An Empirical Analysis of the Collaborative Development of Science and Technology Innovation and Tourism in Liaoning under the Background of Digital Economy
-- Based on VAR Model and Coupling Coordination Model

Aihua Zhao

aihua8663@sina.com

Liaodong University, Dandong, Liaoning Province, China

Abstract. Under the background of digital economy, the high-quality development of tourism industry cannot be separated from scientific and technological innovation and promotion, and the rapid development of tourism can also lead the direction of scientific and technological innovation. Based on the research on the status quo of scientific and technological innovation and global tourism development in Liaoning region, this paper uses VAR and coupled coordination degree model to conduct an empirical study to explore how scientific and technological innovation can promote high-quality tourism development in Liaoning region. The results show that tourism income contributes a lot to the tertiary industry in Liaoning, and the coupling and coordination level between the two systems of scientific and technological innovation and global tourism is gradually improved. Based on these results, this paper puts forward relevant suggestions for further improving the coupling coordination degree of scientific and technological innovation and tourism, which are of guiding significance for the high-quality development of tourism driven by scientific and technological innovation.

Keywords: Scientific and technological innovation; High-quality tourism development; VAR model; Coupling coordination degree.

1 Introduction

Digital economy is a modern emerging economic form that emerged in the 1990s and developed after agricultural economy and industrial economy[1]. It is easier to achieve economies of scale and integration of regional economies, and has a significant effect on economic growth. The important role of tourism in the development of national economy is self-evident, especially the blowout development of ice and snow tourism in Harbin on the New Year's Day in 2024. It can be seen that the high-quality development of tourism can boost domestic demand and accelerate economic growth. The integration of the digital economy and tourism has brought new forms to the tourism industry, created new experiences

IEDM 2024, February 23-25, Kuala Lumpur, Malaysia

DOI 10.4108/eai.23-2-2024.2345910

for tourists, provided convenient business methods for tourism operators, and provided scientific management models for tourism regulators.

In the context of the digital economy, scientific and technological innovation has significantly promoted economic growth. Cultural and tourism industries, as an important part of the industry, are also accelerated by scientific and technological innovation. Scientific and technological innovation is the key to the rapid development of the tourism industry. By attaching importance to the scientific and technological innovation of the cultural tourism industry, improving the scientific and technological content of cultural tourism products and enhancing the cultural experience of consumers, the tourism industry can be promoted to a more sustainable direction and meet the needs of the public.

2 Literature review

With the rapid development of digital economy and the continuous progress of science and technology, the deep integration of digital economy and tourism has attracted extensive academic attention.Research on the digital economy goes back to 1991, when Costello Nicholas et al published a paper entitled "Industrial Restructuring and Public Intervention: Planning the Digital Economy[2]. Therefore, the digital economy has become a hot spot for more and more scholars to study.

Especially since the outbreak of the financial crisis in 2008, countries have regarded the development of digital economy as the key point of economic growth, and the research focus has also focused on how to promote new economic growth drivers. Zhengguang-Yuan(1994), a domestic scholar, pointed out the situation of the international digital revolution early on and expressed the possible impact of the digital revolution on the economy[3]. In terms of the application of digital economy to tourism, one of the early studies was conducted by Pauline J. Sheldon (1997), who discussed the communication application of digital economy in tourism industry[4]. In addition, Yu Wang (2019) discussed the development path of smart tourism in the Internet era by analyzing the importance of smart tourism development in the context of the Internet[5].In foreign countries, scholars began to study how scientific and technological innovation promotes the development of tourism industry, focusing on the importance of innovative behavior and the mode of tourism scientific and technological innovation. For example, Yeoryios (2003) et al. believe that tourism scientific and technological innovation has made important contributions to the sustainable development of tourism[6].

Therefore, we should attach great importance to scientific and technological innovation and apply it to cope with the changes in the tourism industry. Domestic scholars have also conducted a wealth of studies. Haisheng-Zhong (2000) analyzed the impact of scientific and technological innovation on tourism and the relationship between the two earlier, and proposed the direction of future development of tourism scientific and technological innovation through the discussion of tourism scientific and technological innovation system[7].

3 Research methods

In order to better understand the contribution degree of Liaoning's tourism development and the internal relationship between scientific and technological development and tourism development, this paper uses the VAR model and the coupling coordination degree model to conduct an empirical study on the spatio-temporal evolution of the coupling coordination degree of scientific and technological innovation and tourism development in Liaoning.

3.1 VAR model construction

In order to study the contribution of tourism development to local economic development in Liaoning, this paper selects three indicators: total tourism income, per capita tourism consumption of urban residents and output value of tertiary industry in Liaoning. The relationship among the three is shown in Figure 1 below.

