An Empirical Study on the Quality of community Emergency Logistics Services Under Public Health Emergencies

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Abstract. According to the correlation relationship between various factors of community emergency logistics service under public health emergencies, the mechanism of influencing the quality of emergency logistics service for community residents is studied to improve the level and response ability of community emergency service. Construct a model of community emergency logistics service quality under public health emergencies, use structural equation modeling and related theories to analyze the current situation of community emergency logistics service satisfaction and the relationship between variables, and put forward relevant suggestions.

Keywords: structural equation modeling; emergency logistics; service satisfaction; public health emergencies

1 INTRODUCTION

During the epidemic, the emergency logistics system played an important role in helping to fight the epidemic, smooth the supply channels of medical supplies and protect the daily needs of residents, but at the same time, the logistics services could not be quickly deployed to meet the needs of residents.

Parasuraman and Berry developed the SERVQUAL scale by measuring the difference between logistics services and customers' expectations of logistics services [1-2]. On the satisfaction model of logistics service quality, Fan X et al. took the target college students as the research object, established an integrated system through the study of reliability, responsiveness, dependability and tangibility of logistics services, and utilized customer satisfaction to assess the logistics service quality in the market [3]. Wu G and Yang D both constructed a measurement model of logistics service quality based on structural equation modeling and empirical testing using Amos to explore the influencing factors of service quality system [4-5].

Therefore, research exploring the quality of community emergency logistics services under public health emergencies can improve the satisfaction of community residents and build a more reasonable logistics service model [6-8].

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2 RESEARCH IDEAS AND RESEARCH HYPOTHESES

2.1 Research Ideas

Parasuraman concluded the validity of SERVQUAL theory through empirical evidence in 1988, and this paper constructs an evaluation model for the quality of community emergency logistics services on the basis of the existing index system and the current research status of emergency logistics services1. In this model, the basic elements of the SERVQUAL service quality evaluation model are retained, and improved to form the quality of time and the quality of communication. quality indicators. The focus of emergency logistics work is to deliver emergency supplies to customers accurately and timely, and the material guarantee index is added. Infrastructure is an important part of emergency logistics services, innovatively adding infrastructure indicator factors [9-10]. Social equity, as the key to maintaining community stability, is a reflection of the quality of emergency logistics services and has a greater impact on resident satisfaction.

2.2 Research Hypotheses

Nine research hypotheses were proposed based on the existing research results, and the hypothetical model of emergency logistics service quality for public health emergencies was constructed, as shown in Figure 1.

H1: Infrastructure has a significant positive effect on resident satisfaction;

H2: Communication quality has a significant positive effect on resident satisfaction;

H3: Social equity has a significant positive effect on resident satisfaction;

H4: Quality of time has a significant positive effect on resident satisfaction;

H5: Material security has a significant positive effect on resident satisfaction;

H6: Quality of communication mediates the relationship between infrastructure and resident satisfaction;

H7: Material security mediates between infrastructure and resident satisfaction;

H8: Time quality mediates between communication quality and resident satisfaction;

H9: Social equity mediates the relationship between communication quality and resident satisfaction.

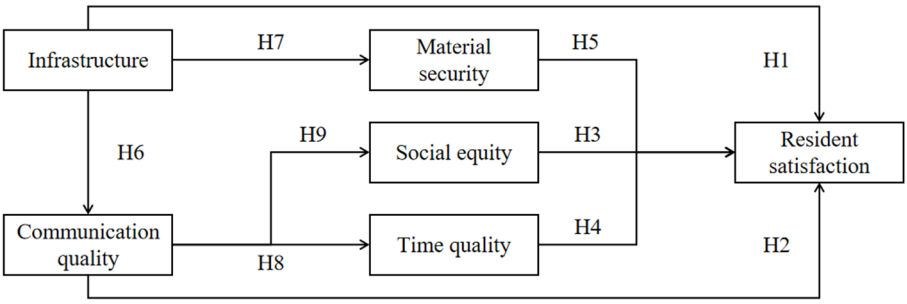

Fig. 1. Community Emergency Logistics Service Quality Assumption Model

3 EMPIRICAL STUDY ON THE QUALITY OF COMMUNITY EMERGENCY LOGISTICS SERVICES

3.1 Scale Design

This study collects and reviews a large amount of literature, asks experts and scholars for their opinions, and preliminarily determines the indicator system of community emergency logistics service quality. The question items used for each variable are all from mature scales in relevant studies at home and abroad, following reasonable dimensions and indicators with innovative modifications, and the indicator system is modified and improved through the method of questionnaire pre-survey. Resident satisfaction was used as the dependent variable to examine the different effects on the quality of community emergency logistics services, as shown in Table 1.

