

The Relationship Between Political Leader's Personalities and Regional Social Governance Modernization

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Abstract

The study aims to investigate the relationship between the personalities exhibited by party and government leaders and the modernization of regional social governance. It aspires to offer novel insights to empower the local governments of Chinese provinces, thereby assisting them in augmenting the modernization of social governance.

Led by upper echelons theory, we proposed an analytical framework to explore the relationship. We firstly collected the texts of the activity reports of the leaders in 31 provinces of mainland China during the years 2018 to 2020. Their personalities were discerned through the application of Latent Dirichlet Allocation (LDA) topic modeling and principal component analysis. Integrating the dimensions of processes and outcomes, we then devised an evaluation system to assess the level of regional social governance modernization. The system underwent a comprehensive evaluation employing principal component analysis. Finally, we employed regression analysis and the Quadratic Assignment Procedure (QAP) regression analysis to quantitatively assess the effect of political leader's personalities on the modernization level of regional social governance.

According to our results, the personalities exhibited by political leaders could be classified into six dimensions, aligning with the framework proposed by Holland vocational interest theory. We revealed that the six types of personalities indeed exert influence on the modernization of regional social governance. However, compared to the effect of environmental factors such as economic conditions and the availability of skilled personnel, their explanatory power is relatively weaker. Among the identified personalities, the leaders displaying realistic and research-oriented personalities demonstrate a heightened capacity to yield substantial positive impacts on social governance modernization. Additionally, social personality also plays a discernible role in the context. Furthermore, the amalgamation of political leaders' personalities illuminates a nuanced picture marked by moderate influence and intricate complexity.

Keywords: personality, political leader, social governance modernization, local government, LDA topic model

1. Introduction

China has witnessed a remarkable stride in the economic and social development since the reform and opening up. However, the trajectory of progress is now challenged by new social contradictions. In response to the new challenges, the leadership of the Communist Party of China (CPC) and Chinese governments has undertaken a process of conceptual innovation and governance enhancement. The impetus for the innovation was introduced in the 3rd Plenary Session of the 18th CPC Central Committee, where the idea to augment the governance capacity for modernization was promulgated. The pivotal concept was reiterated at the 4th Plenary Session of the 19th CPC Central Committee, culminating in the practical execution of endeavors aimed at advancing the modernization of social governance, primarily at the municipal and local levels. The promotion of regional social governance modernization has now crystallized as an integral imperative within the broader context of the development and refinement of national governance system.

Prior research pertaining to the modernization of regional social governance predominantly centered the attention in

public management, political science, policy study, and sociology. For instance, in the realm of public management, Song (2016) postulated that social governance modernization necessitates the establishment of a comprehensive system encompassing social control, social service, and social construction. In the purview of political science, Cai (2021) contended that the augmentation of social governance modernization hinges upon the establishment of an efficacious governmental and social governance framework. This encompasses the modernization of key governance components including governing entities, methodologies, procedures, mechanisms, and the overall sociopolitical environment. From policy perspective, Lin et al. (2020) and Zhou (2021) contended that the central tenet of modernizing social governance resides in the resolution of paramount social contradictions and challenges characteristic of the contemporary era, such as those pertaining to social security and the aging demographic, achieved through policy enhancements and optimizations. In sociology, Du (2020) advanced the principle of prioritizing the welfare of the public in the framework of social governance, while Wang et al. (2019) advocated the utilization of big data technology as an instrumental means for enhancing the modernization of social governance.

Prior studies exhibited a pronounced proclivity towards the content and dimensions of social governance modernization, thereby sidelining the examination of foundational antecedent elements. In this regard, Chen and Li (2023) advanced the notion of "party leading social affairs", underscoring the role played by the leadership of CPC in effectuating the efficacy of modernized social governance. Furthermore, through an illustrative case study focused on the pioneering initiatives in local governance in Zhejiang province, China, Wei (2021) discerned that the formidable leadership of the party stands as the principal advantage for local governance entities in optimizing their social governance capacities. In a complementary vein, Ma (2020) posited that the bedrock of effective social governance in counties rests upon the caliber of team leaders, with the governance aptitude of county party secretaries constituting the linchpin for the seamless advancement of the overarching objective of governance modernization. Concurrently, He and Wang (2023) accentuated the salient roles of secretaries and the practice of party building in the context of modernizing grassroots-level social governance. Hence, the local government assumes the central role in the reform of modernizing social governance, with local party and government leaders serving as the principal agents responsible for the implementation and execution of transformative initiatives in social governance modernization. It is imperative to recognize that the preference, attitude, conceptualization, and capabilities of these leaders are intrinsically linked to and exhibit a substantial correlation with the modernization of social governance in regions (Wu and Duan, 2018).

The involvement of party and government leaders in the advancement of regional social governance modernization can be elucidated through the lens of upper echelons theory. The theory posits that various factors, including the cognitive capacity, value, and psychological inclination of an organization's top-tier executives, assume a pivotal role in the process of making strategic choices in the organization. Consequently, these factors exert a profound influence on the organization's business performance and its ability to sustain developmental progress (Hambrick and Mason, 1984). In a province or city, the individuals holding the positions of the committee secretary and governor effectively function as top-tier executives. Their intentions, decisions, and behaviors are intricately tied to the strategic development of the region. Furthermore, the behavior theory posits that attitudes, intentions, and behaviors serve as outward expressions of an individual's innate personalities, with them acting as prognosticators of the individual's distinctive style and performance (Balali et al., 2010). When an organization undergoes a period of transformative change, specific personalities exhibited by top management team, such as optimism, humility, openness, innovation, self-confidence, and even narcissism, can wield a decisive influence over the ultimate success or failure of the change initiative (Tuwey and Ngeno, 2019; Wu and Gong, 2018).

