Journal of Infrastructure, Policy and Development 2024, 8(9), 6873.
https://doi.org/10.24294/jipd.v8i9.6873

Article

Adoption of blockchain technology in human resource management: Moderating role of institutional support

Fawzieh Mohammed Masa'd[1,*], Hassan Ali Al-Ababneh[2], Rasha Mohammad Rath'an Alraqqad[1], Dirar Abdelaziz Al-Maaitah[3], Esraa Farid Qawasmeh[1], Ahmad Alrousan[1]

[1] Department of Human Resources Management Jadara University, Irbid 21110, Jordan
[2] Department of Electronic Marketing and Social Media, Zarqa University, Zarqa 13132, Jordan
[3] Department of Business Administration and Accounting, Alburaimi University College, Alburaimi 512, Oman
*** Corresponding author:** Fawzieh Mohammed Masa'd, fawziehm@jadara.edu.jo

CITATION

Masa'd FM, Al-Ababneh HA, Alraqqad RMR, et al. (2024). Adoption of blockchain technology in human resource management: Moderating role of institutional support. Journal of Infrastructure, Policy and Development. 8(9): 6873. https://doi.org/10.24294/jipd.v8i9.6873

ARTICLE INFO

Received: 4 June 2024
Accepted: 17 June 2024
Available online: 4 September 2024

Abstract: The key goal of the study is to identify aspects of the implementation of blockchain technologies in human resource management and argue for the moderating role of institutional support. The need to introduce new technologies at both the tactical and strategic levels is substantiated. It is highlighted that the key core of modern organizations is the human resource management system. The role of integration of blockchain technologies in human resource management, which ensures the effective training of qualified personnel at the right time and in the right place, is argued. It has been determined that the introduction of blockchain technologies in human resource management facilitates the organization of cooperation between countries in updating skills and knowledge based on compliance with competency standards and corporate governance rules. A survey of 300 employees of the pharmaceutical industry in Jordan was conducted, which served as the basis for a multivariate analysis to confirm reasonable hypotheses. The results obtained are valuable and can be applied in practice in terms of determining the impact of the implementation of blockchain technology in the human resource management system and on the UTAUT structure, which in turn provides institutional support.

Keywords: human resource management; blockchain; UTAUT

1. Introduction

Modern human resource management processes are imperfect and have a number of areas that need to be optimized and improved. The development and optimization of existing approaches to human resource management cannot be imagined without innovation and blockchain technologies, which will improve the management process, making it transparent, efficient and intuitive. Considering the presented aspects, it is important to state that there is an urgent need to study the specifics and features of the implementation of blockchain technologies in the human resource management system, which is the main goal of the study. The implementation of blockchain technologies in human resource management gives rise to a number of nuances and questions that need to be investigated and a unified approach and methodology that could be used in practice be formed.

The novelty and key goal of the study is aimed at determining the features of the implementation of blockchain technologies in human resource management (HRM) with substantiation of the role of institutional support. To achieve the goal of the study, key theoretical prerequisites and hypotheses have been identified that will allow, in contrast to existing studies, to determine:

- How the personnel management of pharmaceutical companies is simplified using blockchain technology;
- What tools and approaches to management appear with the help of blockchain technology;
- How pharmaceutical companies in Jordan effectively reduce employee resistance when implementing blockchain technology.

Taking into account the presented results, the obtained results will allow us to obtain comprehensive material on the features of the implementation of blockchain technologies in human resource management, which will improve the competitive position of companies and ensure their efficiency. However, to achieve all goals and reasoned hypotheses, it is necessary to consider the features and specifics of the theory of development of blockchain technologies, their implementation in business segments and human resource management systems, which is the subject of this paragraph.

Chapter introduction

The application of digital skills and technology in the Industry 4.0 era includes automation, artificial intelligence, blockchain, and sensor technologies, among other (Zhang et al., 2019). Blockchain technology (BC) has shown to be a revolutionary breakthrough that is grabbing the interest of commercial organizations, scholars, and practitioners (Hughes et al., 2019). Blockchain technology is a developing field that promises to enhance competitive advantages via creative platform-based business models (Al-Ababneh et al., 2024; Zhou, 2022). According to Wang et al. (2017), blockchain technology will fundamentally transform current business systems, opening up new applications for it across a range of industries. Numerous businesses have been experimenting with using blockchain technology in their operations. The UN is allocating funds to Blockchain technology to provide help to precise beneficiaries throughout international borders (Reinsberg, 2019). Blockchain technology is most suited for the financial industry, while businesses in the freight transportation, medical services, and retail industries are also making extensive use of blockchain technology (Attaran, 2019). Blockchain technology is used in the financial services industry for digital supply chains, retail chains' warranty receipts, funds transfers, payment, accounting, and patient data management in the healthcare industry.

