A Study on the Factors Influencing the Modernization of Social Governance Based on Data Intelligence: Take Western China as an Example

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Abstract. The new generation of digital technology uses data as a new production factor and strategic resource, which is deeply integrated with social governance. It also drives the intelligent transformation of social governance concepts, institutional systems, organizational structures, and governance models. However, due to immature technology, reliance on algorithms and equipment, social governance innovation and development still face many challenges. This paper takes Western China as the research area, analyzes the difficulties and influencing factors of current social governance, and discusses the practical path to improve the modernization level of social governance. The study found that Western China urgently needs to scientifically build a top-level governance system, promote data opening and sharing, strengthen the construction of grass-roots governance systems, strengthen security and privacy protection, and reserve interdisciplinary social governance talents to ensure that digital technology effectively promotes the modernization of governance in western China.

Keywords: social governance; digital technology; empirical analysis; Western China

1 Introduction

The level of social informatization has improved to a never-before-seen degree with the vigorous development and widespread application of the new generation of digital technology clusters represented by Big Data, 5G network, Web3.0, and artificial intelligence, which has accelerated the development of China's social governance in the direction of intelligence. On the one hand, the iteration and improvement of the new generation of digital technology, along with the gathering and archiving of massive data, offer strong technical support and rich digital assets for the intelligence of social governance; on the other hand, the practical demand for innovative changes in social governance in the new era also urgently needs to develop towards integration, intelligence, refinement, and rule of law. In other words, the new generation of digital technology is an important foundation and necessary path for achieving precise, efficient, and intelligent governance in social governance.

In the academic community, there is a wealth of research on the application of digital technology in the field of social governance, and has formed a research pattern of multiple fields, dimensions, and themes [1]. However, existing research has mostly focused on areas

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such as governance theory, governance systems, and practical paths. Few studies have explored the influencing factors of the modernization level of social governance from an empirical analysis perspective, and no empirical work has been found on the influencing factors of social governance in the western region. Therefore, In order to provide some helpful references and workable suggestions for promoting the modernization of social governance in western China, this paper comprehensively analyzes the challenges and influencing factors faced by the current social governance innovation in Western China. It also discusses the practical path to improve the level of social governance modernization.

2 The Dilemma of Social Governance in Western China

2.1 Insufficient top-level design and incomplete overall framework

Traditional social governance centers less on cross-regional business processing and data flow and more on regional, industry, or departmental boundaries. Big data's era ushers in an open social governance environment, more intricate business procedures, and improved data flow. In this situation, conflicting value demands of various social units provide new problems for social governance and public decision-making [2]. It is obvious that the fragmented governance model of the past cannot change to meet the demands of modern social governance. Although the western region has acknowledged the significance of the new generation of digital technology, the modernization of social governance has been severely hampered by inadequate overall planning, a lack of overall governance thinking, and an incomplete overall framework.

2.2 Low level of data openness, insufficient data security and privacy protection [3]

Compared to the current data demand for social governance, the openness and sharing of data in the western region is still insufficient. There are issues such as compatibility and integration of multi-source heterogeneous data between different industries and departments, insufficient protection of data security and personal privacy leakage during data collection, circulation, and sharing, and insufficient refinement of data standards and relevant legal provisions [4].

2.3 Inadequate multidisciplinary social governance expertise and technical support

The modernization of social governance necessitates multidisciplinary talent with expertise in a variety of fields, including social governance, economics, data science, ethics, and law. Due to a lack of interdisciplinary technical talent, some locations and fields continue to manually collect and process governance data using traditional technologies and methods, which has a direct impact on the development of social governance capabilities due to its high costs, low efficiency, and error-prone nature [5]. A shortage of data resource creation and utilization are also caused by a lack of Big Data strategic thinking and digital technology assistance.

2.4 Uneven growth of social governance between provinces, cities, and grassroots levels

According to the "Research Report on the Development of Digital Government in China (2021)" published by Tsinghua University, the development of provincial-level digital governments is basically characterized by strong in the east, moderate in the middle, and weak in the west. There are significant development differences in the level of intelligent social governance among different provinces, municipalities, and grassroots levels in the western

region. For example, Sichuan and Guizhou rank fifth and seventh respectively in the comprehensive ranking, while Gansu, Tibet, Yunnan, Xinjiang, and Qinghai rank last five; Grassroots are difficult to adapt to the requirements of data governance, and there are problems such as insufficient infrastructure, talent reserves, and low data quality.

