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Article

Study on the Influencing factors of urban economic resilience in post epidemic Era: A case study of Kunming City

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Research Article

Study on the Influencing factors of urban economic resilience in post epidemic Era—A case study of Kunming City



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ABSTRACT

At the end of 2019, the outbreak of the COVID-19 has a huge impact on China and the world economy, highlighting the vulnerability of the economy in the face of major shocks. The capability to resist pressure and risk of economic resilience can significantly improve the capability of the economy to resist external interference and recover its development. Kunming is located in the “Belt and Road” Economic Zone and is a bridgehead that radiates South Asia and Southeast Asia. Its economic development is particularly affected by the epidemic. How to improve the resilience of the regional economy will be of great strategic significance to achieve high-quality economic development. Taking Kunming as an example, this paper identifies the influencing factors of regional economic development through literature research and expert interviews and constructs a hypothesis model of influencing factors of economic resilience. From the three dimensions of “defense, absorption and learning” of resilience theory, data are collected through questionnaires, and the mechanism between resilience theory and economic development is explored by using the structural equation model(SEM). According to the main factors identified by the model, the paper figures out countermeasures to prompt the development of the regional economic better and faster.

1. Introduction

Compared with the developed areas in the east, Kunming, which is located in the southwestern border of China, faces practical challenges such as relatively lagging economic development and low per capita income. As the capital of Yunnan, the central city of the central Yunnan city cluster, and the bridgehead facing South Asia and Southeast Asia, the negative impact of the epidemic is particularly obvious (Ma & Liu, 2020). The degree of volatility and uncertainty in its economic development has greatly deepened, and there are major problems and risks in regional economic development. Because of this, this study takes Kunming as the research object and explores the use of structural equation models based on 211 valid sample data in Kunming. At the same time, the article takes the economic development of Kunming as the starting point and analyzes the three dimensions of economic resilience (defense capability-capability to resist risks, absorption capability-capability to resolve risks, and learning capability-capability to restore economic development). By describing the complex relationship between various variables, various factors affecting Kunming's economic development are discussed.

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There is no theory directly related to “resilience” in mainstream economics. Fujita and Thisse (Fujita & Thisse, 2002) are the first scholars to introduce resilience into the field of spatial economics. They refer to the idea of multiple equilibrium in the theory of ecological resilience to explain the internal mechanism of various agglomeration phenomena in the real economy. As a result, the research on economic resilience is gradually unfolded, and its importance in the field of economic geography is increasing. On the basis of a systematic review of relevant literature, this paper puts forward the definition of economic resilience (Capello et al., 2016; Martin et al., 2015; Rose & Krausmann, 2013). Economic resilience is a kind of adaptive dynamic adjustment ability, which emphasizes the dynamic process that a country or region makes adaptive adjustment when it suffers from external shocks. In this process, social

