

Article

The Mechanism of Digital Environment Influencing Organizational Performance: An Empirical Analysis Based on Construction Data

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Abstract: The new system formed by digital technology and digital system is different from the traditional environment, and this environment has a sharp impact, either by transformation or replacement, of the traditional environment. However, at present, organizational strategy formulation, structural design, resource allocation, and culture formation are based on the traditional environment, which leads to a declining trend in organizational performance. Therefore, to identify and adapt to the characteristics of the digital environment, the improvement and design of organizational characteristics that highly fit with this environment has become an urgent task for all kinds of enterprises to maintain and improve organizational performance. Based on the analysis of the characteristics of digital environment, organizational change, digital organizational culture, organizational performance, and the data of the construction industry, this study constructs a mediating effect structure model to explain the path and mechanism of organizational performance improvement, and puts forward corresponding countermeasures and suggestions according to the empirical results. The research puts forward the analysis model of “Digital Environment-Organizational Behavior-Organizational Performance”. The results reveal how to improve organizational performance in the digital environment and enrich the research of organizational performance and the practice of organizational performance improvement.

Keywords: digital environment; organizational change; digital organizational culture; organizational performance; construction companies



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1. Introduction

The rapid development of digital technologies such as information technology, communication technology, and the Internet of Things has profoundly changed organizations' production, transaction, and interaction mode, and has transformed society into a new digital system [1]. However, different individuals and organizations cannot adapt to this new environment—the digital environment. Some scholars hold the point that the germination and development of the digital environment will have a sharp impact, transformation, or replacement of some traditional environments. They even believe that the digital environment will become the dominant technology and the institutional environment of the future society, which will deeply change the thinking and management modes of organization managers and also change the competition and cooperation model of organizations [2]. In the traditional environment, the advantages of maximizing competitiveness or monopolization is the “compass” by which enterprises make strategies, design organizational structure, and allocate resources. Based on this, the company has successively formed a linear, functional matrix and other organizational department settings, which have been required to

form a competitive and wolfish corporate culture [3]. However, the disadvantages caused by this hierarchical organization model, including human alienation, efficiency reflexivity, democratic paradox, etc., report that there are problems in the rigid managements, the institutional conflicts, the low efficiency, and corporate deficits within the enterprises. It is difficult for the organization to adapt to the changes in the external market, and the normal operation or even survival of enterprises is threatened by this hierarchical organization model [4]. Therefore, it is necessary to formulate the logic of the organizational strategy, and at the same time make major adjustments to the organizational structure design, organizational resource allocation, and organizational culture, so as to keep the organizational efficiency within an acceptable range.

Since the model of “Market Environment—Market Behavior—Market Performance” was proposed, some scholars believe that the environment is the most important factor causing organizational changes in the theoretical and practical fields [5]. Whether organizational change must be implemented through environmental change mainly depends on three factors: the change of market competition, the change of market resource allocation, and the change of market demand. However, in order to understand the influence of the digital environment leading to the changing of these mentioned factors, it is necessary to analyze the characteristics of the digital environment, to compare the differences between the digital environment and the traditional environment, and to explore how the digital environment can obtain competitive advantage and organizational efficiency by means of rapid iteration and sharing of “information technology+”. In particular, it is necessary to discuss how to implement the strategic logic concepts of competition and cooperation, so as to implement the organizational change. In the field of practice and theory, organizational change is regarded as a complex, systematic, and highly risky dynamic process, involving corporate culture, digital organizational culture, management cognition, strategic thinking, organizational structure, etc., [6,7]. The dynamic process of organizational change can be “spontaneous” or “breaking before establishing”, or “breaking while establishing”, but its ultimate purpose is to reveal the laws behind organizational change. This has important theoretical value and practical significance for studying how to implement organizational change in the digital environment [6,7]. Different scholars have different views on how organizational change affects organizational performance [8]. In addition, some scholars believe that organizational performance is a multi-faceted phenomenon that is difficult to measure [9]. Although some scholars have mainly focused on the narrow definition of the efficiency-related matters of organizational performance, the broader definition also involves such factors as ethics, ecological environment, and human adaptation [10,11]. However, the current research is very fragmented, and focuses on a single part of the concept of digital environment, namely organizational change and organizational performance. Therefore, it is not easy to carry out the empirical research of digital environment, organizational change, and organizational performance.

By studying the first-hand data of the organizational performance of 218 construction enterprises, this thesis analyzes the application of information technology and collects the iteration and promotion of information products in construction enterprises, aiming to explore the deep-seated reasons for the adjustment of the organizational model of the construction industry. Based on the results of previous studies, the author designs measurement questions for the research concepts and constructs a theoretical model to explain the path and heterogeneity of organizational change and organizational performance change induced by the digital environment.