3 Models, Variables, and Data Sources

3.1 Models

According to the research purpose of this paper, and drawing on the existing research results of domestic and foreign scholars in related fields [6-8], the research is carried out on the factors affecting the development level of social governance in Western China. The provincial government is taken as the analysis unit, and the selected data is the cross-sectional data, and the dependent variable is a continuous variable. Therefore, this paper uses Ordinary least squares (OLS) regression model for empirical analysis.

3.2 Variables

3.2.1 Dependent Variable

In order to avoid the inexplicable research results from unidirectional research, this article selects the evaluation results of the provincial digital government development index in the 2020 Digital Government Development Index Report to measure the level of social governance development [7].

3.2.2 Independent Variable

The study selects five independent variables, namely, economic transformation development level, big data development index, information infrastructure, financial resource supply and R&D expenditure. Table 1 gives detailed calculation methods and data sources.

Table 1. Relevant Variables and Data Sources

Variable Type	Variable Name	Calculation Method	Attribute	Data Source
Dependent Variable	Var1: Social Governance Development Index	Comprehensive calculation	/	Digital Government Development Index Report(2020)
Independent Variable	Var2: Economic Transformation Level	The tertiary industry value /GDP	+	China Statistical Yearbook(2020)
	Var3: Big data Development Index	Big data regional development level index	+	China Big data Regional Development Level Assessment Report(2020)
	Var4: Information Infrastructure	Support readiness of Information infrastructure	+	China Big data Regional Development Level Assessment Report(2020)
	Var5: Financial Resource Supply	Financial budget expenditure /GDP	+	China Statistical Yearbook(2020)

	Var6: R&D Expenditure	R&D expenditure/GDP	+	China Science and Technology Statistical Yearbook(2020)
Control Variable	Var7: Total Population	Total population of each province	/	China Statistical Yearbook(2020)
	Var8: GDP	Per capita GDP	/	China Statistical Yearbook(2020)

Note:"+" and "-" respectively indicate a positive or negative correlation between the independent variable and the dependent variable

3.2.3 Control Variable

In order to exclude the influence of other factors on the empirical results, this article sets two control variables: population size and regional economic development level. Among them, the population size is measured by the total population of each province at the end of the year, and the regional economic development level is measured by the per capita GDP of each province.

3.3 Data source and description

This paper conducts empirical research based on the social governance related data of 12 western provinces and regions in 2020. All data are from China Statistical Yearbook, China Science and Technology Statistical Yearbook, Digital Government Development Index Report and China Big data Regional Development Level Assessment Report.

4 Empirical Analysis

4.1 Descriptive Statistics and Correlation Analysis

The descriptive statistical results for the variables are shown in Table 2. The analysis found that the range between the data governance development index and the Big data development index is relatively large, indicating that there is a relatively significant difference between the data governance level in Western China and the Big data development index in recent years.

Table 2. Descriptive Statistics of Variables

Variable Name	Mean	Standard Deviation	Minimum	Maximum
Var1	51.34	10.24	39.60	68.60
Var2	0.5143	0.0217	0.4814	0.5531
Var3	20.37	7.63	11.40	36.89
Var4	24.58	3.26	20.38	30.85
Var5	0.8065	0.1951	0.5390	1.1958
Var6	0.0250	0.0149	0.0044	0.0538
Var7	3192.33	2253.00	366.00	8371.00
Var8	55228.62	11818.44	35904.44	78034.90

The correlation analysis of all variables is shown in Table 3. The results show that the data governance development index and independent variables are basically the same as the expected results. The results show that the data governance development index and independent variables are basically the same as the expected results, except that the level of economic transformation development is negatively correlated but not significant, which indicates that the development of the Tertiary sector of the economy has a low correlation with the data governance development index. The results of the collinearity test show that the variance expansion factor (VIF) of the relevant variables is less than 7, and the average value is 4.320, which means that they pass the multicollinearity test.