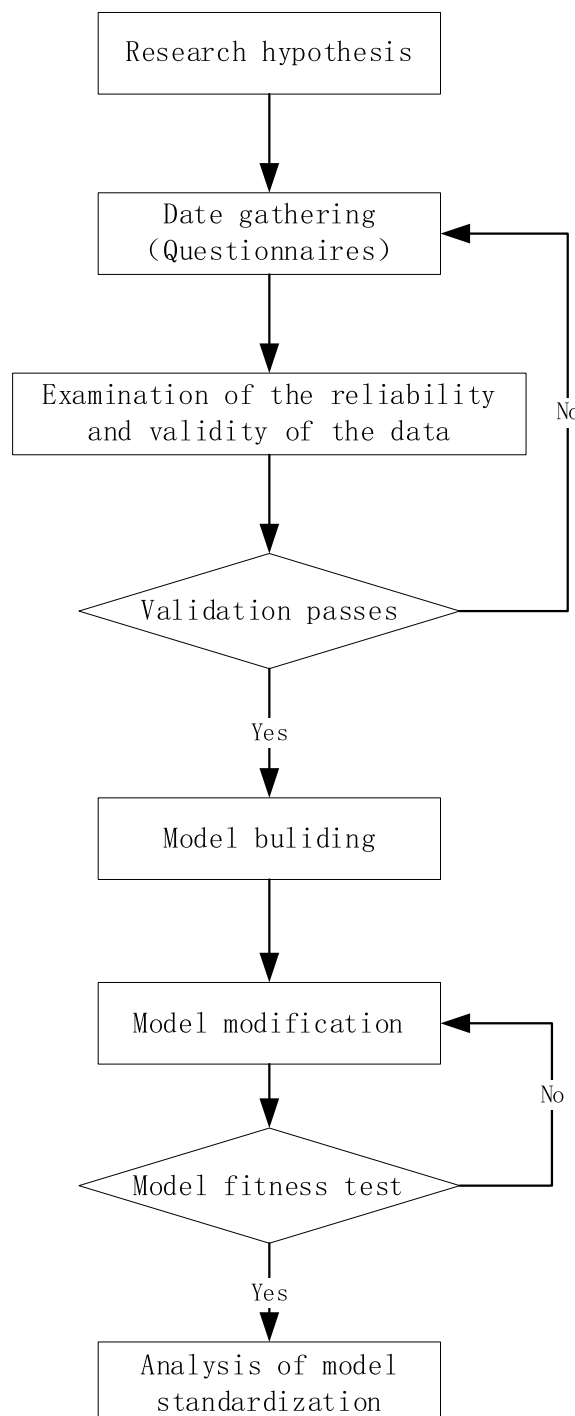


Fig. 1. Technology roadmap.

resources are reallocated, new changes in industrial structure occur, and the maximum feasible output or upper limit of employment of the region is changed, which does not necessarily lead to the recovery of the economy. It is to enter a more powerful and sustainable balanced development path than before the impact, or a more negative and shrinking growth path than before the impact. Martin (Martin, 2011) proposed four interrelated stages to describe the response of regional economy to recession: a) resistance (regional vulnerability or sensitivity to interference); b) recovery (the degree and speed of rebound to the pre shock state); c) adjustment direction (the degree of structural and functional changes); and D) renewal (restoration of pre shock path).

By combing the research results at home and abroad, scholars' research on economic resilience is more in the qualitative introduction stage. As the academic circles pay more attention to resilience, the empirical analysis and evaluation of urban economic resilience become particularly important. Hang Su (Su, 2015) believed that economic resilience is an important evaluation indicator of a country's economy's capability to withstand external shocks. He pointed out that there are abundant theoretical studies on economic resilience at present, but few empirical analyses. Binlian Wan (Wan & Zhai, 2017) aimed at the current situation of insufficient empirical analysis and research on domestic economic resilience. Taking the Wenchuan earthquake as an example, the economic resilience index was used as a measure to analyze and compare the differences in economic resilience in different regions and their causes. Kan Zhou (Zhou et al., 2019) is based on the ARIMA model and uses an improved variable scale return DEA model to reveal the post-disaster economic development status and recovery process of the Wenchuan earthquake. Mingdou Zhang (Zhang & Feng, 2019) used the analytic hierarchy process to analyze and discuss the issue of coordination between urban resilience and the level of economic development in the Yangtze River Delta urban agglomeration. Thus, it can be seen that most of the existing literature on economic resilience uses the most common research method in the measurement of resilience index to simply analyze the factors that affect urban economic resilience, and less comprehensive analysis is performed using more complex models. Compared with most models, the structural equation model is more flexible in dealing with variables, and the final result is closer to the facts. However, in recent years, although structural equation models are mostly used in the analysis and demonstration of the influence factors of various social phenomena, the research on the influence factors of urban economic resilience is rarely involved. Fuqian Fang (Fang & Lu, 2009) used the data obtained from the questionnaire survey to establish a structural equation model and conducted an empirical analysis of the welfare status of urban residents in my country's functional space. Junlin Ji (Ji et al., 2020) used structural equation models to design observation variables to explore the factors affecting wine brand loyalty. The results showed that cultural identity is the most important factor affecting wine brand loyalty. At the same time, in the face of the challenge of the COVID-19 to China's economic resilience and the impact of the high-quality transformation and upgrading of China's economy (Wang & Gao, 2020), this paper introduces a structural equation model based on 211 valid sample data in Kunming. Exploratory calculation and analysis of factors affecting Kunming's economic development after the COVID-19. To enrich the research methods of economic resilience, and to propose Kunming's economic strategy to deal with the impact of the epidemic, to achieve better and faster development of the regional economy.

2. Technology Roadmap

The technical roadmap of this paper is as follows (Fig. 1):

3. Hypothesis and theoretical model

3.1. Hypothesis

Combining with the economic development of Kunming City, based on the existing theories, according to literature reviews and expert interviews, this study identified three dimensions of defense, absorption and learning as the key influencing factors (Shan, 2019; Zhang, 2018), and set defense capability, absorption capability, learning capability and economic development level as four variables, and put forward the following assumptions (Fig. 2):

H1. defense capability has a significant impact on economic development;

