Original Article

Modeling the structural equations of human resource management training in the healthcare sector in critical conditions based on the experiences of COVID-19

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Abstract

Background: Human resources at all levels of the organization are the main force behind building the foundation, which plays a role in providing good services with ability, clearer vision, and greater awareness. The aim of study was to model the structural equations of human resource management training in the medical sector in crisis conditions based on the experiences of COVID-19.

Methods: This study was cross-sectional and using the structural equation modeling on higher education institutions. The statistical population included 202 experts from higher education institutions. The sample size was 127 people using Morgan's table, who were selected among 202 people by stratified random sampling. Data was analyzed using Smart PLS software.

Result: A total of 6 dimensions can be useful for teaching human resource management in crisis situations. The findings demonstrated that the Cronbach's alpha coefficient was greater than 0.70 and that the total dependability of all constructs was strong. According to the path analysis, the training route for human resource management has the most effects when it comes to strengthening transformational decision-making and handling crisis circumstances. The benchmark values for mild, medium, and strong were 0.19, 0.33, and 0.67, respectively. The coefficient of determination of innovative thinking has a weak, interaction to create coherence, emotion management and capacity building for resilience has a moderate, and deepening transformative decision-making and reactive organizational development has a strong.

Conclusion: The results showed that human resource training has an active role in human resource participation and crisis management and planning to solve it.

Keywords: COVID-19; Education; Crew Resource Management, Healthcare; Staff Development.

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Introduction

Despite the development of new technologies, crises are still problematic (1). The studies by experts in the health sector indicate that the number of health-threatening crises has increased in recent years. Economically, it

has caused poverty and economic stagnation in many societies and countries (2). In other words, the occurrence of the crisis has led to the lack of coordination of organizations, the lack of comprehensive rules and regulations, obstacles and dispersion, the inadequacy of the existing rules and regulations, and the limitation of financial resources (3).

Closing universities to investing in online virtual education and supporting the quarantine of students and employees are among the measures that universities have struggled with the spread of the coronavirus and have to adapt to the new conditions (4). This disease has significantly affected almost all aspects of university life, from admissions and registration to budgets and credits (5).

It is possible to shift from the current situation to a desirable situation. It's necessary to predict the demand for higher education and plan for it in the current and post-coronavirus conditions (6).

The human resource role is much more specialized and requires extensive knowledge and skills to ensure that all these organizational needs are fulfilled. Human resources are involved in crisis management (7-8). It is a set of personal, scientific, and practical characteristics and competencies that enable an employee to achieve higher performance levels beyond the normal level (9). According to the procedure, they are described as the set of talents, knowledge, and skills that employees in business organizations possess to accomplish the organization's objectives and assist in resolving crises and solving issues (10).

Training is a crucial aspect that helps high and middle management in organizations, how to cope with crises before, during, and after the crisis to minimize the consequences of this crisis (11). Human resources are a factor playing a significant role in production and desirable services with ability, clearer vision, and more knowledge (12-13).

The management of critical events such as COVID-19 in human resources requires investigation and identification of symptoms, goal setting, executive and practical planning, and focusing on crisis mitigation. Manpower crisis management, especially in higher education, can lead to the growth, prosperity and increase of society's welfare. With the intention of modeling the structural equations of HRM training in crisis situations, this research was carried out using COVID-19 experiences.

Methods

Research environment and population

This quantitative study was conducted using the structural equation modeling method cross-sectionally in December 2023. The application is made with regard to the purpose and type of the descriptive survey. Institutions of higher learning across the nation were regarded as research environments. Members of the nation's higher education institutions' expert populations comprised the research's statistical population.. The random stratified method with a maximum diversity approach was used for sampling. To conduct the study, necessary coordination was made with higher education institutions, and then data collection began. The questionnaires were delivered to members of the statistical population and collected once they had completed them, in accordance with quantitative research. 127 people in all signed up for the research. A bachelor's degree or above and a willingness to engage in the study were requirements for inclusion in the research. Their refusal to continue cooperating and their unavailability were the rejection criteria. Ethical guidelines were followed, such as the opportunity to withdraw at any

