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Identify and prioritize the factors affecting human resource performance management with emphasis on the role of Digital city

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ABSTRACT

BACKGROUND AND OBJECTIVES: Technological advances and the expansion of its application in urban communities have led to extensive changes in conceptual dimensions, strategic importance and geographical concentration of urban services. Today, cities are at the highest level of need to use new methods and technologies of service. Utilizing the numerous capabilities of technology in the field of urban management also has tremendous consequences, and its development in the form of intelligent municipal services requires the proper management of human resources. With the advent of the Fourth Revolution and the development of a new paradigm called digital human resource management, various areas of the human resource management process, including human resource performance management, need to be revised and updated based on this approach. Therefore, the purpose of this study is to identify the factors affecting human resource performance management with emphasis on the digital city and the prioritization of factors in the Municipality of Tehran.

METHODS: This research is applied in terms of purpose, descriptive-survey in terms of method. In order to extract the research background the library method and for data collection purposes the field method, and questionnaire tools were used. After applying the selection criteria 10 articles were selected for information extraction. After extracting the initial indicators using Delphi technique, 10 experts were interviewed. In order to analyze the data, confirmatory factor analysis and structural equations using partial least squares method have been used. The perspective of 11 employees of Municipality of Tehran using pairwise comparison questionnaire and their aggregation (with geometric mean) and analytic technique network process were performed and factors were prioritized with Super Decisions software.

FINDINGS: All items had a t-statistic greater than 1.96; therefore, none of the items were removed from the model and in total, all coefficients were significant at the 95% level. The relative weight of technological factor was 0.537, organizational 0.045, behavioral 0.078 and environmental 0.340 and since IR > 0.1=0.07, then there is consistency in pairwise comparisons. With the formation of a limit super matrix through software, the values of technological factors with 0.133, organizational 0.124, behavioral 0.086 and environmental 0.071, respectively, had the first to fourth priorities for human resource performance management with emphasis on the role of digital city.

CONCLUSION: According to the obtained indicators, four factors affecting the management of human resource performance including technological, organizational, behavioral, and environmental factors were obtained. Findings from network analysis among all the factors, technological factor had the most impact and organizational factor had the least impact on human resource performance management with emphasis on the role of the digital city.

NUMBER OF REFERENCES	NUMBER OF FIGURES	NUMBER OF TABLES
52	4	6

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INTRODUCTION

Digital cities are expanding around the world, and so are technology and communication devices (Oliveira *et al*., 2020). No digital city can stand still (Sacasas, 2020). The Internet has begun its global business, simultaneously enabling humans to create rich information spaces for everyday life (Hacker *et al*., 2020). As long as the Internet makes global research and commerce possible, life will go on locally (Khamesi Maibodi, 2019). Digital cities, like ordinary cities, need to be structured and managed, and municipalities usually have this responsibility (Willis and Aurigi, 2017; Malekzadeh, G.H.; Sadeghi, 2017). In fact, urban development and the provision of urban services are one of the most important goals of municipalities or other responsible organizations (Kronsell and Mukhtar-Landgren, 2018; Ghazali *et al.,* 2021). Digital city is tied to services and concepts such as digital management, digital transportation (smart), digital citizen, and providing a variety of integrated urban services (Sargazi, 2019). The digital city (smart city), in the form of creating a smart network consisting of extensive networks of high-bandwidth fiber optics, provides a suitable infrastructure for providing smart services in the city, which facilitates the process of office work, reduces costs and saves money(Tajpour and Hosseini,2021). Time becomes (Mutule *et al*., 2021). The use of information and communication technologies in administrative affairs, especially in urban management, is an effective step towards the sustainable development of urban management (Benites and Simões, 2021), this can greatly improve the management and urban life and make it easier (Mohammadzadeh and Moharrami, 2015). Advances in information and communication technology and the expansion of its application in urban communities and the daily lives of citizens have led to extensive changes in the conceptual dimensions, strategic importance and geographical focus of urban services (De Guimarães *et al*., 2020). Today, cities, as the manifestation of the new form of life in the age of communication and the fourth wave (which is interpreted as the virtual movement) and due to the concentration of services and the maximum volume of social and economic interactions, are at the highest level of need to use new methods and technologies of service (Strohmeier, 2020). Utilizing the numerous capabilities of information and communication technology in the field of urban