BC technology has the potential to improve nearly every aspect of an organization's operations, including Human Recourses Management (HRM) and manufacturing (Hughes et al., 2019). While nearly all aspects of HRM have been digitalized, the idea that HRM within firms can be improved by utilizing BC technology has received less attention (Stone et al., 2015). Moreover, Industry 4.0 demands a workforce with the skills to exploit the applicable frontier technologies to maximize corporate efficiencies and benefits. The workforce's deficiency in relevant skills and the recruitment process is a major barrier to Industry 4.0 adoption in many nations and industries (van Laar et al., 2019). According to a CareerBuilder survey about the cost of a bad hire, as reported by Tripathi (Yung et al., 2020), 37 percent of employers reported lower productivity, 32 percent said they lost time hiring and

onboarding new hires, and 31 percent said the work quality was unsatisfactory. Consequently, 50 percent of new hires left their jobs within the first six months. Bad hiring has a negative financial impact on an organization, disrupts reputation, lowers productivity, and creates a cultural imbalance. BC revolutionizes how HRM operates in businesses. Blockchain makes it possible for workers to provide their employers with sensitive data. Employers might feel reassured by the digital verification of details including credentials, achievements, references, and abilities. Ramadhan (2021) claimed that the technology makes it easier to do several tasks, including hiring, data security, smart contracts, authentication, safe transactions, compliance, and auditing. A small number of businesses are using blockchain to offer HR solutions, such as payroll processing, staff procedures and acknowledgment, open recruitment information, and the content writer's eco-environment (Bello, 2022). However, businesses have not yet adopted BC as a combined system for HRM. The pharmaceutical sector in Jordan holds a prominent place in the nation and provides substantial contributions to financial growth through increased gross domestic product, exports, FDI earnings, and technological advancements. Nonetheless, a lot of pharmaceutical firms are facing HR challenges and slower growth. These businesses can overcome challenges and advance more quickly if they use blockchain technology to handle HR-related issues efficiently (Shaheen et al., 2023). However, here the problem arises:

Many organizations are facing resistance from employees to adopt the use of BC technology in HRM processes because of a deficiency of knowledge. The low willingness to adopt BC technology is making it difficult to integrate blockchain technology into Human resource management.

This paper seeks to understand staff members' perspectives on the current state of HRM in their organizations, recruitment-related issues that the companies are currently facing, staff members' knowledge of blockchain technology, and staff members' opinions regarding potential BC implementation in HRM. If BC is implemented, HR recruitment processes will be modified, reorganizing the business fully and affecting every employee.

Thus, the questions arise:

Question 1. How HRM procedures of pharmaceutical companies will be made easier by using blockchain technology?

Question 2. How pharmaceutical companies effectively reduce the resistance of employees during the adoption of blockchain technology?

Arguing the presented analysis scientifically, it should be noted that there is no single scientific approach and view regarding the implementation of blockchain technologies in human resource management (HRM) with an argument for the role of institutional support. The presented studies examine the features of personnel management and ensuring its effectiveness, but do not reveal the essence of the process of introducing blockchain technologies into human resource management, which determines the relevance and need for further research. A number of scientific approaches are aimed at studying the features of blockchain technologies and their role in the selection of company personnel, which is relevant and in demand in modern conditions.

However, it should be argued that all the considered scientific approaches and

views do not reveal the specifics of implementing blockchain in the human resource management of pharmaceutical companies and the specifics of managing the support of these processes among personnel. This study provides the first conceptualization and extension of the body of knowledge by examining the relationship between performance expectancy, perceived risk, and blockchain literacy. First, all of these contribute to factors related to the willingness to use blockchain technology in hiring and HR management. Secondly, most existing studies have focused mainly on the function played by organizational or institutional support in human resource management, but not on the impact of blockchain implementation on the human resource management system. The study focuses on arguing the readiness to use blockchain technologies in personnel management and assessing the impact of the role of institutional support. The main aspects of support management among employees of pharmaceutical companies in Jordan, which is determined by the introduction of blockchain technologies in human resource management, are substantiated. The need for the implementation of blockchain technologies in the human resource management system to increase transparency, transparency and improve the efficiency of companies is argued.

2. Literature review

2.1. Chapter introduction

Blockchain is an innovative information technology consisting of a mutual, centrally controlled, and unchanging database for commercial networks. A single network node cannot change it; instead, commercial transactions are recorded in blocks that are connected in a particular order. Blockchain technology allows for the tracking of all assets, both tangible and intangible, as well as the interchange of other transactional data. The adoption of blockchain technology requires favorable perceptions and behavioral intentions (Hussain et al., 2021). According to Hassija et al. (2022) blockchain is a network-wide, immutable, and decentralized database. Its purpose is to make it easier to track firm assets that are accessible over a network and to save business transactions. Blockchain technology can track and record any asset, including intangible assets like intellectual property, patent rights, copyrights, and brand image, and tangible assets like money, machines, buildings, land, and cars. Blockchain technology can be used in hiring to reduce the expense of logistics and communication for verification purposes. Employers who have access to candidates' verifiable resumes and ready references can save money on communication and logistics (Yung et al., 2020).

A human resource is a combination of technology, knowledge, and services. This is the enterprise's core package. Information about human resource management must be authentic. There may be a risk to an organization if a job seeker deceives it with false information about it (Salah et al., 2020). The greatest human resource is never denied to increase an organization's efficiency. BC integration in HRM will assist businesses in developing real human resource management. When the company creates its own private BC, integration starts. Because the customized BC is always available to all stakeholders and is never restricted to management, the system is made more transparent. Human resource information systems have all the necessary data

about employees, and an API interface for performance reward, and planning makes it easy to add, update, or remove employee information. The online-distributed database aids in the verification and authentication of employee information through BC (David et al., 2022).