Table 1. Number of questions of human resource management training variables during a crisis

Variable	Component	Subcomponent	Question number
Human resource management training during a crisis based on the experiences of Covid-19	Creating new thinking in relation to the university	Strengthening online team interaction	1-3
		Improving communication through human resource training	4-7
	Cohesive interference	Improving positive cooperation and skills	8-10
		Increasing the quality and optimizing the educational content	11-13
		Strengthening human resources in unexpected developments	14-16
	Deepening transformative decision-making	Improving efficient management during a crisis	17-19
		Strengthening decision-making in crisis	20-22
	Emotional management strategy in virtual education	The ability of employees to participate online and manage psychological pressure	23-25
		Limitation of equipment and reduction of face-to-face interaction	24-29
	building capacity for organizational resilience	Vitality and stimulation to learn	30-32
		Predicting change and strengthening accountability	33-35
	Emergence of responsive organization	Rapid organizational changes	36-38
		Change in critical conditions and the art of adaptation	39-41
		Flexibility and creativity	42-44

moment, information confidentiality, and anonymity.

Data collection method

A questionnaire was used in the present investigation as the data-gathering instrument. In this research, the validity of the human resource management training model during a crisis according to the experiences of COVID-19 was assessed using a 44-item questionnaire. The components were the creation of new thinking in relation to the university, cohesion-creating interaction, deepening of transformative decision-making, emotion management strategy in virtual education, building capacity for organizational resilience, and the emergence of a responsive organization. The questions are scored on a 5-point scale (I strongly disagree=1, I disagree=2, I somewhat agree=3, I agree=4, and I strongly agree=5) in Table 1.

Statistical analysis

Utilizing Smart PLS software and the structural equation modeling approach, data were evaluated concurrently with the gathering data.

Results

The statistical sample of the study included 127 experts from higher education institutions. Among them, 52.8% (67 people) were female, half of them (64 people) had a master's degree, and the most age group was 30 to 39 years old (35.4%). The lowest age group was above 59 years (7%). The highest level of employment history of the samples was 5-10 years (48.8%) and the lowest employment history of the samples was under 5 years (11.8%). Six dimensions, 14 components, and 44 indicators were used to measure human resource management training during a crisis based on the experiences of Covid-19 (case study: Iran’s higher education system).

The status of variables related to human resource management training during a crisis

Table 2 presents the values of the descriptive indices (central and dispersion indices) for the dimensions and components of the study.

It is evident from the findings that the average value of all computed variables and components is greater than 3. Therefore,

Table 2. Descriptive index values regarding research variables

Dimensions and components	N	Mean	Median	Mode	SD	Min	Max
Strengthening online team interaction	127	3.84	4	4	0.82	2	5
Improving communication through human resource training	127	3.47	3.5	3	0.79	1.5	5
New thinking in relation to the university	127	3.66	3.55	3.22	0.55	2.11	5
Improving positive cooperation and skills	127	3.58	3.66	4	0.75	1.33	5
Increasing the quality and optimizing the educational content	127	3.59	3.66	3.67	0.79	1.68	5
Strengthening human resources in unexpected developments	127	3.40	3.33	3.33	0.68	1.67	5
Cohesive interference	127	3.52	3.55	3.22	0.55	2.11	5
Improving efficient management during a crisis	127	3.32	3.33	3.33	0.74	1	5
Strengthening decision-making in crisis	127	3.06	3	3	0.82	1	5
Deepening transformative decision-making	127	3.14	3.16	3	0.67	1.33	4.83
Capability of employees to participate online and manage stress	127	3.13	3.06	3	0.86	1	5
Limitation of equipment and reduction of face-to-face interaction	127	3.16	3	3	0.72	1	5
Emotional management strategy in virtual education	127	3.09	3	3	0.65	1.17	4.88
Vitality and stimulation to learn	127	3.39	3.66	4	0.78	1.33	5
Predicting change and strengthening accountability	127	3.48	3.66	4	0.78	1.67	5
building capacity for organizational resilience	127	3.43	3.5	3.83	0.62	2.17	5
Rapid organizational changes	127	3.26	3	3	0.83	1.33	5
Change in critical conditions and the art of adaptation	127	3.01	3	3	0.72	1.33	5
Flexibility and creativity	127	3.32	3.33	3	0.78	2	5
Emergence of responsive organization	127	3.06	3	3	0.61	1.67	5

these variables from the viewpoint of the samples in the human resource management training in crisis are at the moderate and high level.

