# An Empirical Study on the Influence of Citizen Information Literacy on Smart City Construction under COVID-19 Epidemic

# Sujuan Zhang\*, Rui Zhang, Zhao Yi

Heilongjiang Bayi Agricultural University, Daqing, Heilongjiang, China \*Corresponding Author.

#### Abstract

**Objectives:** The information epidemic caused by COVID-19 in 2019 makes it difficult to find accurate sources or reliable guidance when people need information. During the outbreak of an epidemic, citizens' information literacy level not only affects people's access to relevant information, but also affects how people take timely and appropriate actions after obtaining the correct information evaluation and utilization and information ethics on urban public health emergencies, and to realize the people-oriented core concept of smart city and improve the construction effect of smart city. **Methods:** Based on the evaluation standard of information literacy for smart city, this paper constructs a structural equation model of citizens' information literacy and smart city for empirical analysis. **Results:** The results show that there is a significant positive correlation between citizens' information literacy information literacy and smart city construction.

Keywords: Citizen's information literacy, smart city, structural equation model, influencing factors

#### I. Background

From 2010 to 2018, China's urbanization rate increased by nearly 10 percentage points to 59.58 in less than a decade [1]. The rapid increase of urban population has brought many problems, such as traffic, health, education and environment, These problems have seriously affected the sustainable development of urban environment and economy and the quality of human life [2]. The smart city concept proposed by IBM has become a good medicine for all countries to solve urban problems, Scholars from different countries study smart cities from different aspects, In terms of the research on the influencing factors of smart city, domestic and foreign scholars have conducted some studies mainly from the aspects of information technology [3], Creative ability [4], intelligent economic level [5,6], intelligent infrastructure, intelligent people's livelihood, intelligent human literacy, intelligent soft environment [7,8], and so on. Li Hongwei et al. proposed five dimensions of influencing factors based on citizens' perception through the investigation of domestic early smart city construction [9]. Previous studies have shown that there are many factors that affect the construction of smart cities in China, and Citizen's Information Literacy is one of the factors affecting the construction of smart cities. However, few scholars pay attention to it. Some scholars suggest that the focus of smart city research should be shifted to citizen participation. [10] However, citizens' willingness and ability to participate are closely related to their information literacy. In the process of using smart city to provide services, citizens will be unable to use the services due to insufficient information capacity, which will damage their personal rights and interests and make them vulnerable groups in the information society, which will affect their participation in smart city. The COVID-19 information epidemic of 2019 has resulted in a massive overspread of information, sometimes accurate information and sometimes inaccurate information, making it difficult to find accurate sources or reliable guidance when people need it [11]. The fundamental way to know, understand and prevent information epidemic is to cultivate and improve public information literacy [12]. By using smart city + information literacy to search in CNKI, only 8 relevant literatures were found, indicating that smart city research lacks attention to the information literacy level of end-user citizens, especially citizens, and there is almost no smart city that takes the improvement of citizens' information literacy as its feature [13]. So what is the relationship between citizen information literacy and smart cities? For this reason, the author chooses Daqing City, which was selected as one of the first national smart city pilot projects in 2013, as

the research object, and tries to conduct an empirical study on the relationship between citizens' information literacy and smart city development through a questionnaire survey

#### II. Conceptual and Theoretical Basis

#### 2.1 Smart city

As for smart cities, domestic and foreign academic circles have not formed a unified understanding. Domestic scholars study and understand smart cities from different perspectives. Such as urban development from the perspective of technology and urban management. Mr. Cheng Siwei once put forward a broad definition of smart city, He think that the construction of a smart city must be based on people, with land as the carrier, technology as the forerunner and capital as the backing [14]. Construction of Smart City is the human and Information Technology, the integration of human informatization and urban informatization, and people-oriented is the core of smart city construction. It is the integration and sublimation of the concept of modern urban sustainable development to take the social environment management as the core element and the ubiquitous green benefit as the main feature [15]. Smart city construction is a construction with goals and evaluation criteria. The development of evaluation standards at different application levels can effectively regulate and promote the construction of smart cities, such as the smart ranking evaluation index of medium-sized cities developed by the European Union, the smart city evaluation standard developed by IBM, and the smart city index system of smart city in Pudong New Area 1.0 smart Taiwan performance index [16]. These indicators reflect the future goals of urban development of countries in different regions. The pricing system of European smart city designed by Giffinger team defines a good smart city from six aspects of smart economy, smart people, smart governance, smart environment, smart life, smart mobility [17]. Referred to the above evaluation criteria of smart city, this study selected four indicators closely related to citizens, namely smart economy, smart citizen, smart government, smart life, to investigate the citizen participation degree in smart city as shown in the figure 1.