The system is processing of authentic human resource data will be represented by digital contracts or accounting records. We can also refer to this as a smart contract. Every contract has an auto-generated digital intellectual property (IP) identity. Without a central system, the stem now builds a relationship of trust. Blockchain, therefore, decentralizes HRM. Effective support information will be used by the HR functions with the Blockchain integrative system to influence the organization. As a result, the organization's decision-making process may function well (Vrontis et al., 2022). The majority of businesses use HRM systems to handle every aspect of their HR, including hiring, payroll, benefits administration, employee advancement, and other employee life cycle activities. The HRMS system is now known as a BC-based HRM system due to the integration of BC technology with HR (Chhetri, 2022).

Onik et al. (2018) have suggested a more user-friendly and effective system. They have an enormous amount of applicant data in their database, which they plan to use with their private network blockchain system. Job seekers must upload their credentials, including their schooling, employment history, and right-to-work permit (RP). The blockchain system will verify this information, and the company will rank and publish the list of authenticated applicants so that it can make judgments.

Using BC technology as a platform for hiring can help candidates gain transparency and trust while providing businesses with a more cost-effective hiring process, claim (Al-Ababneh, 2023; Damle, 2022; Mehedi, 2018). BC technology has huge potential for the future of HRM, and it will be widely adopted because it offers information integrity, openness, and pace that traditional HRM systems do not (Chillakuri, 2022). The usage of BC technology can improve the integrity of the hiring process by streamlining information flow, which enhances selection and lowers hiring and onboarding expenses. To be considered for future job roles, people could grant institutions direct exposure to their professional profiles through a sizable decentralized social network. Lowering the expense of a company's future talent acquisition search (Agarwal, 2023).

BC technology can help manage personal identities, payments, job matching platforms, background checks and credential verification, and identity management additionally, it has been proposed that technology will streamline most HR processes and that the structure will be so transparent and interactive that it will be able to speak with stakeholders to directly address HR-related concerns. Blockchain enhances the value of routine organizational tasks by assessing potential future risks and facilitating the filling of positions with sensible strategies (Javaid, 2021).

The compensation structure of blockchain technology enables all participants to get paid for any kind of value they create. Financial or non-financial incentives, like reputation-based systems, may be used. Financial incentives come in the form of performance-based pay, prizes for finishing a job or course, and ownership stakes in a project or business of the company. Organizations may establish an internal smart contract-based incentive system by issuing decentralized crypto-tokens. Employees can freely spend tokens, which can be redeemed for a variety of items, such as gifts,

cash back for personal expenses, vacation days, supplies, theater tickets, or paid holidays by the company (Sasikala, 2017). Employee morale practice that is in line with company beliefs, collaboration, and moral behavior both inside and outside the company will be encouraged by such a system. The verification and evaluation of recruits' skills and training will be made simpler with the use of blockchain. Second, records about people's education, work experience, and training will be tracked by the blockchain. Applicants to sell details about their qualifications: We have conducted our business up to this point under the assumption that job seekers are more interested in obtaining work opportunities than employers are in employing them (Shiau, 2023). The blockchain has a few disadvantages as well. The main topics of discussion in BC are the financial and technological aspects. An additional determining factor will be how blockchain adoption is perceived. Because blockchain technology is so new, literacy in blockchain is also quite rare. We can determine the variables that affect blockchain acceptance in HRM by using the UTAUT model.

2.1.1. Performance anticipation

The extent to which an individual expects that using a particular technology will improve their performance is referred to as "performance anticipation". Some people believe that Blockchain services have a higher chance of being adopted if they are more advantageous. Previous research indicates that a person's behavioral intention to use blockchain is significantly influenced by performance anticipation (Al-Ashmori et al., 2022). Thus, we can hypothesize that:

Hypothesis 1: The willingness to use Blockchain Technology in HRM is significantly influenced by performance anticipation.

2.1.2. Social impact

Word of mouth and others' opinions play a very important role in the acceptance of new technology especially the BC technology in HRM. According to Al-Ajlouni et al. (2019), social impact is the degree to which individual acceptance of any new technology is affected by others' opinions. It is the most important role during the implementation of new technology. Almekhalfi et al. (2021) found that social impact is the most important factor that affects the employees' willingness and intention to use and adopt new BC technology.

Hypothesis 2: The willingness to use blockchain technology in HRM is significantly influenced by social impact.

2.1.3. Facilitating factors

Organizations are trying to reduce BC technology usage barriers to make the system easier for the workforce. Ter et al. (2020) defined the facilitating factor as the degree to which the employees the technology and corporate framework according to facts that make the technology and system easier for them and help them to shift towards the BC technology in HRM.

Hypothesis 3: The willingness to use blockchain technology in HRM is significantly influenced by a facilitating situation.