The null hypothesis was rejected since the significance level for each variable, as determined by the Kolmogorov-Smirnov test, was less than 0.05. Also, the normality of the variables is not confirmed according to the Kolmogorov-Smirnov test. Consequently, the connection between these variables may be investigated using Spearman's correlation coefficient, and because of the small sample size and non-normality of the variables, the model was checked using SMART PLS software.

Investigating the correlation between research variables

The variables' correlation coefficient is displayed in Table 3:

Table 3. Spearman correlation coefficient matrix between variables

Variable	1	2	3	4	5	6
New thinking in relation to the university	1					
Cohesive interference	0.397**	1				
Deepening transformative decision-making	0.255**	0.587**	1			
Emotional management strategy in virtual education	0.240**	0.262**	0.505**	1		
building capacity for organizational resilience	0.275**	0.543**	0.452**	0.345**	1	
Emergence of responsive organization	0.178*	0.444**	0.705**	0.527**	0.448**	1

*Significant at the 0.05 level

**Significant at the 0.01 level

Table 4: Confirmatory factor analysis results for the measuring model

Component	Subcomponent	Item	Item factor load	Component factor load	Validity and reliability coefficients
New thinking in relation to the university	Strengthening online team interaction	P1	0.861	0.780	AVE: 0.626 CR: 0.770 α: 0.702
		P2	0.864		
		P3	0.780		
	Improving communication through human resource training	P4	0.825	0.803	
		P5	0.868		
		P6	0.814		
		P7	0.697		
Cohesive interference	Improving positive cooperation and skills	P8	0.815	0.761	AVE: 0.560 CR: 0.792 α: 0.706
		P9	0.795		
		P10	0.843		
	Increasing the quality and optimizing the educational content	P11	0.839	0.689	
		P12	0.857		
		P13	0.788		
	Strengthening human resources in unexpected developments	P14	0.848	0.797	
		P15	0.764		
		P16	0.741		
Deepening transformative decision-making	Improving efficient management during a crisis	P17	0.814	0.845	AVE: 0.726 CR: 0.841 α: 0.722
		P18	0.780		
		P19	0.795		
	Strengthening decision-making in crisis	P20	0.833	0.862	
		P21	0.881		
		P22	0.859		
Emotional management strategy in virtual education	Capability of employees to participate online and manage stress	P23	0.858	0.798	AVE: 0.681 CR: 0.810 α: 0.734
		P24	0.892		
		P25	0.855		
	Limitation of equipment and reduction of face-to-face interaction	P26	0.831	0.854	
		P27	0.856		
		P28	0.889		
		P29	0.863		
building capacity for organizational resilience	Vitality and stimulation to learn	P30	0.868	0.774	AVE: 0.635 CR: 0.777 α: 0.728
		P31	0.849		
		P32	0.874		
	Predicting change and strengthening accountability	P33	0.766	0.823	
		P34	0.877		
		P35	0.893		
Emergence of responsive organization	Rapid organizational changes	P36	0.884	0.827	AVE: 0.620 CR: 0.829 α: 0.791
		P37	0.894		
		P38	0.887		
	Change in critical conditions and the art of adaptation	P39	0.808	0.833	
		P40	0.831		
		P41	0.854		
	Flexibility and creativity	P42	0.829	0.700	
		P43	0.881		
		P44	0.906		

There is a strong and positive connection between the study's variables, with 99% and 95% confidence, according to Table 3's Spearman's correlation coefficient data. Therefore, it can be stated that the increase of one of these variables will increase the other and the decrease of one of them will decrease the other.

