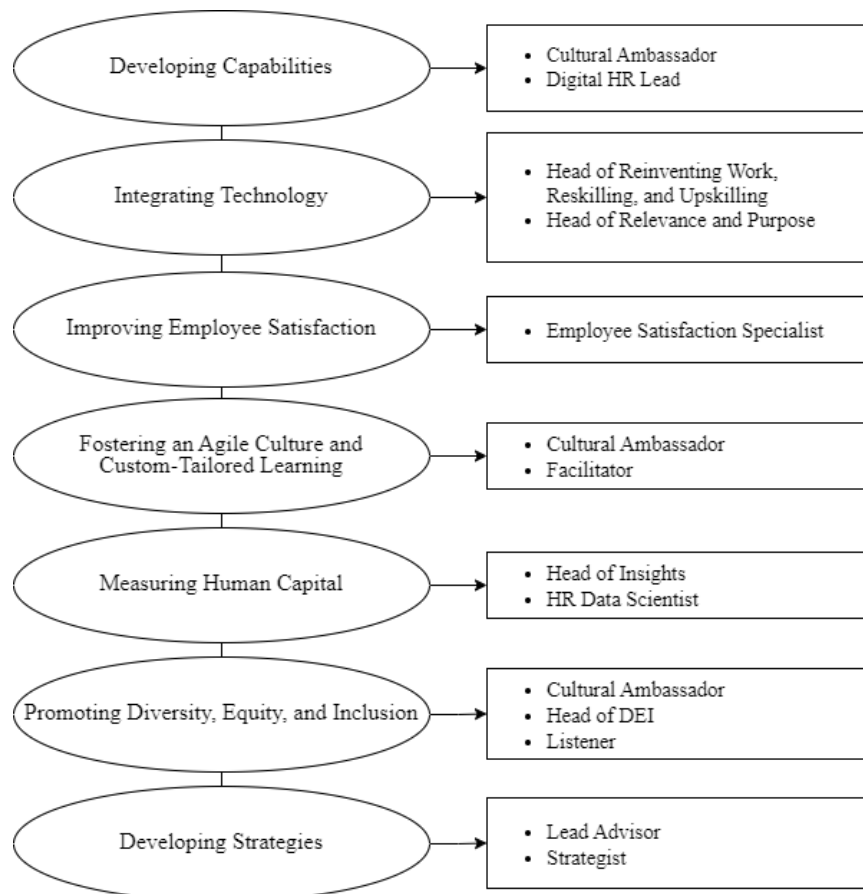
Figure 1 Roles of HR Professionals Contributing to FIR

Sources: World Economic Forum. (2019). HR 4.0: Shaping People Strategies in the Fourth Industrial Revolution [White Paper]; Karimulla, U., Gupta, K., Mashinini, M., Nkosi, M., & Anghel, C. (2020, August). Industry 4.0 and the Role of Human Resource Development in the South African Fabrication and Construction Industry. In Proceedings of the 5th NA International Conference on Industrial Engineering and Operations Management, Detroit, MI, USA

3. METHODOLOGY

To assess the level of preparedness for the impact of the future of work and FIR-associated technologies, we employed a quantitative research methodology and distributed an online survey, after which we analyzed the data with quantitative research methods in SPSS. Moreover, we identified the profile of the ideal respondents based on their profession through our contacts and eventually sent the survey to a database of HR professionals and people holding managerial positions in private companies. The population which was considered included people employed in HR departments and members of management in private companies in North Macedonia. We believe these profiles of respondents to be suitable for this study as they include the key decision-makers when it comes to the adoption of technology in HR.

The methodology is grounded by the current literature on strategic human resource management (SHRM) and managing human capital, connecting FIR-related technologies to the capacity of HR to successfully plan and adopt them, aided by supportive organizational factors. Furthermore, a similar study (Nankervis et al., 2021) has been done in the Australian context, which is different from our context of analyzing these phenomena in a developing country in the Western Balkans. The instrument, i.e., the questions were adapted from this study and modified to suit our research purpose.