Table 3. Variable Correlation Analysis

Variable Name	Var1	Var2	Var3	Var4	Var5	Var6	Var7	Var8
Var1	1							
Var2	-0.098	1						
Var3	0.845***	-0.063	1					
Var4	0.826***	0.071	0.965***	1				
Var5	0.835***	-0.179	0.988***	0.927***	1			
Var6	0.458	-0.269	0.689**	0.626**	0.721***	1		
Var7	0.588**	-0.033	0.843***	0.846***	0.812***	0.478	1	
Var8	0.599**	-0.127	0.879***	0.861***	0.855***	0.627**	0.956***	1

4.2 Regressive Analysis

Table 4 presents the analysis results of different regression models. The P-values of the M1, M2, M3, and M4 models are 0.0035, 0.0083, 0.0690, and 0.0960, respectively. The models all passed the significance test, indicating that the results have good interpretability.

Table 4. Regression analysis results of social governance development level

Variable Name	M1	M2	M3	M4
Var2	-2.0715 (8.2098)	—	-5.4334 (14.5226)	-2.6241 (7.3454)
Var3	0.8416*** (0.1783)	—	0.3445* (3.1354)	2.9557 (3.2402)
Var4	—	0.2902 (0.4753)	0.3645* (1.0667)	0.4809* (0.9343)
Var5	—	3.9172* (2.7432)	1.7509 (2.9066)	8.6327* (1.5977)
Var6	—	1.8476 (1.7324)	1.9202* 2.0072)	1.9169 (2.0116)
Var7	—	—	—	-0.8105 (0.4145)
Var8	—	—	—	-0.2174 * (0.2830)
_Cons	1.0654 (4.2258)	-2.697* (2.0459)	1.8625 (16.2207)	18.0482 (18.5891)
Sample Zize	12	12	12	12
F	11.30	8.08	3.76	4.08
R^2	0.7151	0.7519	0.7580	0.8773

Note: "***", "**", and "*" indicate significant at the 1%, 5%, and 10% significance levels.

5 Conclusion

Currently, social governance is undergoing a process of transformation from dominance, simplicity to invisibility, and complexity [8]. The risks of social governance tend to become invisible and complex, and the difficulty of social governance continues to increase. Due to the low level of social and economic development as well as the application of artificial intelligence in the western region, and the influence of residents' education level and ethnic minority cultural concepts, there are differences in the level of social governance between the urban and grassroots levels in the western region. In order to promote the intelligent transformation of social governance in new forms and tasks, combined with the conclusions of the previous empirical analysis, this article proposes several policy recommendations as follows:

(1) Building a top-level governance system scientifically and enhancing the overall governance scheme. It includes the following three aspects: firstly, scientifically constructing the top-level design of social governance, establishing a standardized, collaborative, interconnected, and efficient social governance system; The second is to improve the linkage mechanism through emerging technologies, achieve process innovation, and actively promote overall governance; The third is to restructure the governance power and responsibility system, strengthen the resource guarantee for local institutional innovation and implementation, and improve the social governance system of co construction, co governance, and sharing.

(2) Promote data openness and sharing, and stimulate the core driving force of digital governance. It mainly involves three aspects: firstly, to make a top-level plan for data management, achieve efficient data collection, multi-source heterogeneous data fusion and processing, and establish an information sharing mechanism; Second, accelerate the deployment of digital infrastructure construction such as 5G and gigabit broadband, and improve the readiness of Information infrastructure; The third is to promote the development of high-quality data centers and establish an advantageous basic environment for regional digital development.

(3) Enhance the digital literacy of the entire population and reserve interdisciplinary social governance talents. In particular, first of all, the government should strengthen the digital thinking of cadres and improve their digital leadership skills. Second, the country should focus on the needs of special groups such as the elderly and disabled, so that the digital dividend can benefit the entire population. Third, universities should fully draw on the experience of domestic and foreign social governance talent cultivation, actively explore interdisciplinary social governance talent cultivation models, and reserve talents for promoting the modernization of social governance development.

(4) Strengthen the construction of grassroots governance system and coordinate the coordinated development of the city and grassroots. It includes breaking down the existing data barriers at the grassroots level and achieving common and shared data; Improve grassroots management systems, relevant laws and regulations, and regulatory mechanisms; Regard the city as the basic unit of social governance, and fully leverage the engine and radiation role of the city as a driving force at the grassroots level.

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