Inferential results; Structural equation modeling

Unidimensionality: The standardized factor load value (β) indicates that the factor load values (above 0.50) for the chosen indicators were of statistical significance at the one percent error level (P<0.01) (t greater than 1.96). The outcome validates that the chosen markers are unidimensional. It is therefore possible to conclude that the indicators chosen for assessing the study constructs are accurate and appropriately chosen.

Validity and reliability of the model: All of the constructs in the suggested study model had composite reliability (CR) values greater than 0.70 and Cronbach's alpha coefficients greater than 0.70, according to an evaluation of the validity and reliability of the study's instrument. Additionally, all of the constructs in the suggested study model had average variance extracted (AVEs) greater than 0.50. As a result, the suggested study model's latent variables all show strong validity and reliability Table 4.

After applying confirmatory factor analysis to validate the measurement model of the investigation, the path analysis approach (structural model assessment) was employed to evaluate the hypotheses in the form of the suggested conceptual model of the study. The model of the research route is displayed in Figures 1 and 2, which illustrate the significant and standardized factor loadings.

Table 5. Collinearity indices and direct effects of the internal model of the research

Path	Direct effect					Effect size
	Values			Confidence interval		
	B	T	sig	2.5%	97.5%	
human resource management training during a crisis → new thinking in relation to the university	0.361	3.29	0.001	0.145	0.556	0.150
Human resource management training during a crisis → cohesive interference	0.764	16.93	0.001	0.658	0.836	1.398
Human resource management training during a crisis → deepening transformative decision-making	0.852	37.59	0.001	0.802	0.892	2.642
Human resource management during a crisis → emotion management	0.712	15.15	0.001	0.615	0.794	1.026
Human resource management training during a crisis → building capacity for organizational resilience	0.737	14.68	0.001	0.627	0.821	1.19
Human resource management training during a crisis → development of reactive organization	0.825	24.43	0.001	0.747	0.879	2.128

Table 6. The results of the overall fit of the model with the GOF criterion

Component	R2	Communality	GOF
New thinking in relation to the university	0.131	0.11	
Cohesive interference	0.583	0.263	
Deepening transformative decision-making	0.725	0.305	
Emotion management in virtual education	0.506	0.22	0.370
Building capacity for organization resilience	0.543	0.30	
Emergence of responsive organization	0.680	0.364	
Mean	0.528	0.260	