Fig 1: Four dimensions of citizen information literacy

#### 2.2 Citizen's information literacy

Information literacy since 1974, when Paul Zekowski, put forward to in 2000, the American association of university and research libraries (ACRL) to develop the higher education of information literacy evaluation standard to the 2015 higher education proposed by ACRL information literacy framework, its concept as the change of information environment and the demand of lifelong learning constantly enrich and more in line with the development of information society. Information literacy education has been devoted to universal information literacy. The United Nations educational, scientific and cultural organization (UNESCO) has been advocating the promotion of public information literacy, believing that citizens' free access to information is a basic human right, and with IFLA many partners such as the European Commission launched a series of advocating the social from all walks of life pay attention to the public declaration of information literacy education, the public the importance of information literacy to rise to promote sustainable development of the society and the height of the United Nations 2030 sustainable development goals.

Information Literacy Standards as a guide to evaluate personal information literacy ability and guide the practice of information literacy education, has high-level reference value and macro guiding significance [18]. This study selected the higher education information literacy evaluation standard developed by the Association of University and Research Libraries (ACRL) as the basis to evaluate the information literacy level of respondents, and selected four dimensions of information acquisition, information evaluation, information utilization and information ethics to examine the information literacy level of citizens. As shown in the figure 2.



Fig 2: Smart city has four dimensions

In the 1980s, literature retrieval courses were set up in colleges and universities in China, which effectively promoted the improvement of the information literacy level of Chinese college students. However, the public information literacy education has not received enough attention, resulting in the overall low level of information literacy of Chinese citizens. With the development of information society, the application of information technology in urban construction is increasing. The construction and development of smart cities require citizens to deeply participate in experiencing the convenience brought by information literacy ability is required to be higher. Improving the information literacy ability of citizens will promote citizens' participation in the construction and development of smart cities and the sustainable development of smart cities.

Based on the above theoretical basis, the author proposes a research hypothesis: there is a significant positive correlation between the information literacy level of citizens and the construction of smart cities, that is, the higher the information literacy level of citizens, the more it can promote the development of smart cities.

# **III.** Construction of Analysis Model for the Impact of Citizen's Information Literacy on the Development of Smart Cities

#### 3.1 Structural equation modeling

The author regardscitizens' information literacy and smart cities as exogenous potential variables and endogenous potential variables respectively; Exogenous observation variable for information acquisition, information evaluation, information application and information ethics, the endogenous observation variable are smart economy, smart citizens, smart government affairs, smart life, The structural equation model of the influence of information literacy construction on smart city, In the model, + indicates that there is a significant positive correlation between two underlying variables. See figure 3 for details.



Fig 3: The influence of citizen information literacy on the development of smart city structure equation

#### 3.2 Construction of measurement model

The measurement model consists of observation variables and potential variables, Citizen's Information Literacy and Wisdom Cities need to be analyzed and determined by their respective observation variables. The measurement model is mainly manifested as an index system that can directly observe the impact of citizens' information literacy on smart cities.