management has also led to dramatic consequences and developments (Dadashpoor and Yousefi, 2018). Development of cities in the form of smart municipal services, in interactions and transactions between citizens and urban management institutions or other organizations providing urban services, are considered as an effective and efficient solution for innovation and development of diversity, quality, speed and reliability in providing services to citizens (Mohammad Rahimi Lahroudi, 2019). Urban management systems in Tehran, like all metropolises, must move towards digital management (Ramezani Farkhad, 2014). The use of information and communication technology in the daily lives of citizens as well as in administrative activities, especially in the field of Human Resources (HR), has led to the emergence of a new paradigm called digital Human Resource Management (HRM) (Meske *et al.*, 2020). One of the influential factors of information technology in organizations is the field of HR (Luftman *et al*., 2017). Today, most organizations use information and communication technology-based systems in recruitment, training, empowering and managing employee performance (Ajami and Arab-Chadegani, 2014). Therefore, different areas of the HR management process, including Human Resource Performance Management (HRPM), need to be reviewed and updated based on the digital HRM paradigm (Papa *et al*., 2018). Because if the HRPM system is not in line with the prevailing paradigm, its effectiveness will be reduced (Lissitsa *et al*., 2017). One of the challenges that Municipality of Tehran is facing is the contradiction between the change of working methods and processes to the requirements of digital city and traditional HRM, which has led to the backwardness of performance in human resource management in Municipality of Tehran which has negative consequences such as inefficiency and ineffectiveness of HR performance management system in this organization. Therefore, the present study aims to identify the factors affecting human resource management with emphasis on the digital city in the Municipality of Tehran, and answer the basic questions of what the factors affecting human resource performance management with emphasis on the role of the digital cities are and how they are prioritized and classified.

Literature review

Human resource performance management is

one of the most important aspects of organizational effectiveness and is one of the top priorities of managers (Govender and Bussin, 2020). The important challenges that organizations face are mostly in the field of performance management, because these challenges mainly affect the survival and life of organizations (Richards, 2019). All specific Human Resource (HR) operations such as recruitment, selection, targeting, feedback and service compensation are to improve the job performance of individuals and increase knowledge, skills and motivation of employees, so the result of all efforts of organizational factors in evaluating its performance can be seen (Rana, Malik, 2017). Unfortunately, the lack of an individual performance appraisal model that would be in line with the performance of the organizational unit and the organization as a whole, leads to incorrect judgments and the design of unattainable goals and unbalanced and impossible strategies (Idowu, 2017). Job selection, training and design operations in Human Resource Management (HRM) are based on the assumptions of individual performance factors and components (Katou, 2017). If these assumptions are violated, the quality of HR operations will also be affected. The performance management system of the individual and the organization helps the managers to check and control the realization of the plans and strategic goals of the organization and in order to be aware of the skills, abilities, knowledge and behavior of the employees on the one hand and the potentials, goals and capacities of the organizational unit on the other hand are establish a strategic link between the individual and the organization through their evaluation and audit (Jayakrishnan *et al*., 2018). In defining performance, the degree of achievement of one or more goals can be used as a criterion. Performance goals can be different depending on the team and organizational applications. The goals of companies in the discussion of performance are focused on the purpose, the element of time and the turning point of the goals (Lebas, 1995). These three elements of purpose, time and priority of goals show that in the organizational structure and organizational hierarchy, performance follows a causal relationship, a relationship in which a bridge is established between data and outcomes. In this model, performance does not define the goal, rather, it charts the path for the organization to continue correctly and transparently

(Fitria *et al*., 2017). According to Tseng and Lee (2014), performance is necessary for organizational success at three levels: individual satisfaction (job satisfaction, achieving goals and personal judgment), group level (ethics, solidarity, effectiveness and productivity) and at the organizational level (income, efficiency and productivity, rate absence is the rate of return on investment and adjustment). Improving the functioning of individuals in the organization is done through clear goals and setting training programs (Taymouri, 2021). Performance metrics and indicators are divided into two general categories of financial and non-financial. Financial performance metrics are important for strategic decision making and external reporting, while non-financial metrics are useful for effective control process and internal reporting (Perera and Perera, 2013). Performance information is important for managers to make decisions from various aspects (Abualoush, 2018). Measuring performance and related information enables managers to make the right decisions at the right time and place, with the right quantity and quality and at the lowest cost (Kenarizadeh and Andar Vaj, 2019). In the performance management literature, six main factors for performance management are considered, as shown in Table 1, "Communication and Alignment" relate to the nature of goal setting, "Situation assessment and forecasting" are related to evaluation and goal achievement, and the final two have a psychological background and are considered at the individual Motivation and organizational levels. (Samsonowa, 2012). The mentioned issues can be the interaction of performance management and various environmental factors such as managerial capabilities, labor relations and organizational culture, human and organizational capital (Tjahjadi *et al*, 2019).