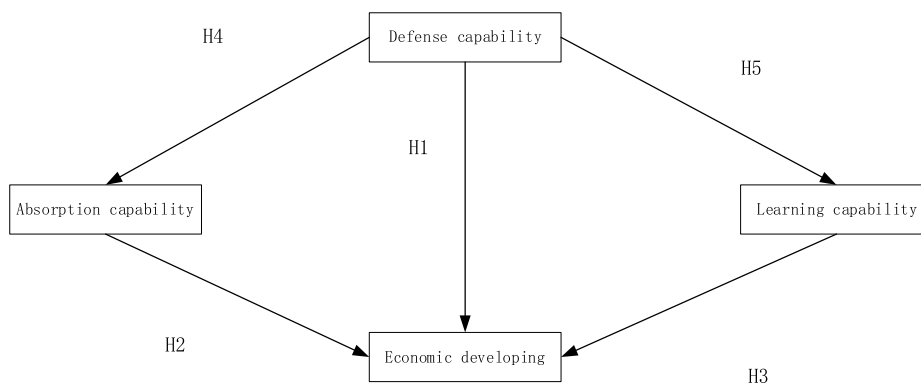


Fig. 2. The initial theoretical framework of factors affecting economic resilience.

- H2. absorption capability has a significant impact on economic development;
 H3. learning capability has a significant impact on economic development;
 H4. defense capability has a significant effect on absorption capability;
 H5. defense capability has a significant influence on learning capability.

3.2. Theoretical model

The structural equation model (SEM) is a kind of confirmatory model analysis. According to the measurement model and hypothetical structure model established in advance, then collect data to verify the model. The covariance matrix of variables is processed and analyzed to analyze the hypothetical relationship among potential variables. The analysis has two statistical methods: factor analysis and path analysis. Compared with multiple regression estimation, the structural equation model is more flexible in dealing with variables. In the structural equation model, latent variables are used to observe the residual estimation of observed values, and its processing effect is better. Moreover, the structural equation model is based on the continuous modification of the original model, and the final result is closer to the fact (Hou et al., 2004, pp. 5–103).

The model includes two basic models: the structural model and the measurement model. The measurement model is composed of a potential model, observation variables, and error terms, which reflect the corresponding relationship between observed variables and potential variables. The structural model reflects the causality of potential variables, including the unexplained residual part of “dependent variables”. The latent variable as the cause is called the external potential variable, while the latent variable as the result is called the internal potential variable (Wu, 2010, pp. 1–71). The relationship between the factors is shown in the following figure (Fig. 3):

The relationship between observable variables and latent variables can be expressed as follows:

$$x = \lambda x \xi + \delta$$

$$y = \lambda y \eta + \varepsilon$$

The structural model can be written as follows:

$$\eta = b \xi + \zeta$$

x —is the vector composed of exogenous explicit variables;

y —vector composed of endogenous explicit variables;

ξ — vector composed of exogenous latent variables;

η —vector composed of endogenous latent variables;

λx — is the relationship matrix between the exogenous latent variable and exogenous explicit variable;

λy —is the relationship matrix between the endogenous latent variable and endogenous explicit variable;

δ — error term of the exogenous explicit variable;

ε — error term of the endogenous explicit variable.

In this study, the structural equation model can not only analyze the impact of each independent variable on economic development but also analyze the internal relationship between each variable at the same time, which can better clarify the three resilience dimensions and their influence paths. Not only that, but it also allows errors between independent variables and dependent variables, which can establish a causal relationship between variables under the premise of considering errors, which is more in line with reality. This study uses the structural equation model to explore the influencing factors of economic resilience, and the theoretical model is shown in the figure.

According to the hypothesis H1~H6, referring to the existing literature and considering the available capability of data, four latent variables are set to analyze the factors affecting Kunming's economic development and their internal relations. Finally, three observation

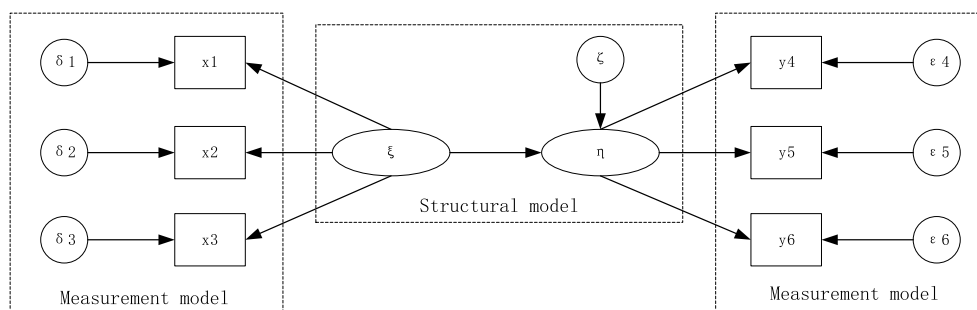


Fig. 3. Structural equation model (SEM).