2. Literature Review

2.1. Digital Environment

Alcácer and Zheng et al. [12,13] argued that traditional business environments, such as manufacturing industrial sectors and construction industries and their production systems are based on information technology; however, they have closed, batch, and offline sales, while Industry 4.0, in digital environments, involves the use of information

technology to promote profound changes in the industry, and its production systems are open and highly intelligent. Mourtzis et al. [14,15] argued that the previous corporate innovation environment was relatively closed, relying on companies themselves or the strategic alliances of companies, while innovation in the digital environment is relatively open, with a wider range of cooperation, relying on information infrastructure such as 5G, big data, and artificial intelligence.

Shea and Master [16] formally put forward the digital environment and pointed out the important value of understanding and adapting to this environment for corporate activities. Subsequently, the digital environment attracts the attention of scholars who are active in the fields of social activities, learning styles, and consumer behavior. Meanwhile, it also rapidly spread to the fields of corporate strategic management, organizational behavior performance, and marketing [17,18]. Dyal-Chand [2] reported that the digital environment would replace the various components of the traditional environment before the 2050s. The UN Sustainable Development Goals for industry, innovation, and infrastructure are to build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation. Yung thought that the so-called environmental change meant the transformation from one environment to another, which includes major changes in technology and substantial changes in systems [19]. Yung argued that the change of environment can result from prudent academic revisions, or it can be reflected in the adjustment of existing activities and regulations by individuals or organizations [19]. There is no doubt that the digital environment is deeply affecting every organization and individual in many aspects in both theoretical and practical circles

However, with the establishment and use of supporting facilities related to the digital environment in various industries, people have gradually found that the previous environment is increasingly unsuitable for the new digital environment. As a result, the social efficiency, which should be improved, stagnates, and even shows a sign of regression [20]. This phenomenon has triggered a lot of discussions among scholars. Yung [21] argued that the emergence of the digital environment will have a strong impact on the existing environment. Plus, the original theory is increasingly unable to guide and predict the existing digital environment. Therefore, it is urgent to study the digital environment in many aspects such as technology, economy, legal institution, and society.

2.2. Organizational Change

In practice and theoretical research, the boundary between organizational change and enterprise strategic change is not clear. As a matter of fact, the research and practice of organizational change are very abundant abroad, which is the mainstream branch of organizational theory and strategic management research [22]. The organizational change was first introduced in China by the research of Business Process Reengineering in the 1990s, which is the theoretical basis of the organizational change of research in our country. In the 1990s, with the transition from a planned economy to a market economy and the constant reform of state-owned enterprises, China was carrying out large-scale mergers and reorganizations of enterprises to provide opportunities for all types of start-ups. Therefore, the organizational change has become an unavoidable topic for enterprises, and lots of research findings and practical experience has been obtained [23]. Through the review of relevant domestic literature, organizational change mainly involves strategy, structure, process, culture, and other dimensions, but scholars have not reached a consensus on this [4,24,25].

Some scholars believe that the external cause of organizational change is the change of external competition, including the improvement of the threshold for platform-based enterprises and the achievement of market monopoly through innovation [26]. In the digital environment, organizational change has systematically adjusted and updated the organization's strategy formulation, power structure, resource allocation, etc., through scientific management [25]. In this way, organizations can adapt to the digital environment and achieve the healthy development of enterprises [27]. Some scholars have considered that the important parts of organizational change are organizational strategy, organiza-

tional structure, and organizational resource allocation [28,29]. Other scholars believe that organizational culture is also a significant part of organizational change [30]. There is very little research on how to conduct empirical research on organizational change in the digital environment. Therefore, scholars believe that it is crucial to conduct a series of research studies on organizational change in the digital environment.

2.3. Organizational Performance

Different scholars have different definitions of organizational performance. Some scholars hold the points that performance is the results brought by specific behaviors and job functions within a specific period of time [31]. Some scholars also believe that it should be connected with work performance and value performance [32]. Albrecht believed that organizational performance is reflected in the smoothness of the organizational workflow, the realization of the strategies, and the utilization of resources. Meanwhile, it is also reflected in the quantity and efficiency of the completed tasks within a certain period [32]. Logically speaking, there is a certain internal relationship between personal performance and organizational performance, that is, the realization of personal performance precedes organizational performance. Only when the individual performance is successfully achieved, then the organizational performance may also be achieved.

Some scholars have argued that organizational performance not only comes from technological innovation, but also mainly from elements within the organizational system, such as from the implementation of corporate strategy, resource management, sales model, communication model, organizational innovation, etc., [33,34]. However, in the digital environment, the sources of organizational performance need to be further studied [35]. For all organizations, the direction of organizational change is measured by the level of performance, and then the content and procedure of organizational change are evaluated based on the performance. In the past few decades, improving organizational performance has become a key issue in management theory and practice. Scholars seem to agree that organizational performance is a multifaceted phenomenon that is difficult to measure. Although the narrow definition of organizational performance mainly focuses on efficiency and efficiency-related matters, the broader definition also includes employee satisfaction, manager leadership, and labor quality [36]. Compared with the traditional environment, the sources of organizational performance are more extensive in the digital environment, therefore it is not easy to accurately define the influencing factors and measure them.