In summary, previous scholars have conducted rich qualitative analysis the interpretation of the connotation of modernization of regional social governance, the path of inquiry and system construction from the perspectives of different disciplines such as public administration, political science, policy science, and sociology. However, there is relatively little quantitative analysis on the modernization of regional social governance. In addition, prior studies have overly focused on the content and process dimensions of modernization of social governance, while relatively neglecting the influence of the behavior of party and government leaders who lead to the modernization on the implementation and execution of governance changes involving regional social governance modernization. Hence, in order to address the limitations of prior studies, the study planned to develop the theory in terms of three aspects. First, based on the behavior theory to make a reverse derivation, we proposed that the personalities of political leaders can be inferred from their participation in different activities. The study developed a method to measure the personalities of party and government leaders by establishing the LDA topic model on basis of analyzing the texts of activity reports of the leaders in 31 provinces. Second, the study provided a comprehensive evaluation of the development level of regional social governance modernization in 31 mainland Chinese provinces based on process and outcome

dimensions. Finally, it integrated the upper echelons theory and behavior theory to put forward the research hypothesis that party and government leaders' personalities are correlated with the development level of regional social governance modernization, and empirically tested the hypothesis with data. The academic contribution of our study is twofold. On the one hand, it constructed the LDA theme model to analyze the theme clustering of the text of leaders' activity reports, which provided a new method for analyzing the personalities of party and government leaders. On the other hand, the study constructed a regional social governance modernization evaluation index system and verified the research hypothesis that party and government leaders' personalities are related to the level of regional social governance modernization, enriching the empirical results of social governance modernization. In addition, our results and findings had important practical implications. They guided and informed the theoretical advancements and practical enhancements in the context of modernizing regional social governance in China. Additionally, the research equipped stakeholders with valuable insights to align individual personalities with the objectives in the framework of selecting and promoting political leaders.

2. Methodology

2.1 Methods

First, the measurement of political leader's personalities. Owing to the inherent challenge in directly acquiring personality data of political leaders via questionnaires, we applied a theoretical framework rooted in behavior theory. It postulates that the decision-making preferences and observable conducts of the leaders in their various engagements may offer insights into their underlying personalities. Texts sourced from official reports on the activities participated in by the leaders were subjected to topic analysis. Subsequently, the method of principal component analysis was employed to extract and denominate the principal components, thereby elucidating the dimensions of personality and their scores. The selected method for topic analysis is the LDA model, an unsupervised machine learning approach that identifies latent variables or obscured structures within data through clustering. The model adeptly discerns potential topics within extensive textual data, proving to be well-suited for the cluster analysis of unstructured report texts in the study (Chen and Li, 2019).

Second, the method for comprehensively evaluating regional social governance modernization. Our study delved into a comprehensive evaluation of the developmental status of regional social governance modernization. The analysis involves a profound exploration of the nuances in social governance modernization, culminating in the establishment of a sophisticated analytical framework integrating processes and outcomes. In the framework, an intricate evaluation index system was meticulously crafted. To navigate the complexity of the evaluation, we employed the method of principal component analysis. It serves as a robust method for dimensionality reduction, enabling the amalgamation of numerous correlated indicators into a concise set of independent and comprehensive variables through rotation (Li, 2011). The method is particularly pertinent in our study due to the intricate interconnections between indices, arising from the inherent logic between process and outcome. By employing the method, our research derives nuanced scores reflecting the developmental levels of social governance modernization across the 31 regions in mainland China.

Third, the examination of the relationship between leaders' personalities and regional social governance modernization. In order to measure the relationship, two statistical methods were employed, i.e., correlation analysis and regression analysis. Correlation analysis was enlisted to unveil the presence of any discernible patterns in the synchronous changes between leader personalities and regional social governance modernization. Regression analysis enhanced our understanding by providing a more precise estimation of the relationship, accomplished through the introduction of control variables. We employed not only hierarchical regression analysis but also the QAP regression analysis. It is an analytical method specifically tailored to examine relationships between relations and is particularly adept at exploring correlations within matrices (Liu, 2007). In our study, hierarchical regression analysis serves to gauge the explanatory capacity of leaders' personalities in relation to the modernization of regional social governance. QAP regression analysis was harnessed to delve deeper into the question of whether the variance in personalities among political leaders in each region can elucidate the disparities observed in the social governance modernization within the regions.

2.2 Evaluation Index System

Social governance modernization stands as a pivotal component in the context of China's national governance system modernization. Placing the public at the forefront of governance is the foundational and ultimate objective of Chinese governance paradigm. The imperative of aligning social governance consistently with people's fundamental interests, addressing people's ever-evolving needs for an improved quality of life, and fortifying people's sense of happiness, prosperity, and security in a lasting and resilient manner are prerequisites for advancing social governance

modernization. In essence, the modernization is intrinsically focused on the amelioration of the quality of people's life and the enhancement of their well-being (Zhang and Luo, 2022). In light of the imperatives, we undertook the construction of an evaluation framework for assessing the level of regional social governance modernization. It encompassed two dimensions: the process dimension, which includes the assessment of government services, economic development, and ecological preservation, and the outcome dimension, which encapsulates the evaluation of people's quality of life, the state of social security, and the progress in urban-rural integration.