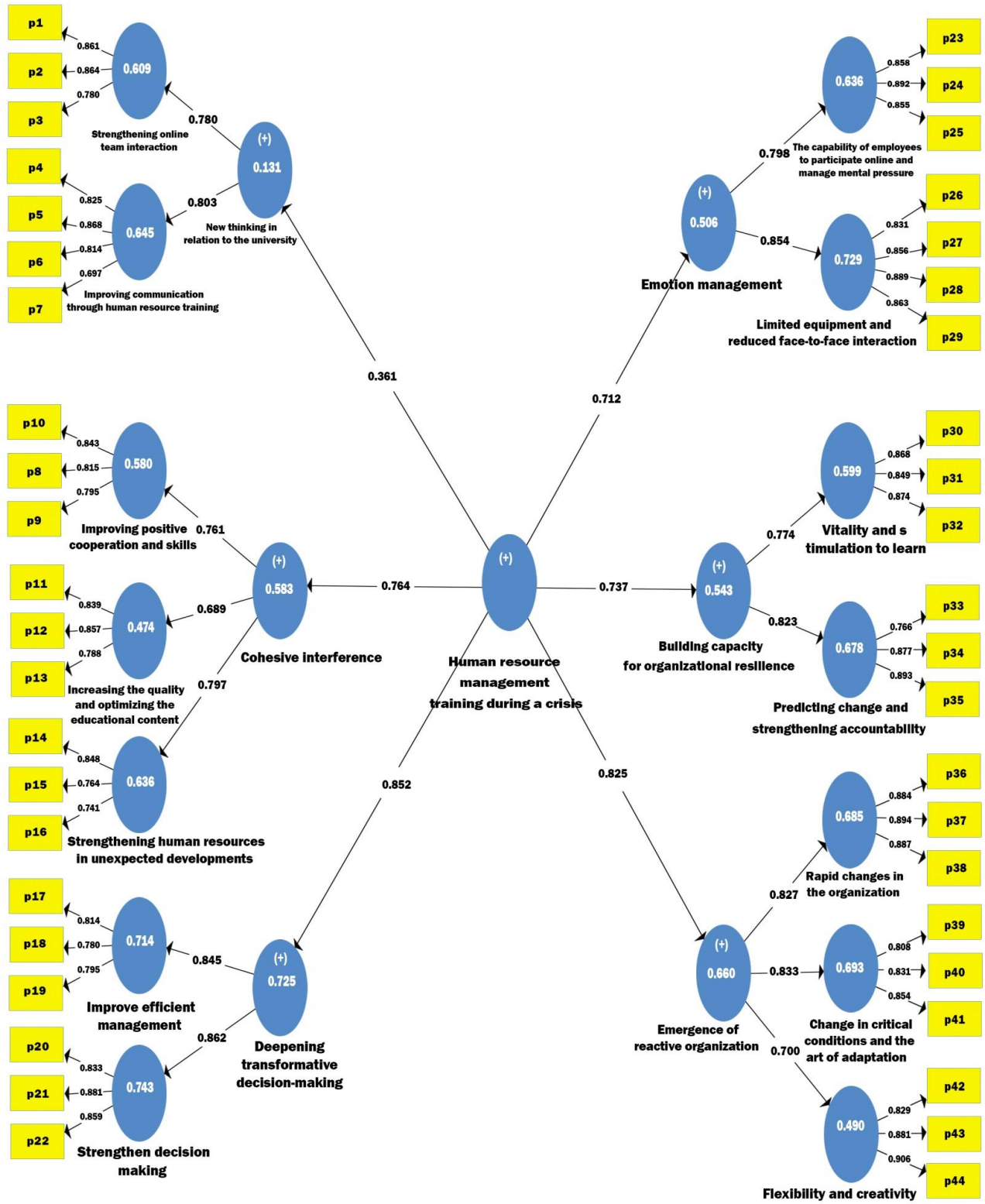

Figure 1. Path model with standardized coefficients

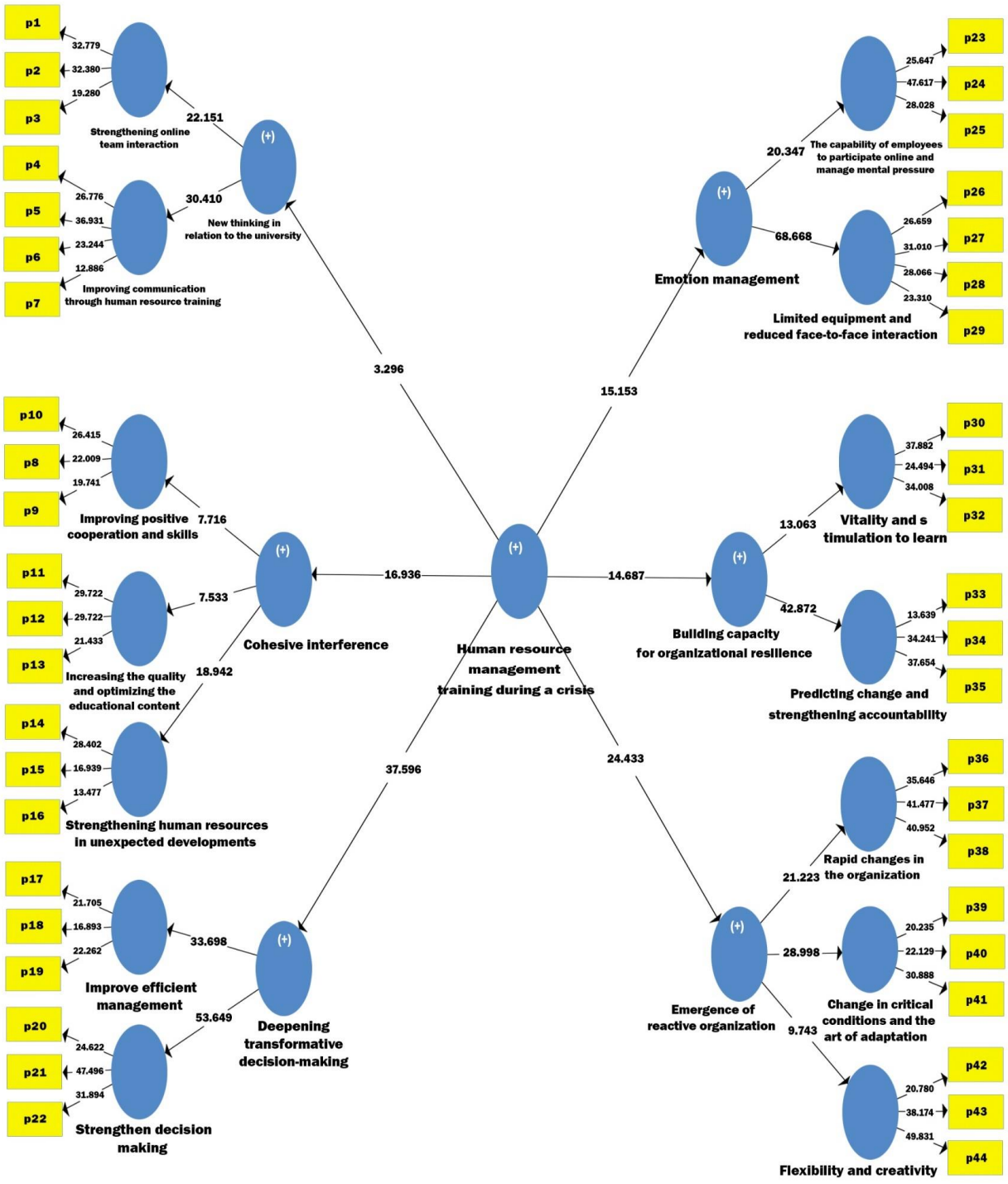

Figure 2. Path model with t-values

In the internal model part, the correlation between the study's variables is analyzed. The evaluation criteria of the internal model are the path coefficients. To examine their significance, the autoregressive procedure was used. Table 5 presents these coefficients, T-values, the significance level, and the confidence interval for the direct effects. The obtained results indicate that all paths of the model have a significant direct and positive effect with 95% confidence. Also, the effect size of each

path has also been shown. Based on these values, the human resource management training path during a crisis and the deepening of transformative decision-making has the largest effect size.

The coefficient of determination (R2) provided information about the model's predictive performance. The threshold values for weak, moderate, and high values are regarded as being, respectively, 0.19, 0.33, and 0.67." The coefficient of determination of modern thinking in relation to the university has a weak value, cohesive interference, emotion management, and building capacity for resilience have a moderate value, and deepening transformative decision-making and the development of a reactive organization have a strong value. The last evaluation criterion of the internal model is Stone-Geisser's Q2 (1974), indicating the predictive fit of the model. This criterion is calculated by removing the data points in the determinants of the endogenous variables and estimating the parameters of the remaining points. A Q2 value higher than zero for a given endogenous dummy variable indicates the predictive fit of the path model for that particular construct.

The numerical value of R2 coefficient for variables New thinking in relation to the university, Cohesive interference, deepening transformative decision-making, Emotion management in virtual education, building capacity for organization resilience and Emergence of responsive organization was 0.131, 0.583, 0.725, 0.506, 0.543 and 0.680 respectively.

Examining the overall model: After evaluating the measurement and structural models, the overall model (the sum of the measurement and structural models) should also be examined. For this purpose, Tenenhaus et al., introduced the GOF index. This index is obtained from the geometric mean of communalities and the coefficient of determination. The closer this index is to one, it indicates the strength and high quality of the model.

$$GOF = \sqrt{\overline{R^2} * \overline{Communality}}$$

Table 6 shows that the GOF criteria value is 0.370, which is higher than 0.36 and indicates that the entire research model fits the data very well.