2.1.4. Perceived risk

Perception of risks and uncertainties plays a major role in persuading customers to use technology and online platforms to make payments. Their perception of risks

influences their online shopping behavior. Wei et al. (2018) discussed that the adoption of BC in HRM is also affected by the same kind of risk perceptions of the workforce and new hiring. The perceived risk impacts the behavior of employees in adopting BC technology in HRM. Therefore, we can hypothesize that

Hypothesis 4: The willingness to use blockchain technology in HRM is significantly influenced by perceived risk.

2.1.5. Blockchain literacy

Sankar and David (2022) discussed that to easily navigate in a disorganized and complex information environment some skills are required and are mandatory which is called blockchain literacy (Sankar, 2022). He claimed that integration of technology is difficult so that requires some specific knowledge and skills, which can make it easy for the workforce to accept BC technology. Thus, we can hypothesize that:

Hypothesis 5: The willingness to use blockchain technology in HRM is significantly influenced by blockchain literacy.

2.1.6. Institutional support

According to Liao et al. (2024) institutional support affects the relationship between human resource management and how easily blockchain databases are perceived to be adopted. Some businesses don't hesitate to use front-line technologies and inform their employees of the ease that results. Staff abilities, understanding, observation, expectation, evaluation, and problem-solving are all improved by the idea that blockchain technology is easily adopted by employees. According to Hutama et al. (2019), companies that support their workers with HR policies and procedures provide them with superior and innovative resources, acknowledge their achievements, and offer training to increase productivity. Employees can receive blockchain training in such a setting and develop the skills necessary to use the technology while doing their jobs. This enhances the perception of the utility of BC technology. These abilities are crucial for human resource management. Therefore, we can state:

Hypothesis 6: The willingness to use blockchain technology in HRM is considerably moderated by institutional support.

3. Materials and methods

Modern business conditions require company management to transform existing management approaches based on the implementation of blockchain technologies. To determine the specific impact of the introduction of blockchain technologies in human resource management and argue the role of institutional support, we will use the pharmaceutical sector of Jordan as an information base. To fill the information base of the study, data was consolidated from the results of a study of more than 300 employees of the pharmaceutical industry in Jordan, as the most developed, highly competitive in the country, which is one of the five largest export goods. To achieve the stated goals and objectives of the study, it was revealed that Jordan has the pharmaceutical industry with the highest level of advanced technology in the MENA region. It is argued that Jordan's pharmaceutical industry is the only one where exports exceed imports. The sector's exports in 2022–2023 were valued at billions of JDI. As part of this, the need was identified to study the impact of the introduction of

blockchain technologies in the activities of these companies in terms of human resource management.

Theoretical aspects and hypotheses for the development of blockchain technologies and their implementation in the pharmaceutical segment in personnel management were identified. Two hypotheses are defined: 1) how blockchain technologies affect simplification of the HR management process of pharmaceutical companies; 2) How pharmaceutical companies effectively reduce employee resistance when implementing blockchain technology. To confirm substantiated hypotheses, the need to conduct a survey among more than 300 employees of pharmaceutical companies in Jordan was determined, which served as the information base for further multifactor analysis of the implementation of blockchain technologies in human resource management.

To substantiate and confirm the hypotheses, a questionnaire was developed to collect data and conduct a survey among employees of pharmaceutical companies in Jordan. This questionnaire made it possible to create an information base for the study in several important areas: 1) the influence of performance expectations based on blockchain technologies; 2) the expected risks of implementing blockchain technologies in human resource management; 3) literacy and understanding of social influences that contribute to the factors of effective human resource management.

The moderating role of institutional support between blockchain technologies and human resource management was assessed. During the survey, it was proposed to fill out the position of each question and direction on a Likert scale, which implies the following criteria: 1—completely disagree and 5—completely agree. To assess the impact of the introduction of blockchain technologies on human resource management as part of the formation of an information base, respondents were selected for the study using a convenient sampling. To conduct a survey study among employees of pharmaceutical companies, consent to participate was obtained: 350 questionnaires were returned out of 400 sent out. The information base for the study was about 300 questionnaires, which were taken as the basis for conducting a multifactor analysis of the impact of the introduction of blockchain technologies in human resource management.

The information base for the study was about 300 questionnaires, which were taken as the basis for conducting a multifactor analysis of the impact of the introduction of blockchain technologies in human resource management. As part of the argumentation and confirmation of the reliability, value and effectiveness of the research tool, a pilot test was organized among the top 20 top managers of the pharmaceutical segment in Ireland. Based on the results of the pilot tests, numerous meetings and discussions were held with scientists to improve the reliability of the measuring instrument and make necessary improvements. PLS-SEM tools were applied as it is effective in testing and evaluating complex models and is used to validate blockchain technology constructs in HRM and test hypotheses.

Mediation analysis tools were applied for the purpose of testing first order variables. It is argued that the use of PLS-SEM tools is the most effective and has greater statistical power than CB-SEM. The methodological and practical aspects formed and proposed to determine the impact of the introduction of blockchain technologies in human resource management have their value and are reliable. The

proposed methodology can be applied in practice when building a human resource management strategy, which should be based on blockchain technologies, which will ensure the efficiency and long-term growth of the company.