#### IV. An Empirical Analysis of the Influence of Citizens' Information Literacy on Smart Cities

# 4.1 Questionnaire design and data processing

The author adopts the questionnaire survey method to collect effective relevant data to conduct an empirical analysis of the impact of citizen information literacy on smart city. The questionnaire is divided into three parts: personal basic information, the questionnaire for information literacy of citizens, and the questionnaire for smart city. Likert 5-level Likert scale was adopted as the survey scale to indicate the strength of the respondents' attitude. This questionnaire was distributed through Questionnaire Star and 486 questionnaires were collected, excluding invalid questionnaire 60 Number of valid questionnaires 426 Share. After the questionnaire was collected, each item was assigned values of 5, 4, 3, 2 and 1 respectively according to the decreasing form of "very conformable" and "generally conformable" and "very conformable" respectively. SPSS statistical software was used for statistical analysis

# 4.2 Reliability and validity test

#### 4.2.1 Reliability test

Through SPSS software analysis, the Cronbach S $\alpha$  coefficient of citizens' information literacy and the observation variables of smart city is as follows: information acquisition ability is 0.878, information utilization ability is 0.879, information evaluation ability is 0.873, information morality is 0.878, smart economy is 0.899, smart citizen is 0.883, smart government affairs is 0.881, and smart life is 0.885.All of them are greater than 0.8, indicating that the internal consistency of the measurement model is good and can be used for further analysis. As shown in the table1.

Cronbach Reliability analysis						
Nama	Correct items of the total The alpha coefficient		Cronbach alpha			
Inallie	correlation (CITC)	the term removed	coefficient			
Intelligent life	0.652	0.885				
Intelligent government	0.692	0.881				
Smart Citizen	0.687	0.883				
Intelligent economy	0.544	0.899	0.805			
Information ethics	0.716	0.878	0.895			
Information Utilization	0.721	0.879				
Information evaluation	0.769	0.873				
Information Acquisition	0.725	0.878				

#### Table 1 Reliability test

#### 4.2.2 Validity test

Validity tests should be performed by KMO and Bartlett sphere tests to determine whether it is suitable for factor analysis. Through SPSS software analysis, the KMO value of the information literacy measurement scale is 0.942, and the KMO value of the smart city measurement scale is 0.89, both greater than 0.8; The Bartlett sphere test value of information literacy is 3454.555, and the Bartlett sphere test value of smart city is 2795.35, P < 0.5; Both of them meet the standard and meet the requirements of factor analysis.

Factor analysis for information literacy and smart city shows that the cumulative interpretation rate of calculated variance is 75.352% and 65.068% respectively, both of which are more than 60%, indicating that the measurement model has good validity. Table 2 shows the load analysis results of citizens' information literacy factors.

Common feator			
Common factor			
Factor1	Factor2	Factor3	Factor4
. 625			
. 707			
. 756			
. 775			
	. 788		
	. 782		
	. 687		
	. 638		
		. 812	
		. 826	
			. 642
			. 729
			. 886
	Common factor Factor1 . 625 . 707 . 756 . 775	Common factor           Factor1         Factor2           . 625         . 707           . 756         . 775           . 775         . 788           . 782         . 687           . 638         . 638	Common factor         Factor2         Factor3           . 625         . 707         . 756           . 775         . 788         . 782           . 687         . 638         . 812           . 826         . 826

# 4.3 Empirical analysis

Using AMOS20.0 software, the initial structural equation model of the influence of citizens' information literacy level on their smart city development is constructed. In the model, we set the path associated with the error term as 1.

# 4.3.1 Model fitting evaluation

Using AMOS20.0 software, the overall fitting index value of the impact of smart city on the initial structural equation model of citizens' information literacy was calculated shown in the table3. RMSEA TLI and X2/DF values do not meet the rational standard of the model, so the model should be revised.

Table 5 millar structural equation model global fitting muex value								
Overall fitting index	$X^2$	RMR	RMSEA	GFI	NFI	CFI	TLI	X <sup>2</sup> /DF
Ideal Standard Value of	f < 0.05	< 0.05	< 0.05	>0.9	> 0.9	> 0.9	> 0.9	<5.0
overall Fit Degree								
Initial model	0.000	0.035	0.134	0.901	0.916	0.925	0.889	8.675

 Table 3 Initial structural equation model global fitting index value

4.3.2 Model correction

In the model modification, only the parameter release of error variables is considered, as observed variables reflect their underlying variables well, as shown in Fig. 4. Table 4 shows the overall fitting index values of the modified model. The overall adaptability of the model is good, which can be analyzed and discussed as research results.