variables are set under each latent variable, with a total of 12 observation variables. Among them, X1~X14 (Chen, 2020; Cheng et al., 2020; Xu & Zhang, 2019; Zhu & Sun, 2020) respectively represent the government's public financial expenditure, the proportion of industrial structure, the degree of economic openness, residents' education expenditure, per capita consumption, wage income, the number of employees, the number of large enterprises, the proportion of scientific research institutions' funds, the number of scientific research institutions, the educational expenditure accounting for the government's fiscal expenditure, the price growth level, GDP growth level, per capita wealth, etc. Likert 7 scale was used in the questionnaire, set 1 = very obvious decrease, 2 = obvious decrease, 3 = general obvious decrease, 4 = no change, 5 = generally obvious increase, 6 = obvious increase, 7 = especially obvious increase. The collected questionnaires are quantified and marked. The specific latent variables, observed variables, and items are shown in the table, and the theoretical model is shown in the figure. According to the data collected from the questionnaire, SPSS25.0 is used for principal component analysis. In this paper, the maximum variance rotation method is used for the principal component analysis of the orthogonal rotation axis. The index structure of each factor is reasonable, and four principal components are extracted, as shown in the table below (Table 1).

4. Empirical test

4.1. Data collection

The survey was conducted from January to October 2020. A stratified sampling survey was conducted among different groups in Kunming employing telephone interviews, email distribution, online questionnaires, and offline discussions. A total of 230 samples were collected after removing the question questionnaire and repeated the questionnaire, 212 valid questionnaires were found, with an effective rate of 92.2%. According to the information of the interviewees, men accounted for 53.72%, women accounted for 46.28%, and men were slightly higher than women; age, 18–50 years old accounted for 89.14%; education level, bachelor's degree or above accounted for 75.16%; occupations engaged in include college students, civil servants, researchers, teachers, service staff, journalists and so on. Thus it can be seen that the respondents of the questionnaire involve most of the occupations and people in Kunming, and the survey is carried out from various aspects to ensure the comprehensiveness of the survey.

Before the formal issuance of the questionnaire, a pre-test is carried out on the questionnaire, and a small-scale distribution test is used to ensure the accuracy and completeness of the questionnaire. Firstly, the questionnaire is collected in a small-scale way, and the questionnaire is modified according to the feedback opinions to eliminate the easily misunderstood or wrong narration (Table 2).

4.2. Data check

4.2.1. Reliability test

To carry out reliable capability analysis by using SPSS25.0 software to measure whether the relative relevance of one item of the scale to other items is better, and meet the requirements of stability and reliability. Cronbach's α and the correlation coefficient (CITC) of the total score of the calibration items are used for judgment. According to the standard of Nunnally (1994), Cronbach's α value ≥ 0.70 is considered high reliability; when $0.35 \leq \text{Cronbach's } \alpha \text{ value} \leq 0.70$, it belongs to medium reliability. The result is as follows (Table 3):

4.2.2. Validity test

For the content validity, this paper followed the procedure of questionnaire design strictly, when designing the questionnaire, and has gone through the stages of literature research and expert opinions. so it can be considered that this study has content validity. While for the structural validity test, the KMO value of the test statistics, the P-value of the Bartlett spherical test, and the cumulative variance contribution rate are selected as the validity test indicators. The specific values are shown in the following table (Table 4). It can be seen from the table below that, except for the learning capability due to the three measurable variables, the KMO value is less than 0.7, and the KMO values of the other three latent variables are all greater than 0.7. The significance level of Bartlett's sphere test (Sig. value is

Table 1
Principal component analysis.

| Measurable variables | component1 | component 2 | component 3 | component 4 |
|--|------------|-------------|-------------|-------------|
| The number of employed persons X7 | 0.841 | −0.030 | 0.251 | 0.043 |
| Wage earning X6 | 0.785 | 0.257 | 0.089 | 0.012 |
| The number of big enterprises X8 | 0.664 | 0.330 | 0.128 | 0.068 |
| Consumption per person X5 | 0.654 | 0.314 | 0.077 | −0.017 |
| Governments' fiscal spendings X1 | 0.033 | 0.762 | 0.257 | 0.003 |
| Proportion of industrial structure X2 | 0.224 | 0.752 | 0.050 | −0.035 |
| Economic openness X3 | 0.309 | 0.691 | 0.041 | 0.037 |
| Household education spending X4 | 0.488 | 0.621 | 0.079 | −0.020 |
| Prices growth level X12 | 0.010 | 0.257 | 0.811 | 0.066 |
| GDP growth X13 | 0.231 | 0.194 | 0.809 | 0.009 |
| Per capita X14 | 0.195 | −0.060 | 0.746 | 0.016 |
| Education expenditure accounts for the level of government financial expenditure X11 | −0.071 | 0.007 | 0.009 | 0.848 |
| Number of research institutions X10 | 0.070 | −0.070 | −0.041 | 0.801 |
| Proportion of funds of scientific research institutions X9 | 0.057 | 0.052 | 0.101 | 0.693 |

Table 2
Questionnaire survey and variable description.