First, the process dimension. The modernization of social governance has undergone a profound transformation, driven by evolving governance paradigms and the advancement of governance technologies. The transformation is discernible in three ways. a. Governmental governance. The shift in focus from control-oriented to service-oriented governance marks a notable development. The transition from single-type to integrated public services, coupled with a continuous enhancement of government services and governance capacity, has been instrumental in the transformation. b. Economic governance. The objective of economic development has transitioned from a mere pursuit of high growth to a more nuanced pursuit of high-quality development. The shift entails a departure from labor-intensive and loosely structured economic models to the talent- and knowledge-intensive approaches, as well as modernized and standardized operations. Hence, the sustainability of economic development has experienced a notable augmentation. c. Environmental governance. The advent of the post-industrial era and the proliferation of service and platform-based economies have significantly bolstered the sustainability of economic development. The transformation is underscored by the shift from a predominantly reactive stance towards environmental pollution control to a proactive posture characterized by ecological restoration and protection. Recent years have witnessed a discernible shift in Chinese approach. In terms of specific initiatives, regions across the nation were deeply engaged in the cultivation of ecological civilization and the promotion of low-carbon economies. Furthermore, there was a comprehensive drive towards fostering greater coordination and promoting green development across the intersecting domains of society, economy, and ecology.

Second, the outcome dimension. CPC has steadfastly adhered to the principle of people-centered governance. In recent years, amidst rapid economic development and technological advancements, the landscape of social conflicts and development pressures has undergone notable transformations. Nevertheless, through the implementation of healthcare reform, targeted poverty alleviation efforts, and rural revitalization programs, etc., the Chinese government has effectively safeguarded the well-being and contentment of the public. The commitment has yielded remarkable developmental achievements across the domains of residents' livelihoods, social security, and the convergence of urban and rural spheres. In terms of residents' livelihoods, the nation has witnessed an elevation in educational standards, improvements in both the scale and quality of employment opportunities, gradual enhancements in pension and medical services, and a notable upswing in residents' incomes. Regarding social security, a robust framework for ensuring a minimum standard of living for residents has been successfully instituted. The social security system has displayed a capacity for adaptation and refinement, resulting in a continuous improvement in the well-being of the public. Concerning urban-rural integration, a dynamic two-way exchange of factors between urban and rural areas has emerged, fostering the reinvigoration and development of rural regions. It has led to a tangible reduction in the developmental disparities between urban and rural regions.

In order to evaluate the level of regional social governance modernization, we devised a comprehensive process-outcome analytical framework. It draws upon the findings of the *Research Group on the Construction of Modern Indicators for Social Governance* (2019), Lan and Wang (2020), and Huang and He (2022). Our methodology involves the meticulous selection of indices for each of the six aspects pertaining to the social governance modernization. The indices collectively constitute an evaluative system, permitting a holistic assessment of regional social governance modernization. The resulting index system was structured into two dimensions, comprising the process and outcome categories, each encompassing three indices. In total, we identified six indices as follows. a. Comprehensive score for the assessment of integrated government service capability. It serves as a gauge of the modernization level of governmental public services. b. Percentage of output value attributed to the tertiary industry. It provides insights into the degree of modernization in economic development. c. Urban green coverage. It is a crucial measure of environmental governance modernization. d. Per capita disposable income. It offers insights into the living standards of residents. e. Minimum subsistence guarantee for urban residents. It reflects the state of social security. f. Urbanization rate. It signifies the level of urban-rural integration and development. All indices are positively oriented, forming a comprehensive framework for the assessment of regional social governance modernization.

2.3 Materials and Data

Our research extends to the 31 provinces in mainland China, from 2018 to 2020. It is essential to acknowledge that deputy leaders in party committees and local governments typically operate in the confines of their designated areas of responsibility, where their actions are predominantly shaped by their official roles and duties. Consequently, the relationship between their conduct and inherent personalities is relatively attenuated. In contrast, principal leaders wield greater decision-making authority, yet their active involvement in various activities is selectively dictated by constraints such as limited time and energies. Consequently, their preferences and behaviors in engaging with the activities can serve as indicative markers of their underlying personality attributes. In light of the consideration, our sample selection process for political leaders is tailored to encompass individuals who have held their respective positions for a minimum duration of one year within the specified time frame. This translates to the inclusion of party leaders, namely provincial secretary, and government leaders, e.g., governors or mayors.

The primary dataset, encompassing information regarding the personalities of political leaders as inferred from their participation in various events, was obtained through web scraping from the official government websites representing the 31 regions of China. In the context of assessing the modernization of regional social governance, we drew upon a set of key indices. They were sourced from authoritative publications, including the Chinese Statistical Yearbook, the Chinese Social Statistical Yearbook, and the localized statistical yearbooks of each region. The comprehensive evaluation of integrated government service capacity was based on data extracted from the Report on *the Survey and Assessment of the Capacity of Provincial Governments and Key Cities in Integrated Government Services (2021)*. The report, an authoritative publication, was disseminated by the *e-Government Research Center of the Central Party School*.