It is important to mention that the COVID-19 pandemic has accelerated the scope and depth of the impact of the digital environment on organizational performance. Regarding sales, there has been a tremendous growth in the digitization of products. According to McKinsey, the COVID-19 pandemic has led to a three to four year acceleration in digitization and a staggering seven-year acceleration in the digital product portfolio, with global product digitization growing from 35% in December 2019 to 55% in July 2020. Now likely above 60%, with some countries reaching 70% or more, companies have a clear view of a possible future and how they will respond to a digital environment that is adapting to it through organizational change and, in doing so, improving organizational performance.

In the face of digital environment, current research has mainly focused on aspects of digital transformation of enterprises and business model innovation and has argued that the digital environment will have many negative effects on traditional enterprise performance growth, but few studies systematically point out that organizations need to change, as well as how to change and what to change. This study clearly proposes that, in the face of the digital environment, companies must first make organizational changes to adapt. Moreover, this study, for the first time, proposes to make organizational strategy changes, organizational resource allocation changes, and organizational structure changes, but the effects of these changes are influenced by the culture of digital organizations, based on which this study constructs a model of how the digital environment affects organizational performance, and, in doing so, enriches the theory of organizations in the digital environment and has significant practical implications.

3. Research Hypothesis and Model Construction

By collating the information of the construction industry and the status of construction enterprises, the author of this thesis considers a logical relationship among the digital environment, organizational change, digital organizational culture and organizational performance. Then, the author aims to construct a theoretical model of related concepts.

3.1. Digital Environment and Organizational Performance of Construction Enterprises

Nambisan believed that technologies such as P6 and CAD, which are born in the digital environment, have changed the mode of working and project management in construction companies. These advanced technologies successfully help to improve the level of project and the organizational performance of construction companies [37]. In addition, BIM technology and the formulation of its standards, as well as BIM+5D, have been widely used in construction enterprises. In fact, BIM technology provides effective help for the projects of construction enterprises, namely in safety management, time management, cost management, and quality management. Affected by the basic data modules, analog construction modules, cloud platform modules, and other aspects, BIM technology provides new ideas and methods for the safety management, schedule management, cost management, and quality management of construction enterprises. Oyemomi believes that BIM technology improves the effectiveness of the current management system as well as the organizational performance of construction enterprises [38]. Based on the above analysis, this paper proposes:

Hypothesis 1 (H1). *Digital environment has a positive impact on organizational performance; that is, the more complete the digital environment is, the higher the organizational performance will be.*

3.2. Digital Environment and Organizational Change of Construction Enterprises

Organizational strategy, organizational resources, and organizational structure are the important contents of enterprise organizational change, which have a significant impact on the change of enterprise strategy. The digital environment also has some influence on the value chain of construction industry, which will change the resource allocation of construction enterprises in the industrial chain. In addition, more and more digital departments and virtual organizations, network organizations, and platform-based organizations appear in the setting of construction enterprise departments such as General Motors and IBM. Based on the above analysis, this article proposes the following hypotheses:

Hypothesis 2 (H2). *The digital environment has a significant positive impact on organizational change. In other words, the more complete the digital environment is, the more the organizations need to change. They have removed the shackle of traditional environment to adapt to the characteristics of digital environment.*

Hypothesis 2a (H2a). *The digital environment has a significant positive impact on organizational strategy. In other words, the more perfect the digital environment is, the more organizations need to reform their organizational strategy. They have got rid of the traditional environment to adapt to the characteristics of digital environment.*

Hypothesis 2b (H2b). *The digital environment has a significant positive effect on the change of organizational resource allocation. In other words, the more perfect the digital environment is, the more organizations need to change the allocation of organizational resources. They have got rid of the traditional environment to adapt to the characteristics of the digital environment.*

Hypothesis 2c (H2c). *The digital environment has a significant positive impact on organizational structure. In other words, the more perfect the digital environment is, the more organizations need to reform their organizational structure. They have got rid of the constraints of the traditional environment to adapt to the characteristics of the digital environment.*

The questionnaire scores of H2a, H2b, and H2c obtained by processing the returned questionnaire data were weighted using SPSS software, i.e., each value was multiplied by the corresponding weight, then summed to obtain the overall value, and then divided by the total number of units to obtain the weighted average of the three, and the final weighted average was the questionnaire score of H2.

3.3. Organizational Change and Organizational Performance of Construction Enterprises

Regardless of the industry, organizational performance mainly comes from the elements in the organizational system. The main purpose of organizational change is to improve organizational performance, such as the implementation of corporate strategy, resource management, sales mode, etc. However, whether it is true in the digital environment remains to be empirically studied [39]. Based on the above analysis, this article proposes the following hypotheses:

Hypothesis 3 (H3). *In the digital environment, organizational change significantly improves organizational performance.*

Hypothesis 3a (H3a). *In the digital environment, the change of organizational strategy significantly improves organizational performance.*

Hypothesis 3b (H3b). *In the digital environment, the change of organizational resource allocation significantly improves organizational performance.*

Hypothesis 3c (H3c). *In the digital environment, the change of organizational structure significantly improves organizational performance.*

The questionnaire scores of H3a, H3b, and H3c obtained by processing the returned questionnaire data were weighted using SPSS software, i.e., each value was multiplied by the corresponding weight, then summed to obtain the overall value, and then divided by the total number of units to obtain the weighted average of the three, and the final weighted average was the questionnaire score of H3.