Goal setting is a prerequisite for real performance and Communication and alignment are two important goals of goal setting. Based on this definition, communication is the presentation of all goals within and all units of the organization. Objectives (goals) are designed and analyzed at the highest levels of the organization and then transferred to lower levels through the communication mechanism. Alignment assures planners that how well the goals which were reflected at the top levels of the organization have been achieved at other levels and in line with the higher goals and to what extent the organization's expectations have been met (Volk and Zerfass,

Table 1: Classification of performance goals (Samsonowa, 2012)

Goal setting		Evaluation and goal achievement		Motivation	
Communication	Alignment	Situation assessment	Forecasting	Individual	Organizational

2018). During the goal setting process, repetition and continuity of communication and alignment with receiving results and providing feedback can be one of the important features of goal setting in a cascading manner (Stouten, 2018). The two goals of communication and alignment reflect the planning element within the performance management cycle (Kalgin *et al*., 2018). Performance management has a significant impact on evaluating progress toward achieving set goals. Performance management is within an agreed framework of goals, standards and requirements (keshtegar and Shukuhy, 2015). Employee motivation affects the performance of individuals and consequently the performance of the organization (Idowu, 2017). The results of various studies in the field of psychology and other behavioral sciences clarify the effects of motivation on performance at different levels of individual, team and organizational. Therefore, it is not inappropriate to consider the motivation of individuals as one of the important elements in examining the performance of organizations (Bonsu, Kusi, 2014). The discussion of individual and organizational motivation issues is considered important because they refer to the element of "improvement" in the performance management cycle (Mello, Thabayapelo, 2021).

According to the systematic review of theoretical foundations to identify the factors affecting the performance management of digital HR, the factors affecting the performance management of digital HR in various indicators such as Information Technology (IT) infrastructure, organization size, data confidentiality and security, employee attitudes and finally, digital literacy divided employees can be categorized. The subject area of this research is HR performance management and its spatial area of research is the Municipality of Tehran. The Municipality of Tehran is a public non-governmental organization with eight deputies and the total number of 63,000 manpower in the headquarters, 22 districts, and affiliated organizations and companies. Deputy of Human Resources Development is one of the eight deputies, which has various goals, including

improving human resource management information systems and smartening its processes, including HRPM. The current study have been carried out in Tehran in 2021.

MATERIALS AND METHODS

Considering that this research can be used in the Municipality of Tehran, the research is applied in terms of purpose and in terms of method, is descriptive-survey. To extract the research background, the library method was used and for data collection, the field method was used using a questionnaire. This study in terms of data collection time, is a cross-sectional study and its main purpose is to identify and rank the factors affecting the performance management of digital human resources. Preliminary studies in this study included archival data, articles published in national and international scientific journals, conferences and authored books on human resource performance management. Fig. 1 shows the screening process of articles. After four stages with applied screening of criteria, the title and abstract were reviewed and two stages of screening with content review were also performed. As a result, 10 articles were selected information extraction. In order to evaluate the quality of the content, they were graded by the Critical Appraisal Skills Program (CASP).

After extracting the initial indicators, interviews were conducted with academic experts and professionals familiar with digital concepts and human resources to confirm and complete the results. The demographic characteristics of the interviewees are shown in Table 3.