| Latent variable | Measurable variables and codes | Meaning and nature of indicators | Mean | Standard deviation |
|-----------------------------------|---|--|------|--------------------|
| Defense capability | Public expenditure of the government X1 | Reflecting the extent of government public financial expenditure(+) | 4.58 | 1.32 |
| | The proportion of industrial structure X2 | Reflecting the proportion of economic structure(+) | 4.33 | 1.32 |
| | Economic openness X3 | Reflecting the openness of the economy(+) | 4.25 | 1.31 |
| | Resident education expenditure X4 | Reflecting the education investment level of residents(+) | 4.29 | 1.20 |
| Absorption capability | Per capita consumption X5 | Reflecting the extent to which consumption contributes to economic growth(+) | 4.22 | 1.38 |
| | Income X6 | Reflecting the degree of economic growth(+) | 3.85 | 1.26 |
| | Number of employed persons X7 | Reflecting the stability of society(+) | 3.88 | 1.34 |
| | Number of large enterprises X8 | Reflecting the scale of development of the city(+) | 4.09 | 1.14 |
| Learning capability | The proportion of funding of scientific research institutions X9 | Reflecting the intensity of scientific research investment(+) | 3.67 | 1.08 |
| | Number of scientific research institutions X10 | Reflecting potential innovation capability(+) | 3.45 | 1.23 |
| | The extent of education expenditure in government expenditure X11 | Reflecting the government's emphasis on scientific research(+) | 3.48 | 1.28 |
| | Price growth level X12 | Reflecting the state of economic development t(+) | 4.76 | 1.30 |
| The level of economic development | GDP growth level X13 | Reflecting whether the economy is booming(+) | 4.37 | 1.29 |
| | Wealth per capita X14 | Reflecting the wealth of residents(+) | 4.80 | 1.40 |

Table 3
Reliability check results.

| Latent variable | Measurable variable | CITC | Cronbach's α | Total Cronbach's α |
|-----------------------|---------------------|------|---------------------|---------------------------|
| Defense capability | X1, X2, X3, X4 | >0.5 | 0.771 | 0.803 |
| Absorption capability | X5, X6, X7, X8 | >0.5 | 0.798 | |
| Learning capability | X9, X10, X11 | >0.5 | 0.687 | |
| Economic development | X12, X13, X14 | >0.5 | 0.748 | |

0.000) is less than 1%, indicating that there is a significant correlation between the original variables. If the cumulative variance contribution rate is more than 80%, the sample data has good validity, and the test results are suitable for structural equation analysis.

4.3. Construction of the structural model

Based on the data, literature, and research experience, the initial structural equation model of the potential variable and the observed variable was established, and the fitting degree and path Coefficient of the model was analyzed by the maximum likelihood method using Amos22.0 software, and fitting the initial model of the influencing factors. According to Kline's viewpoint of skewness coefficient and Kurtosis Coefficient, the data skewness coefficient and Kurtosis Coefficient of each potential variable in the model are all <3 and 8 respectively, which shows that the data of each variable accords with normal distribution and satisfies the requirements of structural equation modeling. The initial model obtained is shown in the figure (Fig. 4):

From the fitting parameters of the initial model, the model parameters are not ideal, and the fitting effect of the model is average. Therefore, the initial model needs to be further modified. The basis for the revision of the structural equation model includes the rationality of the model parameters and the adaptability of the entire model. It is not that the better the fitting parameters of the model, the better the model results. Therefore, it is necessary to modify the actual situation and theoretical significance of the model, so that the model not only has statistical theoretical significance but also reflects practical significance. The absolute fitting coefficient, relative fitting coefficient, and simplification coefficient are used to evaluate the degree of model optimization (Fig. 5).

4.4. Model correction

The maximum likelihood estimation method is used to re-fit the modified model, add or delete paths in the model, cancel fixed

Table 4
Results of the validity test.

| Measurement Index | Defense capability | Absorption capability | Learning capability | Economic development |
|---|--------------------|-----------------------|---------------------|----------------------|
| KMO values | 0.781 | 0.789 | 0.628 | 0.759 |
| Bartlett sphericity test | χ^2 207.411 | 252.263 | 112.410 | 160.728 |
| | Df 6 | 6 | 3 | 3 |
| | Sig. 0.000 | 0.000 | 0.000 | 0.000 |
| Cumulative variance contribution rate/% | 87.738 | 89.486 | 85.076 | 87.554 |