Before launching the survey, it was pilot tested to a selected small group of 13 professionals in the field of HRM and academic research, in general. This resulted in slight modifications regarding the survey's

length based on their recommendations and insights. The sample consists of 87 HR employees and managers from private companies in North Macedonia. While the total number of distributed surveys was 125, the total number of fully-answered surveys was 87, meaning that the response rate overall was 69.6%, which we deemed satisfactory. To prevent losing complementary data in the final sample, we opted for keeping some of the initial data from some of the incomplete surveys.

The survey consisted of three sections: 1) questions for evaluating the profile of the respondent, including demographic information, job position, and size of the organization; 2) questions about used FIR-related technologies in HR, frequency, and plans; 3) questions for assessing the impact of FIR-related technologies on HR, using a five-point Likert scales. Only the authors had access to the submitted online anonymous responses, meaning that the respondents didn't have the option to provide sensitive identifiable information that could be linked to them and had no option to view others' responses. Afterward, the data was cleaned and processed using SPSS, obtaining calculations for the frequency, standard deviations, and mean scores.

The sample comprised almost 80% females and 20% males with most respondents ranging from 31 to 42 years. Most of the respondents had completed undergraduate studies and gained a Bachelor's degree (76%), whereas a smaller portion of them had a completed Master's degree (21%), and few had only finished secondary education (3%). Moreover, a majority of respondents stated their job position as HR manager (44%), or manager (23%), as the rest of the positions included HR specialist, development specialist, talent acquisition specialist, and similar.

When it comes to the size of the organizations where they are currently working, 51.8% of respondents reported working in large organizations, 42% in small organizations, and 6.2% of the sample works in medium-sized organizations. Connected to this, the most frequently-stated industries included IT, banking and finance, and consumer goods production.

4. RESEARCH RESULTS AND FINDINGS

Through the quantitative research, we set out to get an overview and a snapshot of the current and potential adoption of FIR technologies like information systems, cloud technology, AI, big data, machine learning, IoT, and similar in HR and the impact they have or may have on HR's performance.

Table 1 showcases the most common software and applications used in the HR departments of the organizations where the respondents are working. A large portion of the reported software and HR applications are based on FIR technologies like SAP SuccessFactors and Kronos Workforce Ready. Yet, evidently, most companies still don't use HR software and applications for their workforce-related tasks. Software made by domestic vendors in North Macedonia, such as Semos and Digit Computer Engineering, dominates the landscape, too. The most unforeseen finding was the high frequency of 'none' responses.

Table 1 Used HR Software and Applications

	Frequency	Percentage
HR.net	13	14.94
Semos Cloud	12	13.79
SAP SuccessFactors	7	8.05
Digit Computer Engineering	9	10.35
Recruitee	6	6.90
Officevibe	2	2.30
Breathe HR	1	1.15
Kronos Workforce Ready	2	2.30
Microsoft Office	9	10.35
Custom-made system	3	3.45
None	21	24.14
Other	2	2.30
Total	87	100

Source: Authors' calculations

The three most frequent uses of FIR technologies in HRM functions included payment and rewards, performance management, and recruitment and selection. The former was present in more than 80% of the responses, whereas performance appraisals and staffing appeared in more than 50% of the answers each. Job planning, training and development, job design, administrative work, and employee relations appeared less and are given in descending order.

Moreover, most of the respondents, who reported the use of FIR-associated technologies in HRM, assessed the level of adoption as high or moderate with an overall mean score of 3.2529 and a standard deviation of 1.3912. This confirms that when the implementation of FIR technologies commences, HR teams favor using them per their budgets, abilities, needs, and opportunities.