4. Results and discussion

Modern trends in the implementation of innovative technologies and tools have pervaded all sectors and types of human activity. With data security and effective HR management becoming increasingly important, blockchain technology is coming to the rescue in the field of human resource (HR) management. It is important to note that blockchain is a modern technology that can help protect employee data from unauthorized access and use. Blockchain technologies work as a distributed ledger, which means that data is stored on many computers at the same time, making it more secure and more difficult to hack. Blockchain technologies will create a unified system for verifying skills and performance indicators of personnel management and open up many opportunities and prospects. Blockchain technologies in human resource management, presented in **Figure 1**.

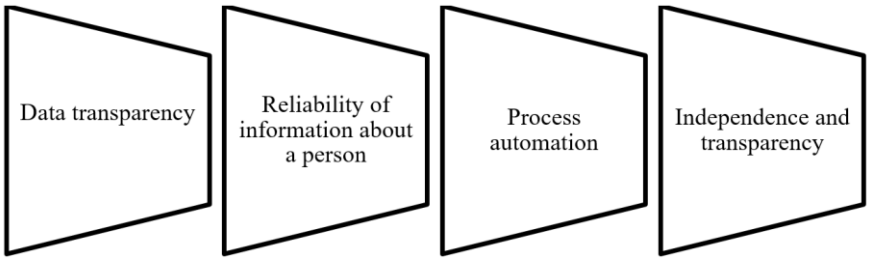

Figure 1. Blockchain technologies in human resource management.
Source: developed by the authors based on the database (Han et al., 2023; Wenhua et al., 2023).

It is important to note that blockchain technologies represent a special database, which is also called a decentralized digital registry. It is supported by many computers around the world. Blockchain data is stored in blocks in chronological order and is protected using cryptography. The first blockchain model was created in the early 1990s, when computer scientist Stuart Haber and physicist W. Scott Stornetta decided to use cryptography on the blockchain to protect digital documents from tampering. Blockchain technology is typically used to record crypto currency transactions, but it is also suitable for recording other types of digital data and can perform a variety of tasks (Bennet et al., 2024). It is important to note that blockchain technologies penetrate into all spheres of human life, and human resource management processes are no exception. In the field of human resource management, blockchain offers endless opportunities. This is typical in that it provides quick access to diplomas and certificates and, as a result, reduces the time spent by recruiters checking information. In addition, blockchain allows us to identify a lot of new information. Blockchain opens up access to professional achievements, and experienced recruiters can find professionals with high potential thanks to blockchain. Credentials recorded on the blockchain cannot be changed or tampered with. Fake data may appear as published data, but it will not be correct, unlike the original records. Digital credentials will be protected even if the company issuing them is hacked. And candidate data will remain

available even if the educational institutions and companies in which they studied and worked close. Blockchain can also be useful in resolving issues of providing benefits and payments. When an employee passes the probationary period, the blockchain can signal an increase in wages. Technology can also be used to administer employee contracts, in particular without allowing competitive actions. For employees of many international companies, blockchain helps to process salaries faster without the need to pay for third-party services. Without intermediaries, payments can arrive within hours rather than days (Sisi et al., 2024).

For candidates, blockchain is capable of realizing the concept of "unbounded identity". Individuals, with full control over their life data, have the ability to share it when applying for a job. Such data includes certifications, courses, grades, employment history, salaries, and more. Arguing the above, it should be emphasized that blockchain technologies radically simplify and transform the process of human resource management in modern companies.

Of course, any user has access to the original information, so you can verify its authenticity and reliability. There are public and private keys, developed using an encryption algorithm, so that no company or employee can edit data for personal gain. Information that is key in human resource management.

Platforms that are based on blockchain technologies operate exclusively on smart contracts, mathematical algorithms, to eliminate or minimize the human factor. The autonomy and transparency of these technologies and systems allows us to maintain the objectivity of information about any company or person (Al-Ababneh, 2022). Convergent validity is a term used to characterize how well the constructs' items measure the construct. Examining **Table 1**.

Table 1. Factor loadings, CR, and AVEs.

Constructs	Items	Loadings	Acceptable/not Acceptable	CR	AVE
Performance anticipation	PA1	0.821	Acceptable	0.901	0.646
	PA2	0.811	Acceptable		
	PA3	0.755	Acceptable		
	PA4	0.875	Acceptable		
	PA5	0.751	Acceptable		
Perceived risk	PR1	0.875	Acceptable	0.93	0.729
	PR2	0.841	Acceptable		
	PR3	0.877	Acceptable		
	PR4	0.865	Acceptable		
	PR5	0.810	Acceptable		
Blockchain literacy	BL1	0.832	Acceptable	0.933	0.739
	BL2	0.877	Acceptable		
	BL3	0.965	Acceptable		
	BL4	0.783	Acceptable		
	BL5	0.832	Acceptable		

Table 1. (*Continued*).