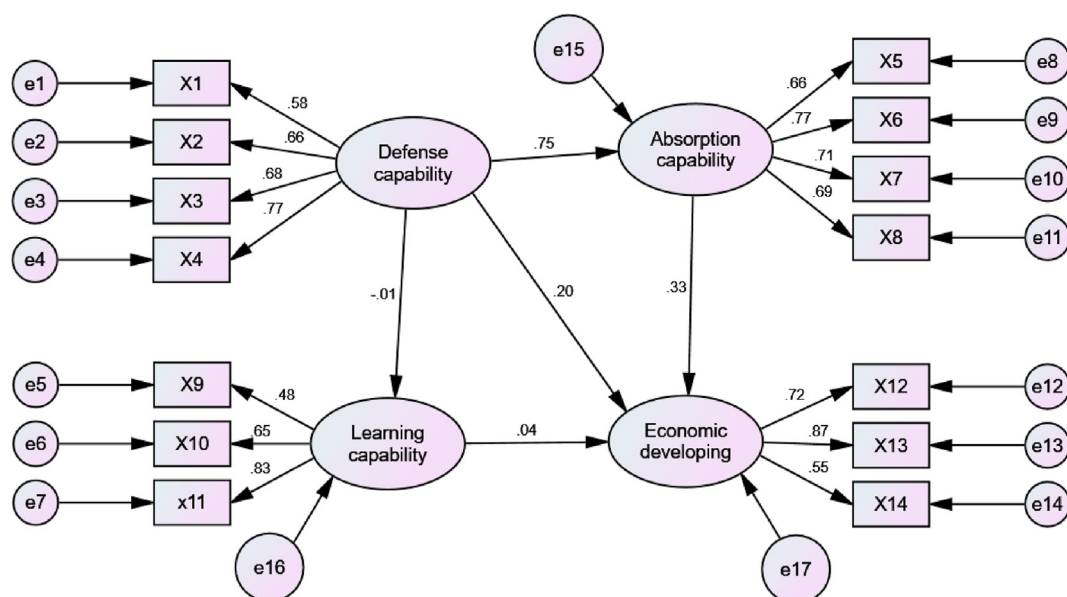


Fig. 4. Initial structural equation model of influencing factors of economic resilience.

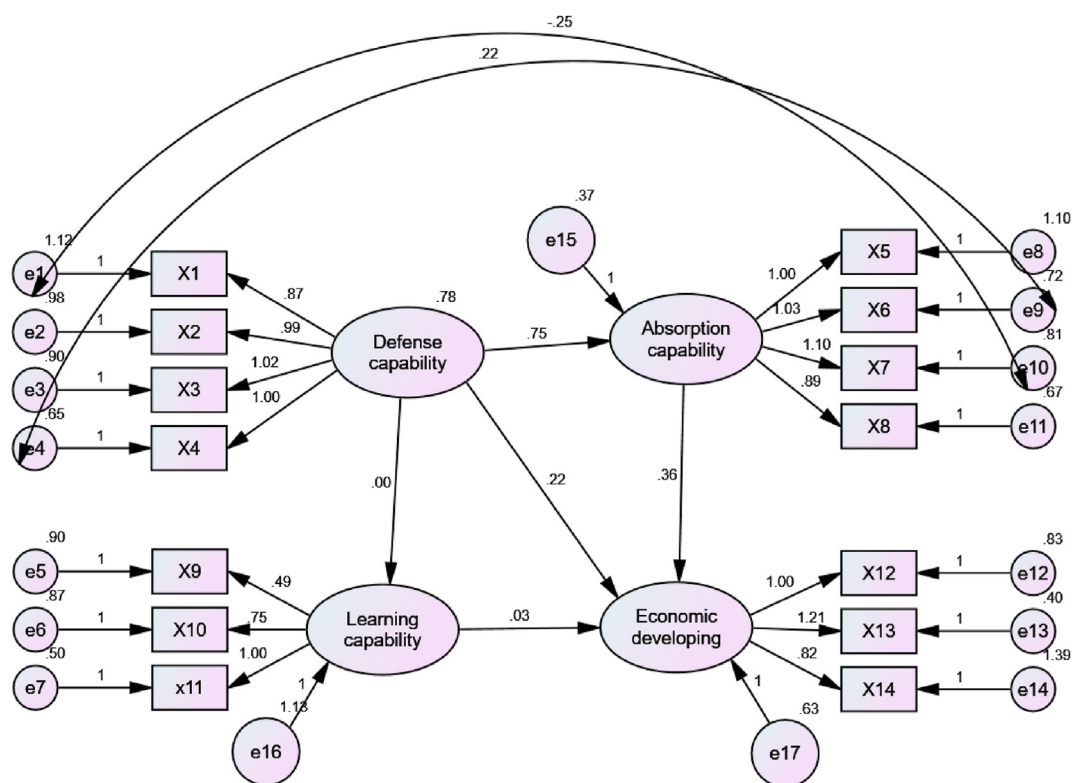


Fig. 5. Standardized modified structural equation model for influencing factors of economic resilience.

parameters, etc., to improve the overall fitness of the model. The final model is obtained after the parameter definition and parameter inspection. The standardized path coefficient of the model is shown in the above figure (Table 5).