3.4. The Intermediary Role of Organizational Change of Construction Enterprises

Based on the hypothesis formed by H1–H3, organizational change may play a mediating role in the process of the digital environment affecting organizational performance. Therefore, this paper proposes the following hypotheses:

Hypothesis 4 (H4). *The organizational change plays a significant mediating role in the process of digital environment affecting organizational performance.*

Hypothesis 4a (H4a). *The change of organizational strategic plays a significant mediating role in the process of digital environment affecting organizational performance.*

Hypothesis 4b (H4b). *The change of organizational resource allocation plays a significant mediating role in the process of digital environment affecting organizational performance.*

Hypothesis 4c (H4c). *The change of organizational structure plays a significant mediating role in the process of digital environment affecting organizational performance.*

The questionnaire scores of H4a, H4b, and H4c obtained by processing the returned questionnaire data were weighted using SPSS software, i.e., each value was multiplied by the corresponding weight, then summed to obtain the overall value, and then divided by the total number of units to obtain the weighted average of the three, and the final weighted average was the questionnaire score of H4.

3.5. The Regulatory Role of Digital Organizational Culture of Construction Enterprises

Many enterprises, including construction enterprises, do not understand the importance of the cultivation of digital organizational culture. Therefore, the influence of digital organizational culture on organizational change is often overlooked [40]. In fact, digital organizational culture is more focused on sharing, and the right of sharing makes more tacit knowledge explicit. In addition, digital organizational culture has an important influence on organizational strategy, decision-making, resources, processes, and other aspects. Poster thought that digital organizational culture improves the method of the resource allocation of organizations and sets the organizational structure with the characteristics of “network”. The fact is that, if enterprises control digital culture well, they will have a favorable position in sales, social efficiency, and production, and have a positive impact on organizational human resources, organizational commitment, and emotional commitment. It can be seen that digital organizational culture enhances organizational performance to a higher degree by influencing organizational change. Based on the above analysis, this paper proposes the following hypotheses:

Hypothesis 5 (H5). *The more mature the digital organizational culture is, the more significant the mediating effect on organizational change will be.*

Hypothesis 5a (H5a). *The more mature the digital organizational culture is, the stronger the mediating effect on organizational strategic change will be.*

Hypothesis 5b (H5b). *The more mature the digital organizational culture is, the stronger the mediating effect on organizational resource allocation change will be.*

Hypothesis 5c (H5c). *The more mature the digital organizational culture is, the stronger the mediating effect on organizational structure change will be.*

The questionnaire scores of H5a, H5b, and H5c obtained by processing the returned questionnaire data were weighted using SPSS software, i.e., each value was multiplied by the corresponding weight, then summed to obtain the overall value, and then divided by the total number of units to obtain the weighted average of the three, and the final weighted average was the questionnaire score of H5.

Based on the above hypotheses, the theoretical model formed in this study is shown in Figure 1:

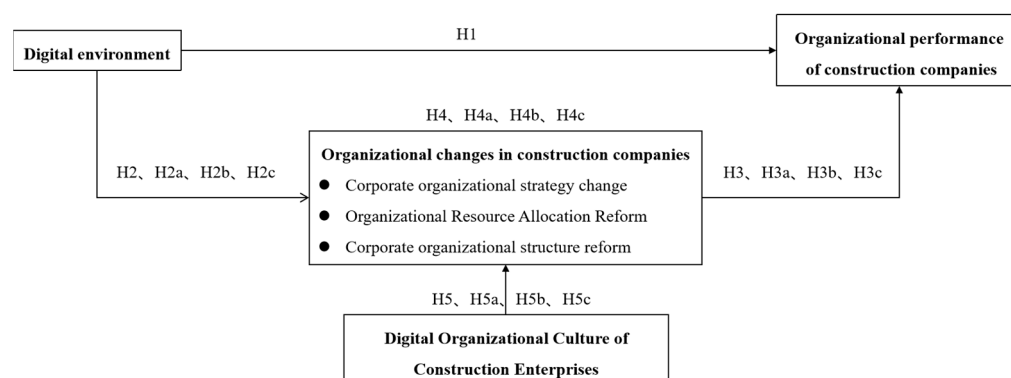


Figure 1. Theoretical model of conceptual relations.

4. Research Methods and Empirical Analysis

4.1. Research Methodology

As the concepts in this study are difficult to quantify, such as digital environment and organizational change, questionnaires were used for empirical analysis in this paper. The questionnaire is suitable for large-scale research and can improve the validity

of conclusions. The questionnaire design can process data conveniently and is suitable for multi-level regression analysis. Thus, the corresponding dimensions can be quantified through the questionnaire. The questionnaires were distributed to the constructors, project managers, technical leaders, consulting engineers, and middle-level leadership in construction companies.