Constructs	Items	Loadings	Acceptable/not Acceptable	CR	AVE
Social impact	SIMP1	0.833	Acceptable	0.916	0.688
	SIMP2	0.759	Acceptable		
	SIMP3	0.821	Acceptable		
	SIMP4	0.830	Acceptable		
	SIMP5	0.899	Acceptable		
Facilitating factor	FF1	0.911	Acceptable	0.939	0.756
	FF2	0.804	Acceptable		
	FF3	0.912	Acceptable		
	FF4	0.899	Acceptable		
	FF5	0.817	Acceptable		
Institutional support	IS1	0.859	Acceptable	0.917	0.69
	IS2	0.811	Acceptable		
	IS3	0.799	Acceptable		
	IS4	0.821	Acceptable		
	IS5	0.863	Acceptable		
Willingness to use BC in HRM	BCHR1	0.888	Acceptable	0.92	0.697
	BCHR2	0.798	Acceptable		
	BCHR3	0.805	Acceptable		
	BCHR4	0.865	Acceptable		
	BCHR5	0.816	Acceptable		

Source: developed by the authors.

To assess the validity of the model, confirmatory factor analysis (CFA) is carried out, which includes all the multi-item scales used, which are presented in **Table 2**.

Table 2. Discriminant validity.

	PA	SIMP	F	PR	BL	IS	BCHR
PA							
SIMP	0.533						
F	0.611	0.561					
PR	0.512	0.407	0.482				
BL	0.523	0.429	0.499	0.532			
IS	0.501	0.498	0.592	0.499	0.411		
BCHR	0.455	0.298	0.352	0.511	0.429	0.488	

Source: developed by the authors.

The findings of the structural model are shown in **Table 3**.

Table 3. Hypotheses result.

Hypothesis	Relationships	Original sample (O)	Sample mean (M)	SD	*T* statistics	*P* values
H1	PA →BCHR	0.049	0.06	0.074	0.662	0.003
H2	SIMP → BCHR	0.321	0.32	0.096	3.465	0
H3	FF→ BCHR	0.117	0.116	0.083	1.382	0.008
H4	PR → BCHR	0.082	0.081	0.074	1.123	0.003
H5	BL → BCHR	0.106	0.131	0.068	1.627	0.002
H6	IS → BCHR	0.112	0.111	0.075	1.293	0.001

Source: developed by the authors.

The model we used is fit, which is why we used all the indicators and accepted their contributions. The Chi-square (X^2) = 451.319, SRMR = 0.07, and NFI = 0.156 showed that all the factor loadings were above 0.50. **Table 1** displays the factor loadings, convergent validity, and discriminant validity along with the relationships between the items and constructs. Every factor loading has a value greater than 0.5. This indicates that none of them were rejected and that they are all acceptable. Additionally, this table showed that all indicators' composite reliability values ranged from 0.901 to 0.939, all of which are greater than the standard threshold value of 0.70. Additionally, every AVE result exceeds the threshold value of 0.5, which confirms convergent validity. Discriminant validity was needed to examine the differences between latent variables. The degree of latent variable difference was determined for this purpose using the Heterotrait-Monotrait ratio of correlations. **Table 2** shows that all of the values are less than 0.90, i.e., less than the threshold value. Discriminant validity is thus confirmed in this investigation. The results confirm the importance of implementing blockchain technologies in human resource management, which radically transform basic processes, improve interactions with staff, increase loyalty, motivation and transparency of management.

Once the measurement model is accepted, the structural model is used to assess the hypotheses. Here, a bootstrapping method using Smart Pls with 5000 resamplings was used to apply structural equation modeling (SEM). As second-order factors, the components of blockchain technology (performance anticipation, social impact, facilitating factor, perceived risk, and blockchain literacy) were chosen and institutional support was used as a moderating variable. The results show that there is a direct relationship among variables. The H1, H2, H3, H4, and H5 show the direct relationship among variables. Furthermore, H6 represents that institutional support is acting as a moderating variable.

H1 represents the significance between performance anticipation and willingness to use BC technology in HRM with a value of beta = 0.049 and p-value < 0.01. Thus, the findings fully support our hypothesis. H2 is also supported with a beta value of 0.321 and $p < 0.01$ which shows that social impact has a positive influence on BC technology in HRM. H3 and H4 demonstrate positive relationships as well with beta values of 0.117 and 0.082 respectively. H5 represents the significance between BC literacy and BC technology in HRM with a value of beta = 0.106 and p-value < 0.01. Thus, the findings fully support our hypothesis. The results of H6 illustrate that institutional support significantly moderates the relationship between willingness to

use BC technology in HRM with a beta value of 0.112 and *p*-value < 0.01. Therefore, H6 is fully corroborated in this research.

5. Discussion

Organizing a modern business and its effective and promising growth is impossible without the use of modern innovative blockchain technologies. Blockchain technologies are a potential tool for key transformations in all industries and types of human activity. These technologies are relevant and in demand in modern conditions and have a significant impact on human resource management processes. The study conducted a study of scientific literature and existing approaches to highlighting the role of blockchain technologies in human resource management. The main directions and their key aspects are argued, however, this analysis is not exhaustive and can be supplemented as part of the development of this issue.

The research has limitations as it looks at the connection between HRM and blockchain technology. Although these are lacking, numerous strategic, social, and environmental factors affect human resource performance. Future writers are therefore expected to expand the study's parameters and look into these variables. Furthermore, using empirical evidence, the authors examined the relationship between these characteristics after gathering data from Jordan's pharmaceutical industry. To investigate the connections between these components, future researchers should gather information from numerous companies and countries.