Of the 32 experts, 10 were eligible for interview. Indices with the highest frequency were selected. One of the methods used to acquire group knowledge is the Delphi technique, which is a process that has a predictive structure and helps decision-making during survey rounds, information gathering, and finally, group consensus. In order to select the experts, four characteristics were considered: knowledge and experience in the related field, willingness, sufficient

Table 2: National and international studies on research background

| Research output	Title	Reference
Digital organizational culture can affect organizational performance, and in this effect, the variables of business digitalization and the development of the value of digital technologies also play a mediating role	Digital technologies and company performance: The role of digital organizational culture	Martínez-Caro *et al*. (2020)
If formal organizational and bureaucratic structures disrupt organizational communication and interaction, these barriers can be overcome through the use of communication technologies, given that the organization's HR can utilize such innovations and the vital preparing in the field	Bridging formal barriers in digital work environments–Investigating technology-enabled interactions across organizational hierarchies	Meske *et al*. (2020)
Focus on managing employee performance by replacing leader and members based on goal setting theory	Employee performance management affects individual innovation in public organizations: The role of stability and LMX	Audenaert *et al*. (2019)
Organizations or companies that work digitally need special design to instill a better attitude and motivation in their employees and clients.	Smart cities and digital workplace culture in the global European context: Amsterdam, London and Paris	Vallicelli (2018)
Digital smart cities must operate on the basis of new communication and information technologies in the dimensions of drinking water system, traffic, weather, population, public transportation, and urban parking lots	Exploiting IoT and Big Data Analytics: Defining Smart Digital City using Real-Time Urban Data	Rathore *et al*. (2018)
Digital HR literacy can solve many organizational problems	Digital work in a digital organization is challenging	Davison and Ou (2017)
Union presence negatively adversely influences the utilization of IT and a low level of e-HRM is expected	Effectiveness of performance management	Haines and St-Onge (2012)
Among the dimensions of attitude, mental norm and perceived behavior control, only attitude has a significant and positive effect on the intention and acceptance of using e-HRM	Improving the quality of municipal services by analyzing the predictors of the intention to use electronic human resource management in Yazd	Khamesi Maibodi (2019)
Understanding the usefulness and ease of using a computer has a positive and significant relationship with the experience of using IT and organizational culture has a positive and significant effect on understanding the ease of using a computer, and the role of HR has a positive and significant effect on understanding the usefulness	Identifying acceptance factors of e-HRM with structural equation approach	Khorsandi and Haj Alian (2019)
HR indices and organizational culture (and the relevant dimensions) have a positive and significant effect on employee performance	Investigating the effect of effective factors (cultural, human resources) on the performance of Ahvaz Municipality employees	Mardani *et al*. (2017)
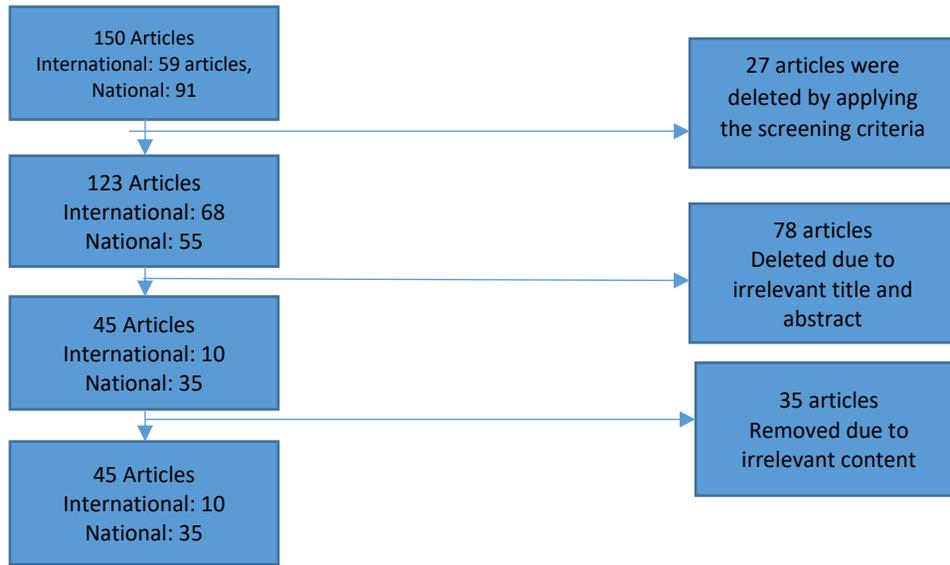
Fig. 1: The process of searching and selecting appropriate articles