Fig 4: correction model

<b>Table 4 The overal</b>	l fit index value	of the modified	structural e	quation model
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						-		
Overall fitting index	$\mathbf{X}^2$	RMR	RMSEA	GFI	NFI	CFI	TLI	X <sup>2</sup> /DF
Ideal Standard Value of	< 0.05	< 0.05	< 0.05	>0.9	> 0.9	> 0.9	> 0.9	<5.0
overall Fit Degree								
Initial model (	0.000	0.019	0.071	0.979	0.981	0.987	0.969	3.157

4.4 Result analysis

Table 5 shows the path coefficient and hypothesis retrieval results of the modified model calculated by AMOS20.0 software.

Parameters			Path coefficient	PValue	Whether to pass the inspection
Smart City	$\leftarrow$	Information literacy	. 950	***	Yes
Information Acquisition	$\leftarrow$	Information literacy	. 857		Yes
Information evaluation	$\leftarrow$	Information literacy	. 863	***	Yes
Information Utilization	~	Information literacy	. 850	***	Yes
Information ethics	$\leftarrow$	Information literacy	. 787	***	Yes
Intelligent life	$\leftarrow$	Smart City	. 595		Yes
Wisdom government	$\leftarrow$	Smart City	. 632	***	Yes
Smart Citizen	$\leftarrow$	Smart City	. 785	***	Yes
Wisdom economy	$\leftarrow$	Smart City	. 506	***	Yes

Table 5 Path coefficient and hypothesis retrieval results of the modified model

(1) As can be seen from Table 5, the path coefficient between the exogenous potential variable information literacy and the endogenous potential variable smart city is 0.95>0, and the t-test reaches a significant level of 0.001, indicating that the hypothetical relationship between the potential variables is valid, that is, the information literacy level of citizens has a significant positive relationship with the development of smart city. The higher the information literacy level of citizens, the stronger the participation degree and sense of acquisition of smart city. In other words, improving the information literacy level of citizens can increase the participation degree of citizens

and effectively promote the development and construction of smart city.

(2) As can be seen from Table 5, the factor loads of the observation variables of information acquisition, information utilization and information morality are 0.857 0.863 0.85 0.787 respectively, indicating that the ranking of citizens' information literacy on the impact of smart city is information evaluation, information utilization and information morality. It can be seen that the information evaluation factor load is greater than the factor load of other components, indicating that the information literacy level and reflects their information literacy level. When other conditions remain unchanged, the stronger the information evaluation ability of citizens is, the greater the promoting effect on the construction of smart cities will be. Strengthen the cultivation of citizens' critical thinking ability, to evaluate information and media content and provider evaluation, the ideology and values to identify important information source of authority Information content is true, can prevent the spread of a large number of false spam, guarantee information environment clean and healthy, effectively prevent the occurrence of "information epidemic".

There is little difference in the factor load between information access and information use, which indicates that both information use and information access ability have great influence on citizens' information literacy. Information acquisition is our ability to access, retrieve and save information by means of technology. In the face of various kinds of information, how to obtain, what means to use what tools to obtain and how to effectively use the acquired information to create new knowledge information are all the abilities that citizens must have in the development of smart city

Information morality also has an impact on citizens' information literacy. In the process of using information, citizens should abide by the norms of information use, rationally express their demands, refrain from the abuse and misuse of information, guard against the infringement of bad information, and pay attention to the protection of personal rights and interests. The development of smart cities is not only the development of technology and economy, but also the improvement of citizens' civilization. The level of citizens' information morality also affects the civilization level of smart cities.