6. Conclusion

The modern realities of business operation are inevitable without the implementation of blockchain technologies. It is substantiated that blockchain technologies have the potential to radically change many areas of human life, including political, economic, cultural and other sectors. It is substantiated that modern human resource management is inextricably linked with blockchain technologies and their implementation in all processes to increase their efficiency and transparency. An in-depth analysis of scientific approaches and research was carried out to determine the role of the impact of the implementation of blockchain technologies on human resource management. The results of the analysis made it possible to highlight the lack of a unified approach and methodology for determining the impact of blockchain technologies on human resource management, which confirmed the relevance and relevance of this study. It has been stated that blockchain technology has the potential to change the norms, values and models that support business and its activities. Moreover, it forces a re-examination of fundamental economic theories and provides new understanding of the role and responsibilities of markets and institutions.

In order to achieve the key goal and objectives of the study, theoretical aspects and hypotheses for the development of blockchain technologies and their implementation in the pharmaceutical segment of personnel management were identified. The authors formed hypotheses: Firstly, determining the specifics of the impact of blockchain technology on simplifying the process of personnel management in pharmaceutical companies; Secondly, how pharmaceutical companies effectively reduce employee resistance when implementing blockchain technology. In order to

substantiate the hypotheses and demonstrate their reliability and value, a survey was conducted among more than 300 employees of pharmaceutical companies in Jordan, which served as the information base for further multifactor analysis of the implementation of blockchain technologies in human resource management.

For the survey, conceptual directions were identified such as: 1) the impact of performance expectations based on blockchain technologies; 2) expected risks of introducing blockchain technologies in human resource management; 3) literacy and understanding of social influences that contribute to the factors of effective human resource management. The presented made it possible to argue the role of institutional support between technologies blockchain and human resource management. The information base of the study consisted of about 300 questionnaires, which were taken as the basis for conducting a multifactor analysis of the impact of the introduction of blockchain technologies in human resource management. As part of the argumentation and confirmation of the reliability, value and effectiveness of the research tool, pilot testing was organized among the top 20 senior managers of the pharmaceutical segment in Jordan. Based on the results of pilot tests, meetings and discussions were held with scientists to improve the reliability of the measuring instrument and make the necessary improvements. It is stated that PLS-SEM tools were applied because they are effective in testing and evaluating complex models and are used to validate blockchain technology constructs in HRM and test hypotheses.

The main results of the study and the formed scientific and methodological aspects to determine the impact of the introduction of blockchain technologies in human resource management have their value and are reliable and complete. The proposed methodology can be applied in practice when building a human resource management strategy, which should be based on blockchain technologies, which will ensure efficiency and long-term growth of the company. The boundaries and the set of factors in the study are not final and can be developed and expanded in the framework of future studies that will be aimed at improving human resource management based on blockchain technologies.

Author contributions: Conceptualization, FMM and HAAA; methodology, RMRA and DAAM; software, HAAA and FMM; inspection, DAAM and AA; formal analysis, EFQ, FMM, and HAAA; Investigation, RMRA; project administration, FMM; funding acquisition, FMM, HAAA and EFQ. All authors have read and agreed to the published version of the manuscript.

Conflict of interest: The authors declare no conflict of interest.

References

Agarwal, A. (2023). Use cases of blockchain technology for sustainable global HR operations in Industry 4.0. Blockchain in a Volatile-Uncertain-Complex-Ambiguous World, 149–161. https://doi.org/10.1016/b978-0-323-89963-5.00009-5

Al-Ababneh, H. A. (2022). Researching global digital e-marketing trends. Eastern-European Journal of Enterprise Technologies, 1(13(115)), 26–38. https://doi.org/10.15587/1729-4061.2022.252276

Al-Ababneh, H. A., Borisova, V., Zakharzhevska, A., et al. (2022). Performance of Artificial Intelligence Technologies in Banking Institutions. Wseas Transactions on Business and Economics, 20, 307–317. https://doi.org/10.37394/23207.2023.20.29

Al-Ajlouni, M. I., Nawafleh, S., Alsari, H., et al. (2019). Determinants of User Acceptance of Electronic-HRM through the

Extension of UTAUT Model via the Structural Equation Modelling Approach. Journal of Information & Knowledge Management, 18(04), 1950044. https://doi.org/10.1142/s0219649219500448

AL-Ashmori, A., Basri, S. B., Dominic, P. D. D., et al. (2022). Classifications of Sustainable Factors in Blockchain Adoption: A Literature Review and Bibliometric Analysis. Sustainability, 14(9), 5176. https://doi.org/10.3390/su14095176

Almekhlafi, S., & Al-Shaibany, N. (2021). The Literature Review of Blockchain Adoption. Asian Journal of Research in Computer Science, 29–50. https://doi.org/10.9734/ajrcos/2021/v7i230177

Bennet, D., Maria, L., Putri Ayu Sanjaya, Y., et al. (2024). Blockchain Technology: Revolutionizing Transactions in the Digital Age. ADI Journal on Recent Innovation (AJRI), 5(2), 194–199. https://doi.org/10.34306/ajri.v5i2.1065

Chhetri, R. (2022). Implementation of Blockchain Technology in Human resource recruitment. JAMK, 34-36.

