Analysis on Influencing Factors of Community Safety Culture Based on the Structural Equation Model

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Abstract

The purpose of this study is to research community safety culture building train of thought through the analysis of the influence factors of community safety culture, This study employs a Likert scale method for the design of questionnaire, investigate community through questionnaire, obtain the relevant data, and by use of the structural equation model (SEM) of statistics, puts forward that the factors including economy, society, education, since and technology, and management form important influence factors on community safety culture. Thus we should take comprehensive measures from the above aspects in the community safety culture construction.

Key words: Structural equation model; Community; Safety culture

INTRODUCTION

With a wide range of community carry out safety community construction, community safety culture construction is also increasingly attracted people's much more attention. Experts of China's safety culture circle define safety culture as "safety culture is the summation of all kinds of material products created and the ideological fields in order to maintain safety by human in social development process; it is the summation of the spirit, idea, behavior and material products created in safety production and safety life; it is the summation of safety value and safety behavior standards; it is the culture to protect the people's physical and mental health, respect for human life, realize the value of human being" (Department of policy and regulations of State Production Safety Supervision and Administration, 2002) Community safety culture is a special safety culture image reflected by community organizations and residents in production, life in the association of culture. It includes the following five aspects: community safety idea, community material safety, community safety management, and community safety behavior and community safety image.

Community is the basic unit of society life, the construction of community culture constitutes the foundation of social culture, and the construction of community safety culture is the foundation of the construction of entire social safety culture. Our country is a natural disaster-prone country, various natural disasters and emergencies have posed great threat on the production and living of community residents. Domestic and international safety construction practice shows that community safety culture construction should constitute the core content of community construction. It not only relates to community residents' health, life and happiness, but also relates to the security of society wealth, relates to social harmony and stability.

Community safety culture cultivation is directly subject to the influence of various factors, including: economic factors, social factors, since

and technological factors, educational factors, and management factors. This article will conduct community safety influence factors analysis on the basis of structural equation model.

1. SUMMARY OF STRUCTURAL EQUATION MODEL

SEM is a multivariate technique combining aspects of factor analysis and multiple regressions, it uses structural parameter to illustrate the connection relation between different variables, it provides the constant describe variable causal invariance, it describes the relationship among observed variables, observable variables and latent variables, as well as the relationship among latent variables. SEM models consist of the measurement model and the structural model.

1.1 Measurement Model

It is also named confirmatory factor analysis model which represents the relationships between each observed variable and latent variable. Measurement model is composed by two regression equations stipulates respectively the regulations of the endogenous latent variables η and endogenous observed variable Y, and exogenous latent variables ξ and observation variables X, the model is as follows:

$$X = \wedge x\xi + \sigma \tag{1}$$
$$Y = \wedge y\eta\xi + \varepsilon \tag{2}$$

Among which x is vector consisting of exogenous variables; y is vector consisting of endogenous variables; $\wedge$ x is the relationship of exogenous and exogenous latent variables, and is upper factor loading matrix of exogenous observed variables over exogenous latent variables; $\wedge$ y is the relationship of endogenous observed variables and endogenous latent variables, and is upper factor loading matrix of endogenous observed variables over endogenous latent variables; σ being an error of exogenous observed variables x; ε being an error of endogenous observed variable y; ξ is the latent variables of x, and η is the latent variables of y.

1.2 Structural Equation Mode1

It is also named latent variable causality model, which represents the relationships among the latent variables. It stipulates causality between exogenous latent variables and endogenous latent variables, the model is as follows:

$$\eta = \beta\eta + \Gamma\xi + \zeta \tag{3}$$

Among which η is the endogenous latent variables; ξ is the exogenous latent variables; β is the coefficient matrix of η, and is also the path coefficient matrix among endogenous latent variables; Γ is the coefficient matrix of ξ,and is also the path coefficient matrix between exogenous latent variables and the corresponding endogenous latent variables; ζ is the residual error, which could not be interpreted in the model.

There are some assumption in these models: E(ς)=0, E(σ)=0, E(ε)=0, E(ζ)=0, E(η)=0,ε and ς are mutually independent, σ and ζ are mutually independent, ε and η are mutually independent, ζ 、$\sigma$and ε are mutually independent.