The source of the question is relatively clear in questionnaires. The digital environment draws on the analysis of several signs of digital maturity in “Achieving Digital Maturity” [1]. The organizational change draws on the analysis of the influencing factors of organizational strategy in the book “Strategic Management: Theories and Cases” [41]. The digital organizational culture draws on the book “Organizational Theory- From the Perspective of Rationality, Nature and Open System” [42]. The organizational performance draws on the analysis of factors affecting organizational performance in the article “The Importance of Ethical Environment to Organizational Performance in Employment at Will States”. Combining the abovementioned related literature and the characteristics of the construction enterprise organization, the author of this thesis selected the type of enterprise, the size of the enterprise, and the nature of the enterprise as the control variables, and finally determined the questionnaire of this article [43].

4.2. Testing of the Questionnaire

After the design of the questionnaire was completed, the author passed out 125 copies for pretesting to test the reliability and validity of the pretest questionnaire. The reliability test used Cronbach α , and the result was 0.753. The validity test is divided into exploratory factor analysis and confirmatory factor analysis. Exploratory factor analysis was carried out using factor analysis in SPSS, and six dimensions were obtained through principal component analysis. The load of other dimensions was basically greater than 0.6, which met the requirements. The confirmatory factor analysis was performed using AMOS, and the fitting results met the critical index requirements. After passing the pretest of questionnaires, they were distributed. After the questionnaire was collected, it was analyzed by SPSS22.0 software, and its AMOS7.0 was used for auxiliary analysis.

4.3. Reliability and Validity Tests of the Questionnaire

The reliability of each latent variable in the questionnaire was tested separately, and the results are shown in Table 1. It can be seen from Table 2 that the Alpha coefficients are all above 0.7, and that the Cronbach’s Alpha coefficient of the total scale has reached 0.704, indicating that the reliability of this scale is high, and that the factor loading values are all greater than 0.6, indicating that the scale has good Convergent validity.

The measures of confirmatory factor analysis included digital environment, organizational strategy change, organizational resource allocation change, organizational structure change, and organizational performance. As can be seen from Table 2, the Chi-square value is 1.232, and RESMA is the asymptotic residual root mean square and square, and its value is 0.072 less than 0.08, which means there is a reasonable approximation error, and that the model fit is fair. TLI is a comparative fit index, and its value is between 0 and 1; the closer to 0 means the worse the fit, and the closer to 1 means the better the fit. When TLI equals $0.922 > 0.9$, then the model fit is considered better. CFI is a comparative fit index, the value of which is between 0 and 1; the closer to 0 means the worse the fit, the closer to 1 means the better the fit. CFI = 0.931 means the model fit is good. The results show that the model has a good fitting degree and the discriminant validity among variables is obvious.

Table 1. Reliability test of each latent variables in the questionnaire.

Factor	Survey Items	Load Value	Cronbach's α
Digital Environment	Organization of the use of digital technology within the scope of the law	0.743	0.815
	Organization of current use of digital technology makes you feel very convenient	0.746	
	Organization values the use of digital technology	0.771	
	The organization values legal constraints	0.776	
	The organization will allocate more resources to digital technology	0.712	
Organizational Strategic Change	Speed of change in the organization's external environment	0.678	0.765
	Change frequency of your superiors	0.747	
	Change frequency of organization members	0.704	
	Regular changes in organizational goals	0.694	
	Your organization has a similar development profile to your competitors	0.735	
Organizational Resource Allocation Change	Organizations often outsource some work	0.632	0.725
	Organizations outsource lots of work	0.724	
	Outsourcing work is often handed over to certain fixed organizations	0.637	
	Your acceptance of organizational outsourcing work	0.691	
	Work outsourcing can effectively save costs	0.731	
Organizational Structure Change	How do you feel about your productivity	0.782	0.827
	What do you think of the efficiency of your superiors	0.761	
	Good coordination between the organization departments	0.732	
	You will share your experience with your colleagues	0.782	
	It is convenient for you to communicate with other organizations	0.720	
Digital Organization Culture	Your attitude about the importance of organizational culture	0.738	0.817
	Organizational culture is always changing	0.788	
	Organizational culture is closely related to organization members	0.756	
	Organizational culture influences strategy, decision-making, resources, and work	0.786	
	Organizational culture changes faster	0.700	
Organizational Performance	The current organizational environment is consistent with your values	0.745	0.778
	Your satisfaction with the organization	0.729	
	Personal qualities of organizational staff are very high	0.828	
	Your current position gives you a sense of security	0.722	

Table 2. The Results of Confirmatory Factor Analysis.