In order to enhance the robustness and reliability of the study's results, the analysis employed the three-year average data spanning from 2018 to 2020 as the foundational sample dataset. All data underwent a thorough preprocessing procedure, which included addressing extreme values. It was undertaken with the purpose of mitigating potential biases in the estimation resulting from singular extreme values and extreme minima on the research findings. In order to conform to the prerequisite that variables are squared in the context of the QAP regression analysis, the inter-variable disparities were transformed into a relationship matrix. The transformation was executed following the method outlined by Liu et al. (2018), wherein each variable's data was differentially subtracted from one another, yielding a 31×31 order matrix. The matrix featured main diagonal elements uniformly set at zero.

3. Results

3.1 LDA Analysis Results

In order to ascertain the personalities exhibited by political leaders, we conducted a topic analysis on textual data derived from news reports pertaining to the 62 chief leaders participating in events across 31 regions. We instantiated 62 LDA topic models. The LDA analysis encompasses four fundamental phases: data collection and preprocessing, determination of the optimal number of topics, computation of topic intensity, and extraction of comprehensive topics.

a. Data collection and preprocessing. Employing Python we authored a web crawler program to scour the official websites of government authorities in each region. Through it we performed full-text searches for news activities associated with the respective chief leaders. The resultant raw news data primarily encompasses three fields: news release time, news title, and news content. The textual data underwent meticulous processing utilizing Excel, the pandas package, and the jieba package to execute data cleansing, Chinese word segmentation, the integration of customized dictionaries, and the exclusion of stopwords.

b. Determining the optimal number of topics. In the realm of Python, the gensim package equips us with two discerning methods for ascertaining the ideal number of topics: topic confusion and topic consistency. The first one alludes to the extent of uncertainty inherent in the model's capacity to categorize the topics embedded in a document. Lower levels of topic confusion are indicative of heightened predictive prowess and superior model fitting (Wang et al., 2014). Conversely, the second one pertains to the semantic congruity of the high-frequency terms manifested in each topic elicited by the model. Elevated consistency scores correlate with augmented interpretability of the model (Mimno et al., 2011). In a comparative context, topic consistency emerges as the more effective metric for gauging model excellence. Therefore, we adopted the topic consistency score to delineate the optimal number of topics. For instance, when we scrutinized the topic consistency regarding the news activities associated with the provincial party secretary of Jiangxi province, our research findings divulged that the optimal number of topics amounts to 18.

c. Computation of topic intensity. The topics that emerge from the LDA model were visually portrayed through the

utilization of pyLDAvis package, and the topics were systematically distilled and labeled by means of an exhaustive analysis encompassing the distribution of individual topic words and the interrelation between pivotal keywords. In our quest to gauge the relative prevalence of each topic category in the corpus of clustered news texts, the study introduced the notion of topic intensity (Zhang and Ma, 2017). The parameter serves as an indicator of the emphasis accorded by the leaders to their participation in diverse types of events. Heightened topic intensity is emblematic of a greater proclivity and significance attached to a particular topic category of events.

d. Extraction of comprehensive topics. The process of topic categorization applied to the news texts of 62 political leaders has unveiled a multitude of topics characterized by the presence of semantically analogous keywords. To refine the complex topic landscape, we employed a combination of topic visualization and a comprehensive examination of the original news content. Through the analytical approach, we consolidated smaller topics marked by a pronounced overlap in semantic content. Consequently, a total of 17 overarching topics have been distilled and extracted. The topics have been organized in order of their thematic prominence as follows, i.e., industrial collaboration, international cooperation, industrial innovation, technological and talent innovation, business environment, industrial research, project research, poverty alleviation and rural rejuvenation, support and assistance initiatives, epidemic prevention and control and resumption of work and production, mass security and production control, tourism and cultural promotion, grassroots visits and condolences, livelihood governance, social security governance, government affairs meetings, and ecological governance.

3.2 Principal Component Analysis Results

SPSS tool was employed to discern and distill the content indicative of the leaders' personalities in the realm of topic activities. It scrutinized the intensity of 17 topic activities undertaken by 62 political leaders. Six principal components with eigenvalues exceeding 1 were extracted, contributing to a cumulative variance of 65.365%. To enhance the clarity and conciseness of factor interpretations, an orthogonal rotation procedure was administered to the factor loading matrix, utilizing the method of maximum variance. The resulting rotated factor loading, as delineated in Table 1, were generated subsequent to coefficient arrangement in a descending order. The rotation process achieved convergence after 10 iterations.

Table 1. Rotated factor loading matrix

Topics	Principal components					
	F1	F2	F3	F4	F5	F6
Livelihood governance	0.834					
Project research	0.641					
Business environment	-0.467					
Government affairs meetings		-0.721				
Industry research		0.648				
Mass security and production control		0.637				
Social security governance		-0.626				
Ecological governance			-0.794			
Epidemic prevention and control and resumption of work and production			0.704			
Grassroots visits and condolences			-0.647			
Support and assistance initiatives				0.846		
Poverty eradication and rural revitalization				-0.730		
Culture and tourism promotion				-0.474		
International cooperation					-0.916	
Industrial cooperation					0.811	
Technological and talent innovation						-0.734
Industrial innovation						0.481