Discussion

The results of the study revealed that modern thinking in relation to the university is one of the components of human resource management training in healthcare departments during a crisis based on the experiences of COVID-19. In this regard, Fallahi et al. (14) found that the effect of using new technologies in human resource management training in healthcare departments is effective during a crisis. Naved Khan & Allil, also confirmed the effect of communication between human resources and success in crisis management (15). Strengthening online team interaction and improving communication through human resources training can provide the conditions for improving decision-making, creating appropriate conditions for human resources management during a crisis, and realizing the decisions of resource managers to realize crisis control. The results revealed that cohesive interference is one of the components of human resource management training during a crisis. In this regard, a study found that the participation of all organizational members is necessary to overcome crises. Increasing the participation and cohesive interference of the employees in the work environment is beneficial to the individuals. It also increases interaction, innovation, and productivity and significantly contributes to the promotion and overall competitiveness of the organization. Employees who have more interaction and cooperation in the organization are more committed and motivated and have a positive impact on the long-term growth of their organization which will lead to improved performance and more successful crisis management to achieve organizational goals (16).

The results revealed that the deepening of transformative decision-making is a component of the human resource management training model during a crisis. In this regard, Sendogdu et al., have confirmed the impact of transformational decision-making on the improvement of crisis management. Overcoming the crisis of the spread of the coronavirus and other such crises requires complementary actions by all departments of the organization. In this regard, human capital managers play a vital and critical role in training, crisis management, designing remote work infrastructures, developing new methods of service compensation, and mental and psychological rehabilitation of employees. Employees should also be more diligent in saving their lives and their colleagues, improving the health of the work environment, and designing innovative models for business continuity (17).

Emotion management guidance in virtual education in this study was identified as one of the components of human resource management training during a crisis. Hamouche (18) and Johnstone (19) confirmed the results of the study and found that there is a significant correlation between emotional management, emotional intelligence, and human resource management training. The emergence of organizational crises is inevitable due to the changes and complexity of the environment. Various factors are involved in the occurrence of crises. The crisis in the organization mostly stems from the inadequacies of the relationship between emotional intelligence and the ability to control crises caused by the internal environment and the failure of management. A crisis occurs as a result of failed management. The ability of employees to participate online, manage mental pressure, and limited equipment and reduced face-to-face interaction can be effective in managing emotions in virtual education and pave the way for improving crisis management.

Analyzing the experts' opinions revealed that building capacity for organizational resilience is one of the components of human resource management training during a crisis. Binnashir Alketbi et al., found that building capacity for resilience is required for training human resources during a crisis (20). Mirzaei et al., indicated that human resource management training is necessary for crisis management (21). The influence of human resource training on crisis handling was also confirmed by Mazroui Nasrabadi & Jannesari (22) and Ebrahimi (23). Since the world is changing rapidly and environmental changes are not constant, human resource managers do not face constant challenges. All the sub-components of human resources management play a crucial role in the crisis management process. Human resources also play a vital role in the crisis containment stage.

Crisis management headquarters are the front line against crises, and managers' quick response to unexpected events is vital. Thus, when facing a crisis and unexpected events, crisis management headquarters require trained specialist personnel who are responsible for providing services with their science, knowledge, skills, and experience to cope with the crises (24). In this study, the emergence of a responsive organization is one of the components identified for human resource management training during a crisis. Nowadays, changes and transformations in all dimensions of human life are in the form of expanding processes. Thus, organizations must innovate and keep pace with the changes and transformations created in different areas to survive and be dynamic. However, to create constructive and effective development and changes in organizations, they should be planned, designed, and managed. There was not a single study in this field with which to compare the findings of this one. In a situation where educational institutions face a crisis like coronavirus and are trying to train their human resources management,

they should act as a reactive organization and overcome crises in line with the adversities and crises to achieve organizational goals. In other words, by creating rapid changes in the organization and changes in critical conditions and the art of adaptation, flexibility, and creativity in the organization, they provide the conditions for crisis management and training according to educational needs.