Table 3: Demographic characteristics of the interviewees

Demographic characteristics	Description	Frequency
Gender	Male	6
	Female	4
Expert age distribution	25-35	3
	36-45	7
Education level	Master	4
	PhD	6
Work experience (year)	5-10	5
	More than 10	5

time to participate and effective communication skills. In addition to the identified indicators, in an open question, the indicators considered by the experts, which did not exist among the identified indicators, were also questioned. Ultimately, the final indicators, according to their sources and the expert's opinion, were extracted and categorized (Table 4) into 4 factors. Fig. 2 shows the conceptual model of the research based on the final indicators. Then, these factors were compiled in the form of a questionnaire (20 questions) and provided to all senior, middle and operational managers of the Municipality of Tehran. For sampling purposes, the relative stratification method has been used. The Municipality of Tehran is a public non-governmental organization with eight

deputies, 63,000 manpower in the headquarters, 22 districts and affiliated organizations and companies. The number of managers in the organization in all areas is 800. According to Morgan's table, 260 people were selected as a sample and completed the questionnaire. The reliability of the questionnaire was calculated by Cronbach's alpha method and using SPSS software, which had an alpha coefficient above 0.7. Content analysis and expert opinion were also used to assess the validity of the tool. Finally, structural equation modeling using PLS software was used for confirmatory factor analysis of factors and indicators and also to fit the research model. The conceptual model of the research based on theoretical foundations is shown in Fig. 2.

Table 4: The study factors and indicators

Row	Factors	Code	Indicators	Row	Factors	Code	Indicators
1		TF1	Technical infrastructure	11		BF1	Culture
2	Technological	TF2	Informational structure	12		BF2	Experts and staff IT skills
3		TF3	Custom system content	13		BF3	Leadership
4		OF1	Organizational demographic characteristics	14	Behavioral	BF4	Psychological factors
5		OF2	Organization size	15		BF5	Common perspective between human resource managers and information systems
6	Organizational	OF3	Knowledge and skills	16		BF6	Support and commitment
7		OF4	Filed of activity	17		BF7	Training of human resources and management staff
8		OF5	Organizational process planning	18		EF1	Presence of the union
9		OF6	Internal marketing system	19	Environmental	EF2	Economic situation of the country
10		OF7	Funds	20		EF3	Society culture
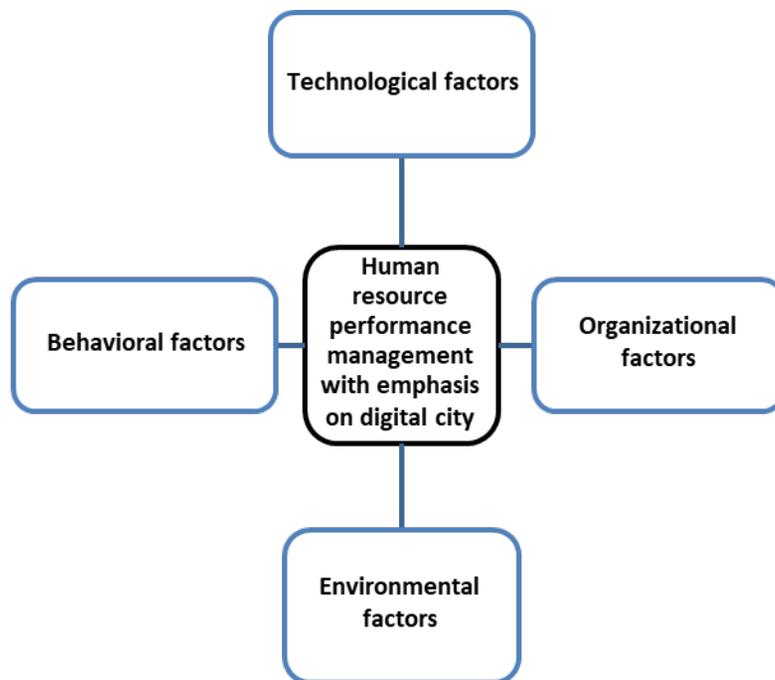
Fig. 2: Research Conceptual model

RESULTS AND DISCUSSION

According to the identified indicators and also the indicators considered by the experts, the final indicators were coded according to Table 4:

After collecting data, in order to check the accuracy of the theoretical model of the research and calculate the coefficients of impact, as well as prioritizing the factors, the method of structural equations with PLS software was used. As shown in Figs. 3 and 4, all items had a t-statistic greater than 1.96; therefore, none of the items are removed from the model. As a result, the work continues with all the items (questions) and the model is examined. The index with the highest factor load will have a greater share, and the indices with smaller coefficients will have a smaller share in measuring the relevant variable. The research questions are examined using an internal model. Hence, if the absolute value of t is greater than 1.96, at the 95% confidence level and if the value of t statistic is more than 2.58, the path coefficient at the 99% confidence level will be significant. The test results of the conceptual model of the research in the significant state of coefficients are shown in Fig. 4. Statistical values of t (significant values) are generated on the graphical path model on the arrows. These results are interpreted as t-test and at 95% confidence level must be greater than 1.96 to have a significant effect.

To prioritize the factors affecting HRPM from the perspective of 11 staff members in the Municipality of Tehran (the top elected employees of 2020 who had superior performance in the field of human resources), by pairwise comparison questionnaire and their aggregation (with geometric mean) the ANP technique was performed and the factors were prioritized with Super Decisions software. Also, the validity of the pairwise comparison questionnaire with the opinion of experts was confirmed, and since in all cases the incompatibility rate is below 0.1, so the reliability has been established. The results of the pairwise comparison of the main criteria are given in Table 5.

As it is observed in Table 5, the relative weight of the Technological factor is 0.537, Organizational 0.045, Behavioral 0.078, and Environmental 0.340. Since 0.1> IR - 0.07, then there is consistency in
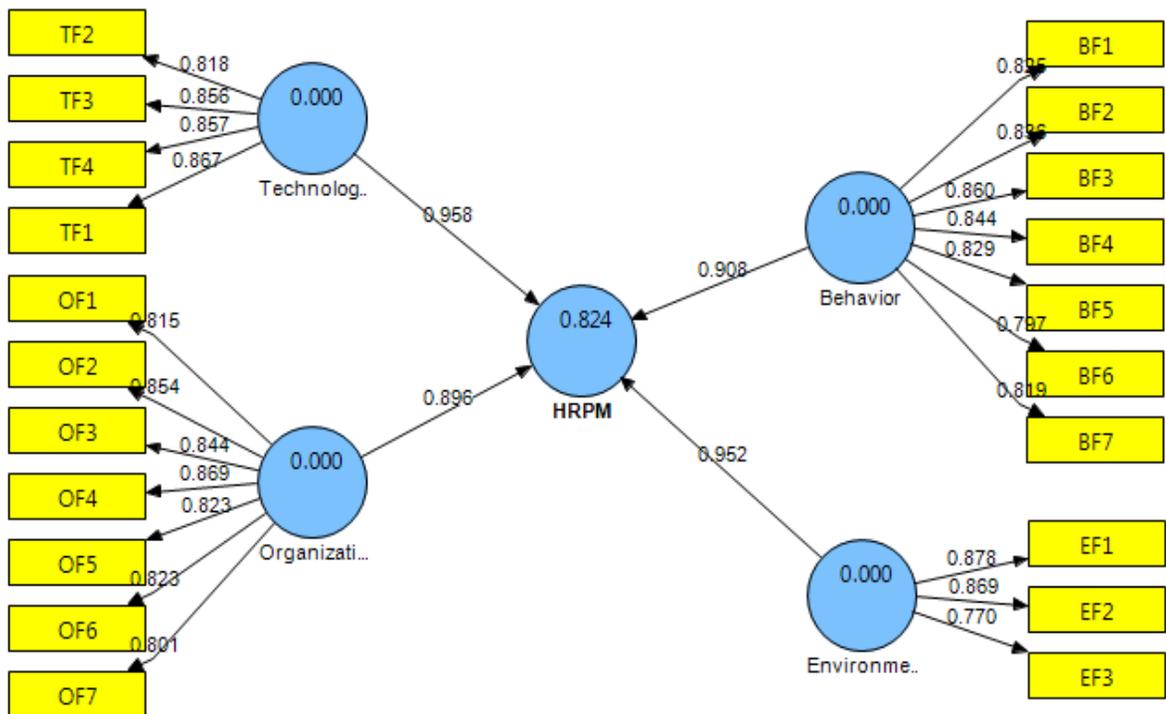