The table reveals a distinct pattern of topic correspondence among the extracted principal components. F1 primarily

aligns with topics related to livelihood governance, project research, and business environment, characterized by their exploratory and reformative nature, thus meriting the classification as *investigative personality*. F2 is prominently associated with topics revolving around government affairs management, industrial research, safety production, and social security. The topics primarily pertain to routine administrative activities or serve a stabilizing function, are therefore designated as *conventional personality*. F3 encompasses topics centered on ecological governance, epidemic control and prevention, resumption of production, grassroots visits, and condolences, reflecting the multifaceted concerns of the leaders with regard to societal, economic, and ecological aspects. Consequently, it is aptly designated as *social personality*. In a similar vein, F4 predominantly reflects topics relating to support and assistance, poverty alleviation, rural revitalization, and tourism and cultural development. These topics constitute focal points of higher authorities and are integral components of assessment indexes, justifying their classification as *realistic personality*. F5 captures topics associated with international cooperation and enterprise collaboration, both emblematic of the party and government's role in maintaining stability and fostering cooperative development within the enterprise and economic domains. Therefore, it is aptly denoted as *enterprising personality*. Finally, F6 encapsulates topics related to science, technology, industrial innovation, and the overarching emphasis on innovative development, thereby categorized as *artistic personality*.

Upon a comprehensive review of prevailing theories, it becomes evident that they align with the perspectives and substance elucidated in Holland vocational interest theory. The theory segments the personalities exhibited by individuals in their professional domains into six categories, i.e., realistic, research-oriented, artistic, social, entrepreneurial, and conventional. It posits an interrelationship among the personalities and suggests that individuals exhibiting different combinations of the traits are inclined towards distinct occupational preferences. The framework finds wide application in talent selection, career planning, and the facilitation of suitable job matches. Our study established that the personalities of political leaders at both party and government levels can be effectively explicated through the lens of Holland vocational interest theory. It substantiated the assertion that the personalities extracted from news report texts using information mining methods possess robust validity and rationality.

Employing the matrix of component score coefficients, the study computed the personality scores of 62 political leaders. The scores were determined using the least squares method and are presented in Table 2. Owing to spatial constraints, only a segment of the table was included herein.

Table 2. Political leaders' scores on six personalities

Political leaders		Investigative	Conventional	Social	Realistic	Enterprising	Artistic
Beijing	Party leader	3.519	-1.164	2.269	0.739	0.124	0.525
	Government leader	2.575	-0.652	1.917	0.572	-0.914	0.812
Tianjin	Party leader	-1.081	-1.308	-0.344	1.791	-0.227	1.100
	Government leader	-0.321	0.248	-0.407	2.008	-0.865	-0.062
Anhui	Party leader	0.314	-0.606	-0.503	1.084	1.614	2.055
	Government leader	1.036	1.739	0.167	-0.569	-0.165	1.860
Shanxi	Party leader	0.205	-0.368	1.164	0.273	0.842	-1.174
	Government leader	-0.153	1.107	0.951	0.088	0.829	-0.966
Inner Mongolia	Party leader	-0.002	-2.123	-0.208	-0.553	0.756	-0.157
	Government leader	0.579	0.536	-0.258	-1.281	0.657	1.948
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Shaanxi	Party leader	-0.910	-1.518	-0.748	-0.464	-0.943	0.528
	Government leader	-0.648	-0.656	0.312	-0.404	-0.420	0.144
Gansu	Party leader	-1.296	-0.612	0.203	-0.952	-0.742	0.387
	Government leader	-0.387	0.122	0.209	-0.659	-0.578	-0.387
Qinghai	Party leader	0.907	-1.348	-2.063	-0.266	0.058	0.291
	Government leader	1.209	-0.245	-2.827	0.093	-0.147	-0.374
Ningxia	Party leader	1.303	-0.846	1.235	-0.906	0.088	0.319
	Government leader	1.048	0.415	-0.612	0.077	1.480	1.333
Xinjiang	Party leader	-0.127	-0.786	-1.833	-0.421	0.488	0.565
	Government leader	0.290	1.007	-0.667	-1.253	-0.236	0.395

3.3 Evaluation Results

The analysis of correlations among the six evaluation indexes of regional social governance modernization revealed an anticipated substantially high correlation among them. It suggests the appropriateness of employing principal component analysis method for the comprehensive evaluation of the level regional social governance modernization. Following the standardization of the index data, statistical tests including Kaiser-Meyer-Olkin (KMO) and Bartlett's sphericity test were conducted using SPSS. The KMO value, standing at 0.739, and the significance level of Bartlett's sphericity test, which registered at 0.000, indicated the suitability of the data for principal component analysis. Principal components were extracted based on the criterion of eigenvalues exceeding 1. The extraction process revealed that the first two principal components collectively elucidated a significant proportion of the total variance, amounting to 81.835%. The primary component, designated as F1, contributed 55.153% to the variance, while the secondary component, labeled as F2, contributed 26.682%.

Combining component score coefficient matrices and calculating principal component scores, the scores of the principal components F1 and F2 were derived individually through the utilization of the least squares method. Subsequently, relative weights were computed on the basis of the variance contribution rates associated with the two principal components. The weighted average method was employed to ascertain the level of social governance modernization across the 31 provinces, as delineated in Table 3.