Table 1. Community Emergency Logistics Service Quality Scale

dimension	title	Evaluation indicators
Infrastructure	IN1	Community emergency service facilities
	IN2	Community Emergency Responders Organization
	IN3	Scope of community emergency services
Time quality	TQ1	Rapidity of material distribution
	TQ2	Accuracy of material distribution
	TQ3	Timeliness of material information updates
Communication quality	CQ1	Employee's service attitude
	CQ2	Understanding of residents' needs
	CQ3	Capacity to deal with relevant situations
Material security	MS1	Integrity of emergency supplies
	MS2	Adequacy of emergency supplies
	MS3	Reliability of emergency supplies
Social equity	SE1	Equitable distribution of community goods
	SE2	Equitable distribution of goods among the population
	SE3	Personalized care for special groups
Resident satisfaction	RS1	Satisfaction with community emergency logistics services
	RS2	Trust in Community Emergency Logistics Services
	RS3	It met my expectations.

3.2 Questionnaire Design and Collection

In this paper, through reading the literature and combining the existing results of scholars at home and abroad, we form a preliminary questionnaire framework and question

settings. Before the questionnaire was formally investigated, the questionnaire was modified and adjusted many times and formed this questionnaire according to the pre-test results.

Four communities, Guanhai International, Century Sunshine, Meixing Garden and Longxing Garden in Xingcheng City, Liaoning Province, were selected for the survey. Data collection was carried out through community groups and electronic questionnaires were prepared; the questionnaires were collected from September 30, 2023 to October 10, 2023; 302 questionnaires were distributed and 228 valid questionnaires were recovered.

3.3 Scale Reliability and Validity Tests

Reliability and validity tests were conducted using SPSS 26.0, and the results are shown in Table 2. The overall Cronbach's α value of the questionnaire was greater than 0.8, the KMO value was above 0.6, and the value of the Bartlett's test of sphericity was less than 0.01. The descriptions of the variables were relatively good, and the design of the questions of the scale had a high degree of reliability.

Table 2. Results of confidence test

variant	Cronbach's α	item	KMO	Bartlett's test		
				approximate chi-square	df	Sig.
Infrastructure	0.857	3	0.668	342.779	3	0
Time quality	0.840	3	0.699	288.431	3	0
Communication quality	0.857	3	0.660	344.300	3	0
Material security	0.878	3	0.689	394.909	3	0
Social equity	0.868	3	0.709	347.772	3	0
Resident satisfaction	0.890	3	0.696	419.226	3	0

The validity of the questionnaire mainly assesses whether the items of the questionnaire can accurately reflect the contents to be measured, which mainly includes convergent validity and discriminant validity. Convergent validity is judged by the factor loadings and AVE values of each variable, and most of the factor loadings of each measurement item of the questionnaire are close to 0.8, and the AVE values are not less than 0.5, which indicates that the questionnaire has a good convergent validity, and the specific data are shown in Table 3.

Table 3. Distinguishing Validity

variant	infrastructure	Communication quality	Social equity	time quality	Material security	resident satisfaction
infrastructure	0.685					
Communication quality	0.515	0.683				

Social equity	0.240	0.467	0.696			
time quality	0.254	0.494	0.231	0.650		
Material security	0.460	0.237	0.110	0.117	0.726	
resident satisfaction	0.451	0.412	0.235	0.413	0.426	0.727
AVE square root	0.828	0.826	0.834	0.806	0.852	0.853

3.4 Impact of Demographic Variables on Resident Satisfaction

One-way ANOVA was performed using SPSS 26.0 with resident satisfaction as the dependent variable and other indicators as independent variables. Under the 95% confidence interval, there were significant differences in resident satisfaction in terms of gender, age, education, household registration, occupation, monthly income, and experience of public health emergencies ($P < 0.01$).

The mean and standard deviation of the variables and resident satisfaction scores are shown in Table 4. The mean of the total score for the level of resident satisfaction in the survey sample was 3.57±1.20, which shows that the overall satisfaction level of the survey respondents was high and the quality of the community emergency logistics services was high.

Table 4. Mean and standard deviation results for each variable and resident satisfaction

variant	subject	Minimum value	Maximum value	Average value	standard deviation
Infrastructure	3	1	5	3.30	1.17
Time quality	3	1	5	3.11	1.03
Communication Quality	3	1	5	3.62	1.27
Material security	3	1	5	3.36	1.16
Social equity	3	1	5	3.74	1.20
Resident satisfaction	3	1	5	3.57	1.20

3.5 Structural Equation Modeling

Structural equation modeling was constructed using Amos 24.0 software with infrastructure, communication quality, social equity, time quality, and material security as exogenous latent variables and resident satisfaction as endogenous latent variables. The prediction effect of the structural equation model was evaluated by the chi-square to degrees of freedom ratio (X2/df) and the root mean square error of approximation (RMSEA). The specific data are shown in Table 5 and the final model is shown in Figure 2.