The fitness of the model is tested by Amos22.0 software. Table 6 shows the index values for evaluating the fitting of the model, including the absolute fitting index, relative fitting index, and simple fitting index. It can be seen from Table 6 that the data of each index are within the standard range, which shows that the overall fitness of the revised model is better.

5. Analysis and suggestions

5.1. Result analysis

Model evaluation is to find an excellent model that accords with theory and has practical significance. Whether the model is valid or not depends on whether the basic fitness of the model, i.e. the significance of the C.R. value and P-value of the path coefficient, meets the requirements. The standardized path coefficient of path analysis of structural equation model is expressed as follows:

According to the results of model modification, in the initial model, except hypothesis 5, the other four hypotheses are all valid. The analysis shows that defense capability, absorption capability, and learning capability have a significant ($P < 0.05$) direct impact on economic resilience, with path coefficients of 0.21, 0.35, and 0.03, respectively. It can be seen from the table that each path coefficient has statistical significance, and the paths among the above latent variables are valid. In the structural equation model, under the premise of a significant correlation, the greater the absolute value of the path coefficient, the greater the influence degree between these factors. Therefore, in the influencing factor model of economic toughness, absorption capability has the greatest direct impact on economic toughness (0.346); The effect of defense factors is second (0.213). The defense capability has an indirect impact on economic resilience by affecting absorption capability.

5.2. Conclusions and suggestions

In this paper, the structural equation model is used to analyze the influencing factors of Kunming's economic resilience, and the relationship models between latent variables and latent variables, and between latent variables and explicit variables are constructed. The main influence of paths and influence degrees of the main driving factors are revealed. The results show that: defense capability, absorption capability, and learning capability are the main driving factors affecting economic resilience, which can have a direct impact on it. The total effect of the three factors on economic resilience is absorption capability (0.346) > defense capability (0.213) > learning capability (0.031). Also, in this study, it is found that the defense capability has a direct impact on economic resilience, but also has an indirect positive impact on economic resilience through the intermediary role of absorption capability.

Among them, the structural parameters of defense capability and absorption capability are significant, and their standardized path coefficients are 0.213 and 0.346 respectively, that is, when the defense capability changes 1, the economic development changes 0.213, and when the absorption capability changes 1, the economic development changes 0.346; And the total effect of the two is 0.559, indicating that defense capability and absorption capability have extremely significant ($P < 0.01$) positive effects on economic development, and absorption capability has the greatest impact on economic resilience. Measurable variables under absorption capability include per capita consumption X5, wage income X6, the number of employed persons X7, and the number of large enterprises X8, which is the same as the research of Jun He(2018). He believes that consumption plays an important role in promoting economic development and is the backbone of driving economic development, which plays an important guiding role in economic development (He & Ge, 2018). At the same time, appropriately narrowing the income gap will not lead to lowering the cost of economic growth, and enhancing the income level of residents can better promote economic development, thus improving economic resilience (Luo, 2019). Employees also play a positive role in promoting economic development. Fangzhi Hu (2020) put forward measures such as promoting the development of the odd jobs economy and promoting flexible employment through multiple channels (Hu & Shao, 2020). Compared with small and medium-sized enterprises, large enterprises have a positive and significant impact on the growth of regional economic aggregate and have a significant contribution to regional economic stability. Its impact on regional economic growth and economic stability will be further enhanced by its scale expansion. Therefore, large enterprises have played an important role in regional economic development (Li et al., 2020).

As for defense factors, the measurable variables include government public finance expenditure X1, industrial structure proportion X2, economic openness X3, and resident education expenditure X4. According to the estimation coefficient (Wagner's law coefficient) obtained from the regression between the proportion of government fiscal expenditure in GDP and per capita GDP (logarithm value), there is a significant positive correlation between economic development and the scale of total fiscal expenditure, and with the continuous development of the economy, the government's fiscal expenditure scale is also constantly expanding (Qi & Yue, 2020). Jinqian Liu (2020) applied the PVAR model to analyze the panel data of industrial structure upgrading and green economy development level of 30 provinces in China from 2002 to 2018 and found that the causal relationship between industrial structure upgrading and green economy development is significant, which is consistent with the research results of this paper (LiuQue, 2020). As far as an open economy is concerned, taking high-quality economic development as the internal foundation of a higher-level open economy can better cope with the changes of domestic and foreign environments and realize the steady, healthy, and high-quality development of China's economy in the new stage, new normal and new era (Hu, 2020). Bowen Yang (2019), based on the provincial panel data from 2000 to 2018, used the random effect model (RE) to analyze the impact of public education expenditure on the regional economic growth gap in China and found that education expenditure played an important role in regional economic growth (Yang & Gao, 2019).