Table 3. Results of the evaluation of regional social governance modernization

Provinces	Evaluation scores	Ranking	Provinces	Evaluation scores	Ranking
Beijing	99.83	1	Sichuan	78.29	17
Shanghai	96.51	2	Ningxia	78.11	18
Zhejiang	87.42	3	Hunan	77.77	19
Tianjin	87.17	4	Shanxi	77.69	20
Guangdong	86.84	5	Guizhou	77.48	21
Jiangsu	85.15	6	Guangxi	77.13	22
Fujian	81.71	7	Heilongjiang	76.71	23
Liaoning	80.6	8	Jilin	76.32	24
Chongqing	80.07	9	Henan	76.15	25
Anhui	79.31	10	Shaanxi	75.92	26
Shandong	79.29	11	Yunnan	75.91	27
Inner Mongolia	79.25	12	Qinghai	73.83	28
Jiangxi	79.1	13	Tibet	73.77	29
Hainan	78.78	14	Gansu	73.44	30
Hubei	78.68	15	Xinjiang	73.12	31
Hebei	78.66	16			

To render the level of social governance modernization in a more accessible and comparable format, the data was subjected to a percentage-based transformation. A thorough examination of the table reveals that the top 5 regional rankings in social governance modernization development encompass Beijing, Shanghai, Zhejiang, Tianjin, and Guangdong, each situated within economically prosperous eastern coastal regions. In contrast, the lowest 5 rankings are occupied by Xinjiang, Gansu, Tibet, Qinghai, and Yunnan, representing less developed western regions. The evaluation results substantially align with our initial perceptions and expectations. The congruence underscores the robustness and validity of both our evaluation index system and the selection of the evaluation method.

3.4 Correlation Analysis Results

Utilizing SPSS for Pearson correlation analysis and Ucinet for QAP correlation analysis, we examined the correlation coefficients between the leader personalities and regional social governance modernization across China's 31 provinces, as presented in Table 4. From the table, it got the following findings. a. The Pearson correlation coefficients and QAP correlation coefficients exhibited a fundamental concordance. It indicates the presence of not only a partial correlation between the leader personalities and regional social governance modernization but also a

similarity in the correlations between their distinctions. b. The personalities of political leaders demonstrate a remarkable degree of consistency in their correlations with the level of regional social governance modernization. It suggests that, at the provincial governance level, political leaders tend to manifest convergent externalized occupational personalities. It implies that the imperatives imposed upon them by the drive for social governance modernization foster a convergence of their personalities. c. From the statistical significance level, the investigative, social, and realistic personalities exhibit strong and positive correlations with regional social governance modernization. The strength of these correlations follows a descending order, with the realistic personality displaying the strongest correlation, followed by the investigative and social personalities. In contrast, there is a conspicuous absence of strong correlations between the regional social governance modernization and other personalities. In summary, it emerges that political leaders predominantly manifest personalities characterized by pragmatism, realism, and a proclivity toward research, while concurrently necessitating a discernible degree of social acumen, signifying the presence of social personality in their repertoire.

Table 4. Correlation between leader personalities and regional social governance modernization

Correlation coefficient	Pearson correlation coefficient		QAP correlation coefficient		
	Government leaders	Party leaders	Government leaders	Party leaders	
Political leaders' personalities	Investigative	0.323*	0.473***	0.323***	0.473***
	Conventional	-0.180	-0.040	0.178	-0.039
	Social	0.323*	0.337*	0.328***	0.337**
	Realistic	0.695***	0.556***	0.695***	0.556***
	Enterprising	-0.040	-0.290	0.043	-0.290*
	Artistic	0.060	-0.110	0.061	-0.106

*** $p < 0.010$, ** $p < 0.050$, * $p < 0.100$.

In Holland vocational interest theory, the six personalities are interrelated, displaying distinctions in terms of their proximate, differentiating, and relative relationships. In terms of the proximate personalities, a greater degree of shared characteristics in individual external behavior becomes evident, while in terms of relative personalities, the commonalities in individual external behavior are comparatively fewer. Among the trio of personalities previously cited as positively associated with regional social governance modernization, the realistic and investigative personalities can be categorized as proximate relationships, exhibiting outward characteristics such as a predisposition for critical thinking, a penchant for exploration, humility, constancy, rationality, and a commitment to execution. Conversely, the realistic and social personalities can be regarded as representative of relative relationships, with the former tending to favor independent thinking and action, and the latter placing emphasis on social engagement, ethical values, societal integration, and care. Finally, the investigative personality is indicative of a segregating relationship when considered alongside the social personality.

Therefore, it can be inferred that at the provincial level, the amalgamation of personalities observed in political leaders possesses a high degree of complexity and conveys a golden mean disposition. It is in the framework of personality characterized by qualities of contradiction, balance, and equilibrium that political leaders navigate their decision-making and actions concerning local social governance.

3.5 Regression Analysis Results

We employed a regression analysis to examine the relationship between regional social governance modernization and the personalities of party and government leaders. We introduced several control variables, namely provincial GDP (i.e., economic level), the percentage of the population with a bachelor's or higher degree (i.e., level of higher education), the percentage of the population over 60 years old (i.e., aging), and the unemployment rate (i.e., employment level). We formulated equations for both multivariate linear regression and QAP regression analyses. The results of parameter estimation were presented in Table 5.

Table 5. The estimation results of multiple linear regression and QAP regression analysis

Models		Multiple linear regression		QAP regression	
		Government leaders	Party leaders	Government leaders	Party leaders
Explanatory variables	Investigative	0.176	0.141	0.176**	0.143*
	Conventional	0.078	0.013	0.079	0.012
	Social	0.092	0.091	0.091	0.091*
	Realistic	0.306***	0.287***	0.305***	0.288***
	Enterprising	0.003	-0.169*	0.003	-0.168**
	Artistic	-0.041	-0.079	-0.041	-0.079
Control variables	Economic level	0.397***	0.230**	0.398***	0.229**
	Higher education	0.612***	0.574***	0.613***	0.572***
	Aging rate	-0.188	-0.022	-0.187*	-0.02
	Employment level	0.046	0.012	0.048	0.013
Goodness of fit	R^2	0.901	0.888	0.901	0.888
	$Adj-R^2$	0.852(0.000)	0.832(0.000)	0.900(0.000)	0.887(0.000)

*** $p < 0.010$, ** $p < 0.050$, * $p < 0.100$. The explanatory variables are regional social governance modernization or its inter-regional differences. The regression coefficients for the intercept terms are all 0.000, omitted.