(3) The factor load of intelligent life, Wisdom economy, Wisdom government and Wisdom citizen is 0.595, 0.501, 0.632 and 0.785, respectively, indicating that the dimensions that have a positive effect on the construction of smart city in order of importance are Wisdom citizen, Wisdom government, Wisdom life and Wisdom economy. This shows that: ① Smart citizens are an important factor for information literacy to promote the construction and development of smart cities, which fully reflects that people-oriented is the core of smart city construction and development. City is the result of human cognitive wisdom, serve the people demand, the whole process is dominant, therefore, enhance the level of citizens' information literacy to improve citizen participation in the management of city construction and development through the effective method to the media and government provide personal, intercultural dialogue, and opportunities to participate in social public activities, thereby promoting wisdom faster development of the city. 2 The second influencing factor of information literacy on the construction of smart city is smart government affairs. By improving the level of government affairs, the government can change the information asymmetry in social governance and public services and provide people with high-quality management and services [19]. ③ The third factor that information literacy affects smart city is smart life. The third factor that information literacy affects smart city is smart life. In December 2016, the state released the "Evaluation Index of New Smart City", improving the weight of the two indexes of people-benefiting service and citizen experience [20], indicating that smart life is an important content of smart city construction. The fourth factor that information literacy affects smart cities is smart economy. Citizens with high information literacy can make better use of public platforms for information exchange, employment selection, innovation and entrepreneurship, release all kinds of commercial information and conduct commodity trading, identify the authenticity and effectiveness of information, and participate more in the economic development of smart cities.

#### V. Research Conclusions

Based on the evaluation standard of information literacy and the standard of smart city construction, this paper constructs the structural equation model and measurement model of citizens' information literacy and smart city. Taking Daqing City of Heilongjiang Province as the research object, it conducts a questionnaire survey to investigate the relationship between citizens' information literacy and smart city. Construction Measurement model and structural equation model are used for empirical analysis. The results show that the improvement of citizens' information literacy level can effectively apply the content of smart city construction, promote the government to improve the level of smart city construction, improve the governance ability of the government, drive urban economic development, improve people's living standards and promote the all-round development of the city, such as educational equity. There is a significant positive correlation between the information literacy level of citizens and the development of smart cities. Improving the information literacy level of citizens on smart city is information evaluation, information acquisition, information utilization and information morality. The main factors of information literacy affecting smart city are smart citizens, smart government affairs, smart life, smart economy, in turn.

Citizen is the starting point and the end point of the construction of smart city. Only when citizens actively participate in and benefit from the construction of the people can it be effective [21]. If Citizen Information literacy Level Can't keep up with the development of smart cities, many smart cities construction projects will be difficult to reach Anticipation Effect, Citizen's information literacy has become the last kilometer to restrict the construction of smart city to truly benefit the people. Therefore, the education of citizen's information literacy should be raised to an important position [22]. The significance of this research lies in the fact that from a theoretical point of view, this paper under the background of the wisdom urban construction selected citizens' information literacy a micro perspective on wisdom study influence factors of city construction and development, help people better understand citizens' information literacy, and wisdom city construction development is closely related, citizens' information literacy, high-energy good promote the development of wisdom urban construction. Practices, this article through the wisdom of daqing citizens of empirical research to investigate the level of citizens' information literacy and wisdom of the relationship between urban development and help to related department to better understand citizens' information literacy influence degree of each factor on wisdom city construction in the wisdom of the urban construction at the same time to strengthen citizen's information literacy level of ascension. In view of the national informatization strategic needs and the specific content of smart city construction, a citizen information literacy training system will be established, and the training of citizens' basic information skills will be strengthened. The government uses public platforms to carry out high-quality online open courses on information literacy for citizens, so that high-quality information literacy education resources can benefit citizens in the most convenient way, improve service quality through citizens' participation and feedback, and promote the construction and development of smart cities. So the citizens' information literacy, and wisdom, the relationship between urban development and can adapt to the need of the national education innovation strategy, to promote quality education resources construction and sharing of information literacy, can cause a society to improve the level of citizens' information literacy to reduce the digital divide caused the attention of the social stratification, the wisdom city construction achieve the construction goal of people-oriented.

# VI. Acknowledgement

This Paper was supported by the Heilongjiang Bayi Agricultural University Support Program for San Heng San Zong, under Grant [number ZDTDJH201801].

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