2. THE COMMUNITY SAFETY CULTURE INFLUENCE FACTORS ANALYSIS

This paper uses structural equation model to analysis the immeasurable variables concerns community safety culture evaluation, based on the characteristics of structural equation itself, we design questionnaires to obtain relevant information (here due to space constraints, questionnaire contents omitted). The questions in "Community safety culture evaluation questionnaire" is designed according to the Likert scale method, adopt the 5- point method which were easy to accept by respondents, given 1,2,3,4, or 5 score according to the influence degree of the" five factors "which impact community safety culture: "does not affect", "little impact", "have a certain influence", and" have relatively large effects of influence".

In the investigation, 300 questionnaires were issued, and 275 questionnaires were recycled, the recovery rate of questionnaires is 91.67%, remove the invalid questionnaires which are incomplete, contradictory or repeat, the effective questionnaire number is 251, effective questionnaires are at a rate of 91.2%.

In all the studies, the treatment relating to the structural equation model should include the following two components: measurement of model and measurement of match degree of structure model. In the process of validation of the measurement model, mainly carries on the reliability and validity test of the questionnaire data, in the empirical research, reliability and validity of measurement tools is very important, good reliability and validity is the premise and the foundation of the next step in the study. In this study, before we make the hypothesis, we should make reliability and validity analysis of the questionnaires, to ensure that the survey data to illustrate the conclusions of the investigation.

2.1 The Reliability Analysis

Data reliability analysis is to test whether the data is reliable, it is to justify whether a group of measuring item is measuring the same concept, and it is an important index to measure data quality. In the empirical study, academic circles generally use the internal consistency coefficient (Cronbach's coefficient α).

This study uses Cronbach's coefficient α to measure internal consistency reliability, the results is in table 1.

Table 1
Cronbach Reliability Coefficient Results

Research variable	α coefficient	Overall α coefficient
Economic factors	0.895	
Social factors	0.778	
Education factors	0.842	0.905
Science and technology factors	0.839	
management factors	0.730	

American statistician Josep F. Hair, Jr. Rolph E. Anderson, Ronald L. Tathan and Willian C. Blaek point out that Cronbach's α value is greater than 0.7, indicates that the data is reliable, Cronbach's α value is greater than 0.6 indicates that the data is reliable when measurement scale is less than 6 .

From the study of variable reliability test table, the Cronbach's α value of the 5 variables is more than 0.7, and the total scale of 0.905, therefore, can induce that each research variable measurement terms is with high internal consistency reliability, survey data is reliable.

2.2 Validity Analysis

Validity (Validity) refers to the degree that measurement instrument can correctly measure the extent of the problem; it is an important index to measure the effectiveness of questionnaire.

The validity is high, shows that the use of measuring tools is able to measure the characteristics of the measured object; conversely, validity is not high, you couldn't really play the role of measurement tools. In the present academic research, content validity, criterion-related validity and construct validity are mostly used.. Content validity is a measuring tool for measuring whether the sampling scope is fit for the content or activity we want to study; criterion-related validity refers to the measurement tool in describing the measurement object trait validity; structure validity refers to the measurement instrument capable of measuring object concepts or the extent. Content or activity sampling fit; criterion-related validity refers to the measurement tool in describing the measurement object trait validity; structure validity refers to the measurement instrument capable of measuring object concepts or the extent. On the content validity and criterion-related validity mainly depends on the researchers' subjective feelings, and checking the structure validity of the most commonly used method is to factor analysis, the main index is factor loadings, and according to Hair and some other researchers' propose, when the index factor load is greater than 0.5, its index should be retained.

Table 2
Related Validity Between Measurement Items and Overall Sample

Measurement item	Overall sample
Economic factors	0.571(**)
Social factors	0.647(**)
Education factors	0.675(**)
Science and technology factors	0.676(**)
management factors	0.558(**)

This research adopts the criterion-related validity of measurement tools for the validity analysis. Calibration analysis results show that if all the measurement items and overall correlation coefficients were significant at the 0.05 level, proved that the overall validity of the measuring tool is good, see table2.