The tabulated results reveal that, subsequent to the inclusion of the control variables, the parameters of the regression analysis exhibit a marked reduction in significance levels when contrasted with the correlation coefficients. The observation suggests that the control variables exert a more robust predictive influence on the dependent variables compared to the independent variables. In essence, while certain personalities of political leaders indeed wield a statistically significant impact on regional social governance modernization, they do not stand as determinative factors. The environmental conditions such as the local economic status and the level of higher education emerge as the more pivotal determinants.

The results of both multiple linear regression and QAP regression analyses exhibited a noteworthy level of consistency. However, it is important to note that a larger proportion of regression coefficients derived from the multiple linear regression results do not attain statistical significance in comparison to those obtained from the QAP regression analysis. The discrepancy can be attributed to the substantial difference in sample size between the multiple linear regression model ($N=31$) and the QAP regression model ($N=961=31*31$). Consequently, while the results of the multiple linear regression and QAP regression analyses mutually support one another, the latter stands as a more robust and reliable method.

Based on the results of QAP regression analysis, the following conclusions can be drawn. a. In elucidating the mechanism through which personalities influence regional social governance modernization, nuanced distinctions emerge between government leaders and party leaders. Specifically, it is observed that the realistic and investigative personalities of government leaders exert a significantly positive impact, while party leaders rely more on their social personality. The distinction may be linked to their distinct responsibilities, primarily centered on the execution of ideological and political coordination. b. The hierarchy of the impact of leader personalities on the modernization of regional social governance, from most to least influential, is as follows: realistic, investigative, and social. The hierarchical order aligns with the findings of correlation analysis, underscoring the significance of humility, stability, and pragmatism in leaders as critical attributes for effective social governance. c. In the context of party leadership, the presence of an enterprising personality may have an adverse influence on the modernization and advancement of social governance. According to Holland theory of vocational interest, an enterprising personality is typified by a strong inclination towards power-seeking and a predisposition for competition. Our findings align closely with the specific occupational demands imposed upon political leaders in their roles and their need to harmonize in Chinese cultural framework. It becomes evident that party leaders who overly prioritize power-seeking and competition may undermine the cohesiveness and unity of the leadership collective, ultimately exerting a negative effect on activities requiring innovation and change, e.g., social governance modernization.

3.6 Hierarchical QAP Regression Analysis Results

We conducted a Hierarchical QAP regression analysis to facilitate a comparative assessment of the individual effects

of distinct personalities. The resulting parameter estimates were presented in Table 6. In the table, M1 and M9 represent the foundational models, featuring only the inclusion of control variables. In contrast, M8 and M16 correspond to the fully saturated models, encompassing all explanatory and control variables. The remaining models in the table represent intermediate models, each featuring a single explanatory variable introduced independently, built upon the foundational model. Upon careful examination of the findings, it is apparent that the hierarchical QAP regression analysis largely aligns with the conclusions derived from the standard QAP regression analysis. Specifically, it continues to affirm the positive impacts of realistic, investigative, and social personalities, while corroborating the detrimental effect associated with entrepreneurial personality.

Table 6. The results of hierarchical QAP regression analysis

Models	Government leaders							
	M1	M2	M3	M4	M5	M6	M7	M8
Investigative		0.112**						0.176**
Conventional			0.105					0.079
Social				-0.074				0.091
Realistic					0.257***			0.305***
Enterprising						-0.018		0.003
Artistic							0.062	-0.041
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.836	0.842	0.845	0.839	0.879	0.836	0.840	0.901
$Adj-R^2$	0.811	0.811	0.814	0.807	0.855	0.804	0.807	0.852
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ΔR^2	0.000	0.006	0.009	0.003	0.043	0.000	0.004	0.065
Models	Party leaders							
	M9	M10	M11	M12	M13	M14	M15	M16
Investigative		0.040*						0.143*
Conventional			0.049					0.012
Social				0.051*				0.091*
Realistic					0.162***			0.288***
Enterprising						-0.062**		-0.168**
Artistic							-0.057	-0.079
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.836	0.837	0.838	0.838	0.855	0.839	0.839	0.888
$Adj-R^2$	0.811	0.804	0.805	0.806	0.826	0.807	0.807	0.832
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ΔR^2	0.000	0.001	0.002	0.002	0.019	0.003	0.003	0.052

*** p<0.010, ** p<0.050, * p<0.100. The explanatory variables are the inter-regional differences of regional social governance modernization. The regression coefficients for the intercept terms are all 0.000, omitted.