Conclusion

Establishing an organizational culture helps members of the system work and cooperate to improve each other's skills, capabilities, and talents, try to increase each other's capabilities through cooperation with each other, overcome the crisis, and have positive and constructive cooperation and cooperate with each other to realize the quality and optimization of educational content and strengthen each other's power and create optimal educational content with coherence and coordination, and perform the tasks collaboratively. To successfully overcome the crisis and manage it, it is recommended that the human resources in the educational system be strengthened and empowered in a constructive way and according to their professional needs, so they can perform optimally when unexpected changes occur. This study suffers some some weaknesses along with its strengths. The study was conducted cross-sectionally and used a case study strategy to find research questions in the study organization with its specific conditions. Thus, its results cannot be generalized to other organizations. Generalizing its results depends on other measures, including the use of multiple case studies.

Authors' contribution

Majid Kamali Ardakani and Hamid Taboli developed the study concept and design. Malikeh Beheshtifar acquired the data. Majid Kamali Ardakani and Hamid Taboli analyzed and interpreted the data, and wrote the first draft of the manuscript. All authors contributed to the intellectual content, manuscript editing and read and approved the final manuscript.

Informed consent

Questionnaires were filled with the participants' satisfaction and written consent was obtained from the participants in this study.

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Conflict of interest

The authors declare that they have no conflict of interests.

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Items

1- Online team interactions and the development of social interactions increase.
2- There is a variety of communication, the flow of changes and maintaining communication with the university.
3- Effective communication with the university is maintained during Covid-19.
4- Online education is done with the aim of maintaining interaction and communication with students.
5-Continuous notification is done through email, communication platforms, etc.
6- Education is transferred to the online space.
7- Online education is done by maintaining continuous interaction and communication with the university.
8- Positive cooperation training should be promoted during Covid-19.
9- Management skills should be improved in complex situations and strategies.
10- Learning skills for unexpected changes.
11- Stress management training is effective in crisis.
12-Experiences of other universities in crisis conditions should be evaluated.
13- The training content should be optimally adjusted by responding to crisis conditions.
14- Human resource management training: transfer of knowledge and skills to crisis situations.
15- Improving the knowledge of professors and managers to face the crisis.
16- Strengthening the skills and knowledge of employees to face challenges and changes.
17-Training in crisis conditions to manage resources and increase efficiency.
18- The goals of training in crisis: increase cooperation and stress management.
19-Efficiency in crisis management should be improved at the lowest cost.
20- Training should be done in crisis conditions to make the best decision.
21- Experiences should be used to make the best decision in crisis situations.
22- Supervise learning and evaluate training to improve decision-making.
23-Challenge of Covid-19: Empowering employees to interact in a virtual environment.
24- Crises can cause psychological pressure and stress.
25- Time management and balance between home affairs and online education is a challenge.
26- The human resources training in the crisis requires special and conceptual trainings.
27- The challenge of Covid-19 is to convert education into online space.
28-Decreasing face-to-face interaction in education reduces quality.
29- Quality is affected by equipment limitations in online education.
30- Human resource management training: strengthening individual morale and motivation during a crisis.
31- It is necessary to optimize education in crisis conditions.
32- Training in crisis conditions creates motivation and passion for learning.
33- Technology in online education is crucial to improve learning.
34-Crisis management like Covid-19 should be done with previous continuous training.
35- Managing and predicting the changes in the work environment.
36- Sustainable and continuous training adapts the organization to rapid changes.
37-Transfer of information and encouraging quick adaptation.
38- Effectively coping with challenges caused by crises and adapting to new conditions.
39- Encouraging quick adaptation to changes and developments.
40- Understand the necessity of training to adapt during a crisis.
41- The primary goal of human resource management training is: rapid change during a crisis.
42- Training should be creative and flexible in crisis situations.
43-Training supports the person psychologically in crisis situations.
44-Flexibility and creativity in the face of changes and crises.