Table 5. Table of overall fit coefficients

norm	fitted value	recommended value	fit assessment
X^2/df	2.521	<3	positive
GFI	0.821	>0.8	positive
AGFI	0.800	>0.8	positive
RMSEA	0.048	<0.05	positive
TLI	0.868	>0.8	positive
NFI	0.830	>0.8	positive
IFI	0.875	>0.8	positive
CFI	0.874	>0.8	positive

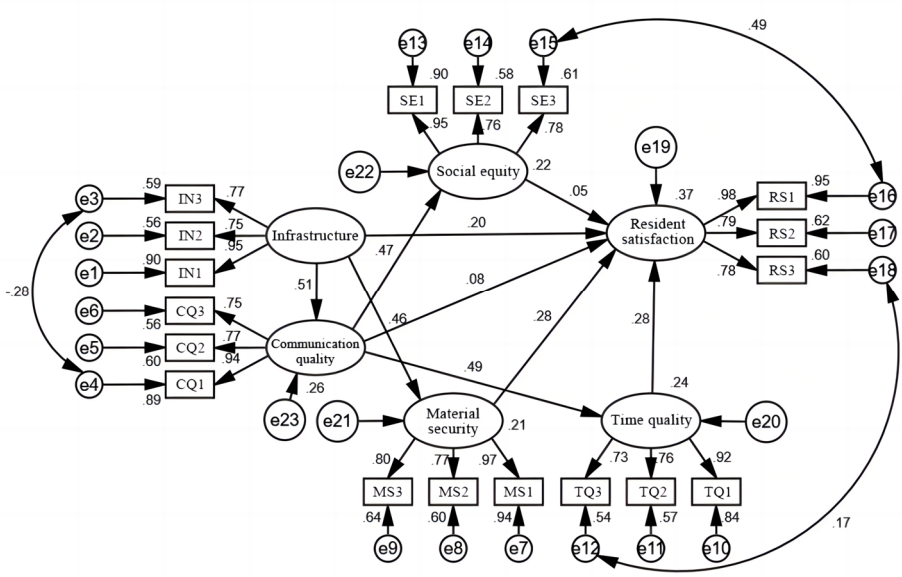

Fig. 2. Structural equation model of community emergency logistics service quality under public health emergencies

The greatest influence of community emergency logistics service facilities in infrastructure, with a correlation coefficient of 0.95; the greatest influence of staff service attitude in communication quality, with a correlation coefficient of 0.94; and the greatest influence of fairness in distribution of materials in different communities in social equity, with a correlation coefficient of 0.95.

4 HYPOTHESIS TESTING ANALYSIS.

4.1 Direct Effects Test

The model standardized path analysis is shown in Table 6, infrastructure positively and significantly affects resident satisfaction (β = 0.218, t = 2.663, P < 0.001), therefore hypothesis H1 is valid. Communication quality does not significantly affect resident satisfaction (β = 0.083, t = 1.028, P > 0.001), so hypothesis H2 does not hold. Social equity does not significantly affect resident satisfaction (β = 0.060, t = 0.077, P > 0.001), so hypothesis H3 is not valid. Quality of time positively and significantly affects resident satisfaction (β=0.361, t=3.747, P<0.001) and material security (β=0.307, t=3.918, P<0.001), so hypotheses H4 and H5 are valid.

Table 6. Table of model standardized path coefficients

path coefficient			Estimate	S.E.	T	P
Social equity	→	Resident satisfaction	0.060	0.077	0.774	0.439
Infrastructure	→	Resident satisfaction	0.218	0.082	2.663	***
Communication quality	→	Resident satisfaction	0.083	0.080	1.028	0.304
Material security	→	Resident satisfaction	0.307	0.078	3.918	***
Time quality	→	Resident satisfaction	0.361	0.096	3.747	***

4.2 Tests for Mediating Effects

Based on Amos24.0 software, the Bootstrap interval method was used to test the mediation effect, the results of the mediation effect test are shown in Table 7. The direct effect of infrastructure on residents' satisfaction is significant, and it can indirectly affect residents' satisfaction through "infrastructure → communication quality → residents' satisfaction", and there is a mediation effect, so H6 is established. Similarly, H7, H8 and H9 can be obtained.

Table 7. Results of the mediation effect test

pathway	Estimate	S.E.	95% confidence interval		P
			Lower	Upper	
Communication quality → Time quality → Resident satisfaction	0.330	0.044	0.317	0.490	***
Communication quality → Social equity → Resident satisfaction	0.195	0.039	0.127	0.282	***
Infrastructure → Communication quality → Resident satisfaction	0.223	0.037	0.150	0.294	***
Infrastructure → Material Security → Resident Satisfaction	0.282	0.039	0.230	0.383	***

5 CONCLUSIONS

For the community, the higher the satisfaction of the residents, the better the quality of community emergency logistics services under public health emergencies, and the better it can meet the real needs of community residents. The higher the degree of community emergency logistics infrastructure, the higher the degree of rapidity and accuracy of material distribution, the wider the scope of emergency logistics services, so that residents can obtain living materials in a timely manner. The material security of emergency logistics is a visual reflection of the level of community emergency logistics services. Secondly, compared with the direct impact of emergency logistics services, the indirect impact of emergency logistics services is more complex and varied, which also shows the importance of assessing the satisfaction of community residents and the quality of emergency logistics services in the case of public health emergencies such as the New Crown Pneumonia Epidemic.

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