2.3 The Research Hypothesis of the Model

As the reliability and validity of the structural equation model' measured variable have been tested, therefore, we can analysis the structure model. As mentioned before, economic factors, social factors, educational factors, since and technology factors and management factors produce influence on community safety culture to certain effect. Therefore, this study proposes the following hypothesis:

- Hypothesis H1: There is a positive correlation between economic factors and community safety culture. Regional economic condition is good, community safety culture level is high; conversely, community safety culture level is low.
- Hypothesis H2: There is a positive correlation between social factors and community safety culture. The better the Social environment, community safety culture level is higher; conversely, community safety culture level is low.
- Hypothesis H3: There is a positive correlation between education factors and community safety culture. The higher the level of community education, community safety culture level is high; conversely, community safety culture level is low.
- Hypothesis H4: There is a positive correlation between the science and technology factors and community safety culture. The higher the level of science and technology development, community safety culture level is high; conversely, community safety culture level is low.
- Hypothesis H5: There is a positive correlation between management factors and community safety culture. The higher management ability and level, community safety culture level is higher; conversely, community safety culture level is low.

On the other hand, the higher a region's economic development level, corresponding educational level and technology level is higher also, this paper puts forward the following research hypothesis:

- Hypothesis H6: There is a positive correlation between educational factors and Economic factors.
- Hypothesis H7: There is a positive correlation between Science and technology factor and economic factor.

In this study we use the Amos7.0software to conduct structural equation analysis to verify the hypotheses. A measure of structural equation model fit goodness-of-fit

indices the results is shown in table 3. All kinds of fitting indicators meet the recommended value; show that the proposed structure model and actual data fitting is good,

they can be used to verify the research hypothesis. The statistical test results of the research hypothesis and path coefficients are shown in table 4.

Table 3
Goodness of Fit Index of Structure Model

Fit index	Recommended value	Structure mode
Goodness of fit index(GFI)	Exceed 0.8	0.91
Normed fit index(NFI)	Exceed 0.9	0.96
Comparative fit index(CFI)	Exceed 0.9	0.97
non-normed fit index (NNFI)	Exceed 0.9	0.95
Root Mean Square Error of Approximation(RMSEA)	less than 0.08	0.053

As Shown in table 4, the path coefficient between economic factors and community safety culture is 0.32, shows that there is a positive correlation between them, the higher economy development lever, the better the community safety culture construction; The path coefficient between social factors and community safety culture is 0.28, indicates that there is a positive correlation between them, the better the social environment, the better the community safety culture construction; The path coefficient between education and community safety culture is 0.15, shows that there is a positive correlation between them, the higher the level

of education, the better the community safety culture construction; The path coefficient between science and technology factors and community safety culture is 0.05, shows that there is a positive correlation between the level of science and technology factors and community safety culture, the higher the science and technology development level, the better the community safety culture construction; The path coefficient between management factors and community safety culture is 0.05, shows that there is a positive correlation between them, the higher the management level, the better the community safety culture construction.

Table 4
Result of Hypothesis Testing

Path of model	Standardized path coefficient	t	Test results
H1:Economic factors→Community safety culture	0.32	5.79	approve
H2:Social factors→Community safety culture	0.28	2.34	Approve
H3:Education factors→Community safety culture	0.15	2.68	Approve
H4:Science and technology factors→Community safety culture	0.09	4.83	Approve
H5:Management factors→Community safety cultur	0.05	3.57	Approve
H6:Education factors→Economic factors	0.17	2.81	Approve
H7:Science and technology factors→Economic factors	0.15	3.45	approve

In addition, it can be seen from table 4, All the structural equation model hypothesis were approved, therefore the analysis of the influence factors will have important guiding significance on the community safety culture assessment.

we should take measures from the social point of view and community at the same time, from economy, society, education, technology, management, etc., take comprehensive measures form each dimensions so as to be productively.

CONCLUSION

Cultivation of Community safety culture is a multifarious system project. In the construction of community safety culture, economy, social, education, science and technology, level of management etc, which composed of community environment, and the relevant aspects of the community itself form very important implications on community safety culture cultivation and construction. Therefore, in the community safety culture construction,

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