A crucial factor for applying FIR technologies in the workplace is the support from the top management. Oftentimes, HRM is seen as the link to the top managers and a strategic asset in organizations, thus giving rise to strategic human resource management (Paauwe & Boon, 2018). With that being said, responses regarding support from the top managers for FIR technologies application clustered around 'high', 'moderate', and 'very high' in descending order (mean score = 3.5517, standard deviation = 1.1887). Furthermore, this finding is encouraging and can represent a wind at the back for organizations and HR professionals who are struggling with the adoption of FIR technologies.

Respondents agreed that FIR technologies are helpful for their organizations to complete tasks faster, more efficiently, and easily, thus enhancing job performance and productivity. Table 2 presents the support from FIR technologies for the aspects of HR effectiveness. The data, derived from a five-point Likert scale, shows overwhelming support and benefits from using technology in HR.

Table 2 FIR Technologies' Impact on HR Effectiveness

Descriptive Statistics	Mean (M)	Standard Deviation (SD)
FIR technologies…		
Help HR improve performance	4.770	.475
Enhance HR responsiveness	4.689	.489
Enhance communication and ideas exchange with HR	4.575	.542
Help organizational competitiveness	4.391	.721
Add value to HR's work	4.805	.392

Source: Authors' calculations

There is a significant disparity between the FIR-related technologies HR employees and managers use today and the technologies they expect to adopt in the near future (five to ten years). From the FIR technologies that HR uses now, cloud technology, IT (human resource information) systems, and machine-to-machine interaction lead before the rest. On the other hand, in the near future, respondents expected to mostly use AI, followed by big data and cloud technology; the latter remaining in the top three, but losing plenty of its popularity. The overview of the most used FIR technologies is presented in Table 3, together with data on current use, non-use, and potential use from the respondents who answered they don't use the particular technology.

Table 3 Overview of Most Applied Technologies

Variables	Frequency	Percentage
Cloud technology		
1. Present use	65	74.71
2. Not used	22	25.29
2a. Not used, but plan future use	17	
Machine-to-machine interaction		
1. Present use	66	75.86
2. Not used	21	24.14
2a. Not used, but plan future use	20	
Mobile technology		
1. Present use	72	82.76
2. Not used	15	17.24
2a. Not used, but plan future use	6	
Artificial intelligence		
1. Present use	35	40.23
2. Not used	52	59.77
2a. Not used, but plan future use	52	
Big data		
1. Present use	31	35.63
2. Not used	56	64.37
2a. Not used, but plan future use	44	

Source: Authors' calculations

5. CONCLUSIONS

The study aimed to outline the preparedness, the current state of the adoption of FIR technologies, and a look forward to the future adoption of such technologies. The findings point out that the adoption remains limited even though there have been massive improvements in recent years for some technologies rather than all of them. The most frequently used technologies currently include cloud technologies, IT systems, and machine-to-machine interactions with an emphasis on low levels of AI adoption, which is expected to change in the future. This is expected in the context of North Macedonia, and potentially in similar contexts of Western Balkan countries, since using AI in the workplace is still new. Respondents were adamant that AI, big data, and similar pioneering technologies would most likely help make their jobs easier, boost their performance, as well as speed up and streamline processes. This has been supported by their belief that FIR technologies can positively impact HR effectiveness. Furthermore, support from the top management for adopting FIR-related technology continues to play an instrumental role.

The study can further benefit from increasing the sample size and expanding to other similar settings to gain a regional perspective on the adoption of FIR technologies and the readiness of HR professionals for the future of work. Also, more parameters like job satisfaction, employees' attitudes, job (in)security, and similar can be further analyzed in this context.

Evidently, HR professionals are aware of these new technologies that can help or hinder their work, which highlights the need for developing new capacities and skills to successfully manage them (Wilson, 2013). Both the literature review and the findings stress that when new changes happen, organizations have leaders and laggers when it comes to adopting new technologies. It is up to HR professionals to lead, undertake a proactive role, and use the benefits technology has to offer for maximizing effectiveness, performance, and therefore organizational competitiveness in the new era of the future of work.

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