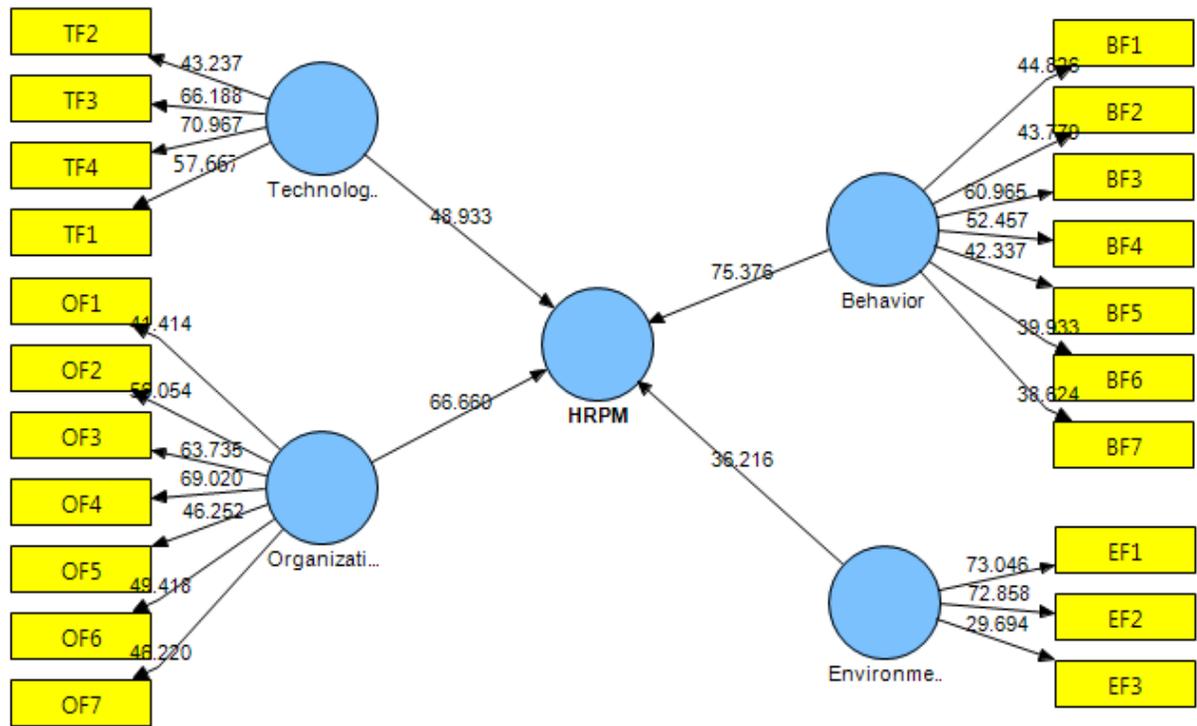Fig. 3: The original model in the mode of path coefficients

Fig. 4: The main model in the case of significant numbers (t value)

Table 5: pairwise comparison matrix of main criteria

Factor	Technological	Organizational	Behavioral	Environmental	Relative importance
Technological		9	8	2	0.537
Organizational			0.333	0.167	0.045
Behavioral				0.143	0.078
Environmental					0.0340
					IR=0.07

Table 6: Limited Super matrix Result

Factors	Technological	Organizational	Behavioral	Environmental
Objective	0.133	0.079	0,086	0,124

pairwise comparisons. After the formation of the supe rmatrix (unbalanced and rhythmic), Super Decisions software was used to obtain the limited super matrix, the result of which can be seen in Table 6.

As shown in Table 6, the factors of Technological with 0.133, Organizational with 0.124, Behavioral with 0.086 and Environmental with 0.071, respectively, will be the first to fourth priorities for human resource performance management with emphasis on the role of digital city. Therefore, according to the results of ANP, the Technological factor has the most impact and the Organizational factor has the least impact on human resource performance management with emphasis on the role of digital city. Based on the conducted studies