Chillakuri, B., & Attili, V. S. P. (2021). Role of blockchain in HR's response to new-normal. International Journal of Organizational Analysis, 30(6), 1359–1378. https://doi.org/10.1108/ijoa-08-2020-2363

Damle, M., Kulkarni, P., & Damle, M. (2023). Blockchain Technology in Talent Retention and Capability Development in HRM. 2023 5th International Conference on Inventive Research in Computing Applications (ICIRCA). https://doi.org/10.1109/icirca57980.2023.10220633

David, A., Kumar, C. G., & Paul, P. V. (2021). Blockchain Technology in the Food Supply Chain. International Journal of Information Systems and Supply Chain Management, 15(3), 1–12. https://doi.org/10.4018/ijisscm.290014

Gomathi Sankar, J., Ilangovan, K., David, A., Ganeshkumar, C. (2022). Korea review of international studies adoptation of blockchain technology in HRM. Korea Review of International Studies, 15(40), 10-22.

Han, H., Shiwakoti, R. K., Jarvis, R., et al. (2023). Accounting and auditing with blockchain technology and artificial Intelligence: A literature review. International Journal of Accounting Information Systems, 48, 100598. https://doi.org/10.1016/j.accinf.2022.100598

Hassija, V., Ratnakumar, R., Chamola, V., et al. (2022). A machine learning and blockchain based secure and cost-effective framework for minor medical consultations. Sustainable Computing: Informatics and Systems, 35, 100651. https://doi.org/10.1016/j.suscom.2021.100651

Hussain, A. A., & Al-Turjman, F. (2021). Artificial intelligence and blockchain: A review. Transactions on Emerging Telecommunications Technologies, 32(9). https://doi.org/10.1002/ett.4268

Hutama, R., Yudianto, I. (2019). The Influence of Budget Participation, Budget Goals Clarity and Internal Control Systems Implementation on Local Government Performance. Journal of Accounting Auditing and Business, 2. https://doi.org/10.24198/jaab.v2i1.20430

Javaid, M., Haleem, A., Pratap Singh, R., et al. (2021). Blockchain technology applications for Industry 4.0: A literature-based review. Blockchain: Research and Applications, 2(4), 100027. https://doi.org/10.1016/j.bcra.2021.100027

Liao, L., Ye, Y., Wei, N., et al. (2024). Exploring blockchain technology acceptance among non-managerial construction practitioners in Shenzhen, China. Engineering, Construction and Architectural Management, 31(5), 2053–2076. https://doi.org/10.1108/ecam-08-2023-0840

Onik, M. M. H., Miraz, M. H., & Kim, C. S. (2018). A recruitment and human resource management technique using Blockchain technology for Industry 4.0. arXiv, arXiv:1812.03237. https://doi.org/10.48550/arXiv.1812.03237

Salah, D., Ahmed, M. H., & ElDahshan, K. (2020). Blockchain Applications in Human Resources Management. Proceedings of the Evaluation and Assessment in Software Engineering. https://doi.org/10.1145/3383219.3383274

Sasikala, J., & Jeganathan, G. S. (2017). A Study on Employee Engagement in Information Technology (IT) Industry. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.3536354

Shiau, W. L., Chen, H., Wang, Z., et al. (2022). Exploring core knowledge in business intelligence research. Internet Research, 33(3), 1179–1201. https://doi.org/10.1108/intr-04-2021-0231

Sisi, Z., & Souri, A. (2021). Blockchain technology for energy-aware mobile crowd sensing approaches in Internet of Things. Transactions on Emerging Telecommunications Technologies, 35(4). https://doi.org/10.1002/ett.4217

Ter Ji-Xi, J., Salamzadeh, Y., & Teoh, A. P. (2021). Behavioral intention to use cryptocurrency in Malaysia: an empirical study. The Bottom Line, 34(2), 170–197. https://doi.org/10.1108/bl-08-2020-0053

Vrontis, D., Christofi, M., Pereira, V., et al. (2021). Artificial intelligence, robotics, advanced technologies and human resource management: a systematic review. The International Journal of Human Resource Management, 33(6), 1237–1266. https://doi.org/10.1080/09585192.2020.1871398

Wei, Y., Wang, C., Zhu, S., et al. (2018). Online Purchase Intention of Fruits: Antecedents in an Integrated Model Based on

Technology Acceptance Model and Perceived Risk Theory. Frontiers in Psychology, 9. https://doi.org/10.3389/fpsyg.2018.01521

Wenhua, Z., Qamar, F., Abdali, T. A. N., et al. (2023). Blockchain Technology: Security Issues, Healthcare Applications, Challenges and Future Trends. Electronics, 12(3), 546. https://doi.org/10.3390/electronics12030546

Yi, C. S. S., Yung, E., Fong, C., et al. (2020). Benefits and Use of Blockchain Technology to Human Resources Management: A Critical Review. International Journal of Human Resource Studies, 10(2), 131. https://doi.org/10.5296/ijhrs.v10i2.16932