Chi-Square	RESMA	TLI	CFI
1.232	0.072	0.922	0.931

4.4. Empirical Analysis

4.4.1. Descriptive Statistical Analysis of the Variables

The mean value and correlation coefficient of the variables are shown in Table 3 (excluding control variables). The data in the table shows correlation coefficients of 0.970 ($p < 0.01$) for digital environment and organizational strategy change, 0.424 ($p < 0.01$) for digital environment and organizational resource allocation change, 0.594 ($p < 0.01$) for digital environment and organizational structure change, 0.183 ($p < 0.01$), and the correlation coefficient between digital environment and organizational performance was 0.051 ($p < 0.05$) and were significantly correlated, indicating that further regression model tests were appropriate.

4.4.2. Mediation Effect Test

In this study, the hypotheses were tested using SPSS software and the SPSS PROCESS macro program. Tables 4 and 5 show the results of the regression analysis of mediating effects using SPSS PROCESS. The labeling error of the digital environment on organizational strategic change was 0.121, $t = 3.241$, $p < 0.05$, reaching a significant level of 0.05. Similarly, it can be seen that there is a significant positive relationship between the independent variables and the mediating variables in digital environment, which include organizational resource allocation change, organizational structure change, and digital organizational culture. At the same time, there is a significant positive relationship for the dependent variable organizational performance among digital environment, organizational strategy change, organizational

resource allocation change, organizational structure change, and digital organizational culture. This verifies H2 (H2a, H2b, H2c), H3 (H3a, H3b, H3c), and H4 (H4a, H4b, H4c). Finally, the independent variable digital environment has a significant direct effect on organizational performance, which verifies H1. It can be seen that the direct and indirect effects of the digital environment on organizational performance are significant.

Table 3. Mean values of variables and correlation coefficients.

Variables	Mean Value	1	2	3	4	5	6
Digital environment	20.040	1					
Organizational strategic change	20.054	0.970 **	1				
Organizational resource allocation change	20.040	0.437 *	0.424 **	1			
Organizational structure reform	20.080	0.962 **	0.980 **	0.594 **	1		
Digital organization culture	19.953	0.120 *	0.158 **	0.213 **	0.183 **	1	
Organizational performance	19.940	0.585 *	0.292 *	0.197 *	0.302 *	0.051 *	1

Note: * is the significance level $p < 0.05$, ** is the significance level $p < 0.01$.

Table 4. Results of regression analysis of mediating effects.

Method	Estimated Value	Standard Error	T-Value
Digital Environment→Direct Effect of Organizational Strategic Change	0.302 **	0.121	3.241
Digital Environment→Direct Effect of Organizational Resource Allocation Change	0.291 *	0.116	2.412
Digital Environment→Direct Effect of Organizational Structure Change	0.332 **	0.113	2.233
Organizational Strategic Change→Direct Effect of Organizational Performance	0.451 **	0.132	3.656
Organizational Resource Allocation Change→Direct Effect of Organizational Performance	0.462 **	0.115	2.245
Organizational Structure Change→Direct Effect of Organizational Performance	0.564 **	0.094	4.231
Digital Environment→Direct Effects of Organizational Performance	0.259 **	0.112	2.358

Note: * is the significance level $p < 0.05$, ** is the significance level $p < 0.01$.

As can be seen from Table 5, the organizational strategy change for the regression analysis was 0.421, indicating that the amount of variation in the dependent variable that can be explained by the independent variable was 42.1%. The range of the mean square error was $[0, +\infty)$, and it was 0 when the predicted value was exactly the same as the true value. The greater the error is, the greater the value will be. The mean square error of organizational strategy change was 0.284, which means that the error is small and more accurate. The F value is the ratio of two mean squares, which is not likely to be negative. The larger the F value is, the smaller the residual error will be, as well as the higher the simulation accuracy is. The F-value of organizational strategy change was 18.436, which indicates the high precision of the test. It can be seen that the smaller error of the mean square error and the larger F-value of organizational resource allocation change and organizational structure change indicates that the results are more accurate.

Table 5. Model fitting criteria for regression analysis of mediation effects.

Meta Variable	R ²	Mean Square Error	F-Number
Organizational strategic change	0.421	0.284	18.436
Organizational resource allocation change	0.286	0.215	11.323
Organizational structure reform	0.322	0.265	12.511

In Table 6, through organizational strategic changes, organizational resource allocation changes, and organizational structure changes, the mediating effects of the digital environment on organizational performance are 0.127 (confidence interval [0.025, 0.218]), 0.185 (confidence interval [0.110, 0.235]), 0.156 (confidence interval [0.110, 0.235]), respectively. Since the confidence interval does not contain 0, the mediating effects of these five mediating variables are all significant.

Table 6. Bootstrapping results of mediation effects.

Meta Variable	Effect	Standard Error	Lower Limit	Upper Limit
Organizational strategic change	0.127	0.056	0.025	0.219
Organizational resource allocation change	0.185	0.035	0.110	0.235
Organizational structure reform	0.156	0.055	0.023	0.205

4.4.3. Analysis of Moderated Mediation Effects

PROCESS was used to analyze the mediating effect with adjustment, the analysis results of which are shown in Table 7. When the digital organization culture is immature, the mediating effects of organizational strategic change, organizational resource allocation change, and organizational structure change are 0.016, 0.049, and 0.026, respectively, and the confidence interval does not include 0. When the digital organizational culture is relatively mature, the mediating effects of organizational strategic change, organizational resource allocation change, and organizational structure change are 0.047, 0.110, and 0.064, respectively, and the confidence interval does not include 0. The analysis results show that, whether the digital organizational culture is mature or not, the three levels of organizational change have significant indirect effects on organizational performance, that is, building a digital organizational culture is conducive to improving organizational performance.