In comparison to the findings presented in Section 3.5, the additional insights provided by the results of hierarchical QAP regression analysis primarily pertain to the examination of ΔR^2 . The statistical measure captures the incremental explanatory capacity of the respective explanatory variables in each model, relative to the baseline model. Through an interpretation of Table 6, we derived the following conclusions. a. When we contrasted the results of ΔR^2 from the QAP regression analysis for government leaders and party leaders, it became evident that the former’s personalities significantly contributed more to the advancement of social governance modernization. It aligns with the established norms of administrative governance in China, where government leaders shoulder greater responsibilities and wield more substantial influence in matters related to business affairs. b. The incremental influence of government leaders' personalities on the progress of social governance modernization stands at 6.5%, whereas the corresponding figure for party leaders' personalities amounts to 5.2%. The disparity represents a notable

influence. The realistic personality exerts the most substantial effect, with a marginal contribution rate of 4.3% in the functional mechanism of government leaders.

4. Discussion

4.1 Findings

Drawing upon upper echelons theory, the study posited a theoretical hypothesis that there exists a relationship between the personalities of party and government leaders at the provincial level and the level of regional social governance modernization. The study extensively utilized diverse sources of data and information, including news reports and yearbooks, while encompassing a sample of 31 provinces in mainland China during the period from 2018 to 2020. The research employed statistical testing through correlation analysis, regression analysis, and QAP regression. Upon a meticulous examination of the data, the study arrived at the following principal findings. a. The innovative utilization of web-crawling technology for the acquisition of textual data from news reports, coupled with the application of LDA topic modeling and principal component analysis, yielded an effective extraction of the personalities of political leaders. It represented a noteworthy advancement in terms of both conceptual and technological innovation. b. The study adopted the process-outcome analytical framework, which formed the foundational underpinning for the assessment of regional social governance modernization. The proposed evaluation index system for measuring the level of regional social governance modernization constructed in the ambit of the framework was characterized by its scientific and rational attributes. c. The characterization of the personalities of provincial party and government leaders manifested in six dimensions, i.e., realistic, investigative, artistic, social, enterprising, and conventional ones. The categorization harmonizes with the fundamental tenets of Holland theory of vocational interest. d. Realistic, investigative, and social personalities play a significant and positive role in enhancing the level of regional social governance modernization. The marginal contribution rate of these personalities can be as high as 5.2% for party leaders and 6.5% for government leaders, with government leaders exhibiting a slightly higher effect. e. The realistic personality demonstrates the most substantial effect, followed by investigative and social personalities. Conversely, the impacts of other personalities are comparatively insubstantial. f. Entrepreneurial personality among party leaders do not foster the progression of regional social governance modernization. g. At the provincial level, the amalgamation of personalities among both party and government leaders reveals characteristics indicative of moderation, complexity, and equilibrium. h. Party and government leaders exhibit homogeneity in their respective personalities. i. The level of regional social governance modernization mirrors the pattern of economic development, displaying an east-high and west-low trend. It suggests a similarity between the two in their developmental characteristics. j. While acknowledging the positive impact of the personalities of party and government leaders, it is noteworthy that regional environmental factors such as economic status and higher education level are of paramount importance, often exerting a more significant role in the advancement of regional social governance modernization. The significance of environmental conditions should not overshadow the positive role played by political leaders' personalities.

4.2 Implications

Building upon the findings, we presented the following managerial insights. From an academic perspective, the research introduced a novel avenue of inquiry in the field of public management. It suggested that the foundational determinants of local government strategies, policies, and administrative efficiency can be investigated through the personalities exhibited by party and government leaders. Furthermore, the study served as a catalyst for scholars in information management, encouraging the extraction of personalities of political leaders, corporate executives, and others through the application of text analysis on news reports.

On a technical level, the LDA topic model proposed in our study for the analysis of political leaders' personalities held potential for refinement. The model could find practical utility in the selection, development, and evaluation of political leaders, thus constituting a novel instrument for cadre management. The evaluation indices and methods for regional social governance modernization warranted consideration for the application in the assessment of local government performance.

At the managerial level, it offered valuable insights to guide practitioners in according greater significance to the personalities of prospective candidates during the selection and cultivation of political leaders. It advocated the construction of an information repository encompassing the personalities of senior cadres, enabling the scientific and dynamic management of pertinent data and information. Furthermore, it underscored the importance of acknowledging the potential positive or negative impacts stemming from the political leaders' personalities, thereby fostering a more nuanced perspective on social governance modernization.

For policy improvement, the findings furnished optimization strategies and prescient recommendations for the refinement of human resource management policies. The insights are instrumental in facilitating the advancement and growth of regional social governance in the context of modernization.

In comparison to existing literature, the study made significant contributions in two aspects. First, it introduced a novel method for analyzing political leaders' personalities, culminating in the identification and extraction of six dimensions. The innovative approach enriches and broadens the application of Holland theory of vocational interest. Second, the study empirically validated the research hypothesis positing a correlation between the personalities of party and government leaders and the level of regional social governance modernization. The validation serves to enhance the body of knowledge pertaining to the modernization and development of social governance.

4.3 Limitations and Future Research

The study was not without limitations. For instance, the scope of social governance modernization should be expansive, encompassing multifaceted domains. However, the evaluation index system developed in our study was relatively simplistic, necessitating optimization in terms of both the quantity and quality of the developed indexes. Additionally, the study's approach involves clustering and analyzing all news texts related to activities attended by party and government leaders in a single term of office. However, a more nuanced analysis considering yearly data, as opposed to cross-sectional data, is warranted. The use of panel data in future research endeavors would mitigate potential biases in the inference of causality. Finally, it is imperative to refine the research method and models to bolster the precision with which the core ideas and conclusions of the study are articulated.

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