and surveys, most of them in the field of HRPM and digital city, in spite of the fact that performance management has been the core subject, but ultimately did not identify the factors affecting performance management and ranking these factors simultaneously and the lack of this ranking is self-evident. In the first step, recognizing the factors affecting the management of human resource performance by emphasizing the requirements of the digital city has been essential in this direction. In this study, 20 effective indicators were identified using the research literature and the help of experts. Technological factors had three indicators: technical infrastructure, information structure and system content, respectively. Organizational and Behavioral factors with the highest index, including demographic characteristics of the organization, organization size, knowledge and skills, field of activity, etc., as well as Environmental factors were identified with three indicators. Finally, by designing a questionnaire, the fundamental identified elements were tested using PLS software. Prioritization of effective factors was done using the opinions of 11 expert staff and utilizing the pairwise comparison questionnaire and ANP technique. In light of the outcomes, the technological factor had the most impact and the organizational factor had the least impact on HRPM, with accentuation on the role of the digital city. The results of the current study showed that organizational culture is one of the influential sub-indices, which is consistent with the results of the research by Eva *et al.* (2020) in the digital organizational culture index. Vallicelli 2018, in their research conducted in the cities of Amsterdam, London and Paris, concluded that organizations or companies that work digitally, need a special design to inspire a better attitude and motivation to their employees and clients, yet, the current research using rankings of the indices showed that technological factors have the greatest impact. Hooy (2006) performed a study in manufacturing plants, identified the use of HRPM in small and medium enterprises (SMEs) in the production sector in the five main areas of human capital management, while the current study although examined the relevant factors, but it was performed in a very large organization of Municipality of Tehran with 64000 employees. The results of Mardani *et al.* (2017) showed that human resource factors

and organizational culture (and their dimensions) have a positive and significant effect on employee performance, while in the present study, human resource factors and organizational culture are among the indicators of behavioral factors. Technological, environmental and organizational factors were also identified.

CONCLUSION

Tehran is the most developed city in Iran (capital of Iran) in terms of many social, economic, and developmental indicators, such as income per capita, level of education, medical, cultural services, employment opportunities, and investment opportunities and like any large and developing city, it has experienced significant growth in recent decades, and according to the development criteria of the world's metropolises, the citizens of Tehran want to receive faster, easier and wider urban services. According to the paradigm of a digital city, which in recent years has gradually introduced itself in the urban management of Tehran metropolis also, the change of approaches in the field of HRM towards digitalization, the importance of the organization's move to adapt its various management dimensions to the aforementioned emerging phenomena, is quite clear, and disregarding it can have negative operational consequences. One of these management dimensions that ought to be changed and updated in the current circumstance of the Municipality of Tehran is the performance management of employees in this organization. Today, smart gadgets, virtual environments, and technological innovations have become part of the existence of every single individual. Albeit these advances can pose numerous threats to human society, innovative managers and leaders can take advantage of them in their organizations. On the other hand, the pervasiveness of information technology in organizations along with the expansion of various social networks, has provided a platform for collecting large volumes of data and information about individuals. Given these facts, it can be said that creative thinking and alignment with the flow of facilities, needs and requirements of today is an issue that should be given more attention, especially in relation to human capital. The effect of paying attention to the philosophy of the organization on the flexibility and creativity of human capital and

having the literacy of the optimal use of information systems are among the important methodological issues in the field of HRM.

Suggestions

According to the obtained results, the following suggestions are presented to the Municipality of Tehran:

• Organizing technology infrastructure in The Municipality of Tehran;

• Technological language standardization and system content creation;

• Updating the content of internal systems for more transparency of the managers;

• Smoothing and organizing administrative processes in order to achieve organizational goals;

• Having organizational knowledge and skills

• Having a proper organizational culture in order to promote the performance of HR appropriate to the digital city and respond to the abstract norms of the organization;

• Optimal use of the consequences and amazing results of human resource performance management with emphasis on digital city if it is accepted in the culture of society.

Research limitation

The limitations of the research include the small number of researches and international and national scientific studies related to the purpose of the research and the small number of experts related to the subject.

AUTHOR CONTRIBUTIONS

Y. Nazimi reviewed the literature, collected, analyzed, and interpreted the data. K. Teymournejad, in charge of correspondence, reviewed the results and the text editing. K. Daneshfard was responsible for reviewing the literature and interpreting the data.

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CONFLICT OF INTEREST

OPEN ACCESS

PUBLISHER'S NOTE

ABBREVIATIONS

Digital HR	Digital Human Resource
E- HRM	Calibri (Body)
HRM	Human Resource Management
HRPM	Human Resource Performance Management
ICT	Information and Communications Technology Ministry
IT	Information Technology
PM	Performance management

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