Table 7. Analysis of moderating mediation effects.

Meta Variable	Conditional Indirect Effects				Modulated Mediating Effects			
	Regulated Variable	Effect	Lower Limit	Upper Limit	INDEX	Standard Error	Upper Limit	Lower Limit
Organizational strategy Change	Low value	0.016	0.007	0.043	0.025	0.015	0.001	0.045
	High value	0.047	0.012	0.107				
Organizational resource allocation changes	Low value	0.049	0.001	0.157	0.043	0.027	0.006	0.115
	High value	0.110	0.024	0.267				
Organizational structure Change	Low value	0.026	0.014	0.158	0.032	0.014	0.003	0.046
	High value	0.064	0.019	0.147				

The mediating effects of digital organizational culture on organizational strategic change, organizational resource allocation change, and organizational structure change are 0.025, 0.043, and 0.032, respectively, and the confidence interval does not contain 0. That indicates that the moderated mediating effect is significant, which proves H5a, H5b, H5c, therefore H5 is also significant.

5. Results Discussion and Policy Recommendations

5.1. Discussion on Heterogeneity of Interactions among Variables

Although the digital environment has an impact on organizational change, the digital environment has the strongest impact on organizational structure change with an impact coefficient of 0.332.

The organizational structure change has the most obvious impact on organizational performance with an impact coefficient of 0.564. The above analysis also shows that the digital environment has the most significant impact on the organizational structure, which confirms the intermediary role of organizational change to a certain extent. Secondly, the organizational structure change has the weakest impact on organizational resource allocation change, with an impact coefficient of 0.462. This reflects a lack of clarity on how to carry out organizational strategic change in the digital environment, or a lack of awareness of the importance of organizational strategic change in the digital environment.

By examining digital organizational culture, it is found that the mediating effect of organizational change has changed a lot. The mediating effect coefficient of organizational strategy is $0.047/0.016 = 2.938$, the mediating effect coefficient of organizational resource allocation is $0.110/0.049 = 2.245$, and the mediating effect coefficient of organizational structure change is $0.064/0.026 = 2.462$. It can be seen that a healthy organizational culture is more conducive to the mediating role of organizational strategy. In turn, it is more helpful to improve organizational performance and achieve the leading role of organizational strategic change. However, organizational strategy change is in a relatively behindhand situation. The direct effect coefficient of the mediating effect of organizational strategy change is lower than that of the mediating effect of organizational structure change, and is also lower than that of the mediating effect of the organizational resource allocation change. It can be seen that organizational resource change and organizational structure change play a fundamental role in organizational change, which is relatively easy for enterprises to accept.

5.2. Representation of Research Findings and Construction Case Company Performance

The personnel of construction enterprises, including senior managers, heads of functional departments, project managers, technical leaders, and university researchers each selected concrete examples of digital environment, organizational change, organizational performance, and digital culture in construction enterprises from 1999 to 2018. For example, in 1999, new technologies and new systems emerged in the digital environment in the construction sector; organizational performance was treated in a simplistic way and was measured by the gross profit of the net assets of the enterprise in that year. If the values were missing in that year, they were treated as the average of similar enterprises in that year.

The following are key examples of research concepts that have emerged in different companies each year. Key words selected of the digital environment in each year: computers as everyday office equipment, computer-aided drafting (CAD, the first in a series of software, the same below), access to the internet, adoption of costing software such as Godspeed, computerised accounting, ERP software adoption, P3 project management software adoption, establishment of corporate websites, WEB 2.0, smartphones, Internet of Things, big data, information platforms, shared platforms (B2B, B2C set up or joined), BIM, BIM4D, BIM5D, smart materials, smart projects, smart cities, digital construction, assembled buildings, mobile payments, internet finance, 2G, 3G, 4G, 5G, cloud computing, 3D printing, digital supervision, artificial intelligence.

Keywords selected of organizational change in each year: bureaucratic, linear, functional, matrix, project-oriented, reticulation, flat, substitution, project manager responsibility system, use of project financing models, participation in projects such as BOT, team-based, virtual structure, borderless organisation, implementation of full process consultancy integration, participation in general contracting, participation in EPC (turnkey projects), merger with construction companies, merger with design institutes merging with construction companies, merging with design institutes, merging with supervision companies, merging with labour companies, project teams being responsible for project

financing, using the “crowdfunding” model, using the “crowdsourcing” model, setting up a digital marketing department, setting up a digital research and development department, and creating an innovative team system within the company.