As for learning factors, measurable variables include the proportion of funds of scientific research institutions X9, the number of scientific research institutions X10, and the degree of education expenditure to government financial expenditure X11. And the path coefficient of learning capability in economic development is 0.031, which is the last of all potential variables, that is when the learning capability changes 1, the economic development changes 0.213. Although the impact on economic development is small ($P < 0.01$), the positive path coefficient also plays a positive role, which is consistent with the research of MaYu(2016). With the full implementation of the strategy of building an innovative country and the rapid development of the knowledge economy and information age, the important position and driving role of scientific research innovation in the development of higher education is becoming more and more obvious,

Table 5

The evaluation index value of structural equation model fitness.

| index | | Criteria | Initial model fitting results | Modify the simulation results of the model |
|------------------------|---------|----------|-------------------------------|--|
| Absolute fitness index | CMIN/DF | 1–3 | 1.662 | 1.407 |
| | GFI | >0.90 | 0.929 | 0.941 |
| | AGFI | >0.90 | 0.896 | 0.911 |
| | RMSEA | <0.08 | 0.056 | 0.044 |
| Relative fitness index | NFI | >0.90 | 0.879 | 0.900 |
| | IFI | >0.90 | 0.948 | 0.969 |
| | TLI | >0.90 | 0.933 | 0.959 |
| | CFI | >0.90 | 0.947 | 0.968 |
| Simple fitness index | PNFI | >0.50 | 0.695 | 0.692 |
| | PCFI | >0.50 | 0.749 | 0.745 |
| | PGFI | >0.50 | 0.637 | 0.627 |

Table 6

Estimation results of the structural equation modeling.

| Path | Standardized path coefficient estimation | S.E. | C.R. | Standardized path coefficient estimation |
|--|--|-------|----------|--|
| learning capability ← defense capability | −0.004 | 0.105 | −0.037 | −0.003 |
| absorption capability ← defense capability | 0.747 | 0.107 | 6.988*** | 0.734 |
| economic development ← defense capability | 0.224 | 0.146 | 1.532*** | 0.213 |
| economic development ← Learning capability | 0.027 | 0.068 | 0.397* | 0.031 |
| economic development ← absorption capability | 0.358 | 0.146 | 2.450*** | 0.346 |
| X4 ← defense capability | 1.000 | | *** | 0.738 |
| X3 ← defense capability | 1.020 | 0.117 | 8.712*** | 0.689 |
| X2 ← defense capability | 0.989 | 0.118 | 8.417*** | 0.661 |
| X1 ← defense capability | 0.870 | 0.116 | 7.493*** | 0.589 |
| X5 ← absorption capability | 1.000 | | *** | 0.651 |
| X6 ← absorption capability | 1.033 | 0.120 | 8.600*** | 0.739 |
| X7 ← absorption capability | 1.098 | 0.129 | 8.518*** | 0.739 |
| X8 ← absorption capability | 0.887 | 0.108 | 8.236*** | 0.698 |
| X12 ← economic development | 1.000 | | *** | 0.714 |
| X13 ← economic development | 1.209 | 0.142 | 8.486*** | 0.872 |
| X14 ← economic development | 0.825 | 0.117 | 7.049*** | 0.545 |
| X11 ← absorption capability | 1.000 | | *** | 0.834 |
| X10 ← absorption capability | 0.745 | 0.143 | 5.216*** | 0.646 |
| X9 ← absorption capability | 0.494 | 0.101 | 4.897*** | 0.485 |

*, ** and *** indicated significant levels at 10%, 5% and 1% levels, respectively.

so the scientific research innovation of higher education effectively promotes the development of local economy (MaYu).

As far as defense capability is concerned, the path coefficient is 0.734, which indicates that defense capability has an extremely significant ($P < 0.01$) positive effect on absorption capability. Improving defense capability can greatly improve absorption capability, thus enhancing economic resilience and promoting economic development. Also, the path coefficient of defense capability to learning capability is -0.003 . Although the path coefficient is small, it is the only variable with the reverse effect. Therefore, we should pay more attention to the influence on learning capability while improving defense capability.

Also, the region selected by the institute is located in the southwest border area, and the research results will help the government to accurately grasp the driving factors of economic resilience, and then formulate more scientific, effective, and reasonable policies from the macro and micro levels, and also provide a reference for other border areas.

Declaration of competing interest

We declare that we have no financial and personal relationships with other people or organizations that can inappropriately influence our work, there is no professional or other personal interest of any nature or kind in any product, service and/or company that could be construed as influencing the position presented in, or the review of, the manuscript entitled, “Study on the Influencing Factors of Urban Economic Resilience in Post Epidemic Era—A Case Study of Kunming City”.

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