Keywords selected of organizational culture in each year: integrity and law-abiding, hard-working, hardship, unity culture, building quality products, attention to detail, QQ groups, corporate BBS, WeChat exchange groups, social networks, sharing and common prosperity, enhancing customer value, open innovation, harmony and nature, sharing opportunities and resources.

Keywords selected of organizational performance in each year: gross margin of net assets for each year of the enterprise.

Based on the questionnaire, this study judged whether the digital environment faced by the enterprise was above average. This study also judged whether organizational change and the corporate culture management level were above average too. Each enterprise received 199 votes for all three levels (i.e., more than 70% considered it to be above average). The total number of enterprises that met all three criteria was 52, and these enterprises were placed in one group, which was recorded as Group A. Each company received 199 votes for all three levels (i.e., more than 70% considered them to be below the average) and was placed in a group of 93 companies, which were classified as Group B. The other less differentiated companies were discarded as a fuzzy sample, totaling 139 companies, which were recorded as Group C. Organizational performance was based on objective gross net asset margin. The data for Groups A and B (mean values) are shown in Figure 2.

It can be seen from Figure 2 that, when carrying out better organizational changes and corporate digital culture construction, the performance of Group A companies is getting better and better in an increasing digital environment. The gross margins have improved significantly since 1999, especially in 2008 after the global economic crisis. Group B companies, on the other hand, had good gross margins until 2007 before they declined. After 2013 in particular, the gross margins of Group A companies exceeded those of Group B companies, and since then the gap between the two groups has grown. Therefore, cultivating digital environment has significant and positive social value, and enterprises should realize the urgency and importance of organizational reform and cultural construction adapted to digital environment.

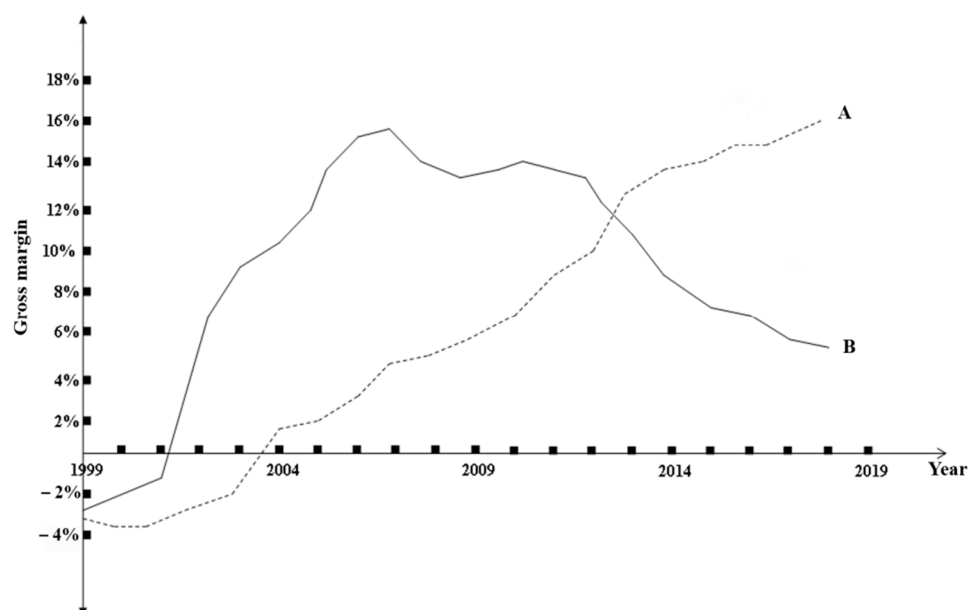


Figure 2. Group A and Group B Gross Margin Change Curve by Year.

6. Research Conclusions and Prospect

This paper summarizes the characteristics of the digital environment and analyzes the importance of the construction of the digital environment. The author of this thesis puts forward the important content of organizational change and constructs the impact model of organizational performance in the digital environment. The conclusion drawn from the analysis of the collected questionnaire data is: digital environment has a positive effect on organizational performance; the more perfect the enterprise digital environment becomes, the better the organizational performance becomes; digital environment has a significant positive effect on organizational change. Meanwhile, in digital environment, organizational change significantly improves organizational performance; organizational change plays a significant mediating role in the process of digital environment. The more mature the digital organizational culture becomes, the more significant the mediating effect of organizational change is. In addition, combined with the data of construction enterprises and industry, this paper determines the influencing mechanism of “digital environment—organizational change—organizational performance”, and reveals the influencing path and heterogeneous effect of the digital environment, organizational change, and digital organizational culture on organizational performance. Because the research is based on the empirical results obtained by the construction industry and enterprises, construction enterprises have strong project-oriented characteristics. Whether it is universal in the industry needs to be verified in other industries.

The research is mainly based on the data collected by the survey questionnaire. The subjective knowledge and judgment of the questionnaires have a great influence on the research results. Especially, some subjective data spanned 20 years, which has a great influence on the reliability of this research. Therefore, subsequent research should be carried out with a combination of financial data, expert judgement, and in-depth research data from individual companies in terms of data collection.

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