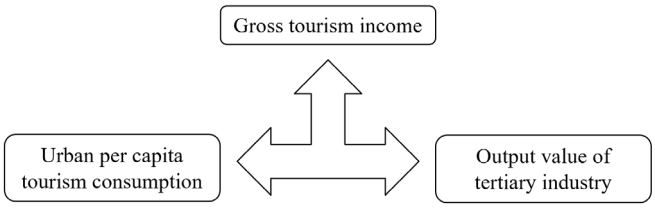

Figure 1. Relationship between gross tourism income, urban per capita tourism consumption and output value of tertiary industry.

Based on the relationship between the above three, the vector autoregressive model is established as follows:

$$\begin{bmatrix} LNINCOME \\ LNACUS \\ LNSGDP \end{bmatrix} = \alpha_1 \begin{bmatrix} LNINCOME_{t-1} \\ LNACUS_{t-1} \\ LNSGDP_{t-1} \end{bmatrix} + \cdots \alpha_n \begin{bmatrix} LNINCOME_{t-n} \\ LNACUS_{t-n} \\ LNSGDP_{t-n} \end{bmatrix} + \begin{bmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \varepsilon_n \end{bmatrix}$$

In the above formula, LNINCOME represents total tourism income, LNACUS represents tourism consumption of urban residents, and LNSGDP represents the output value of the tertiary industry. The above data are logarithmic data, where n indicates the lag period and t indicates the year.

3.2 Construction of coupling coordination degree model

In order to better understand the interaction between technological innovation and tourism development, it is necessary to measure the coupling degree of the two systems.

$$C_i = \frac{2\sqrt{G_i^1 G_i^2}}{G_i^1 + G_i^2} \qquad 0 \le C_i \le 1$$

Let the contribution degree of the two systems be G_i^1, G_i^2 . According to the calculation results, in the process of studying the coupling degree of two systems, it may appear that the

development level of each system is not high, but the coupling degree calculation results show that the coupling degree of both sides is high, and even highly coupled. Therefore, it is necessary to build a coupled coordination model to measure the real coordination development level of the two systems, as shown in Table 1.

Table 1. Criteria for coupling coordination level.

Coupling coordination degree	Coordination level	Coupling coordination degree	Coordination level
$1 \geq D \geq 0.9$	Quality coordination	$0.5 > D \geq 0.4$	Borderline disorder
$0.9 > D \geq 0.8$	Good coordination	$0.4 > D \geq 0.3$	Mild disorder
$0.8 > D \geq 0.7$	Moderate coordination	$0.3 > D \geq 0.2$	Moderate dysregulation
$0.7 > D \geq 0.6$	Primary coordination	$0.2 > D \geq 0.1$	Severe disorder
$0.6 > D \geq 0.5$	Forced coordination	$0.1 > D \geq 0$	Hyper dysregulation

4 Data source

4.1 VAR Research

VAR studies the relationship between total tourism income, per capita tourism consumption of urban residents and output value of the tertiary industry in Liaoning Province, and selects three variables. The data span is from 2005 to 2019, and the data are all from the Guotai 'an database. In this paper, the selected data is unified first, and then the data is processed logarithmically.

4.2 Research on coupling coordination degree

Based on the relevant research results of scholars, this study established an indicator system for the development of the two systems, as shown in Table 2. The science and technology innovation system includes two first-level indexes of science and technology input and benefit of science and technology innovation, including six second-level indexes. The Tourism development System consists of two first-level indicators of tourism input and tourism efficiency, covering eight second-level indicators.

Considering the significant impact of the epidemic on the tourism industry, a thorough understanding of the interplay between technological innovation and tourism development is crucial. To this end, this paper focuses on an in-depth analysis of Liaoning region, specifically examining data spanning from 2005 to 2019. The aim is to evaluate and analyze the time-series changes in the coupling coordination degree between scientific and technological innovation and tourism development, providing insights into how these two factors have interacted and influenced each other over time. The research data sources include the National Data Network and the Statistical Bulletin of National Economic and Social Development of Liaoning Province 2005-2019.

Table 2. Scientific and technological innovation and tourism development index system.

System	Primary index	Secondary index
Scientific and technological innovation	Scientific and technological input	Gross national product
		Proportion of value added of tertiary industry
		Investment in fixed assets
	Scientific and technological innovation benefit	R&D expenditure
		Authorized patent
		Technical transaction amount
Tourism development	Tourism input	Disposable income of urban and rural residents
		Number of tourists
		Number of accommodation enterprises
		Number of employees in accommodation enterprises
	Tourism development benefit	Tourism income
		Business turnover in the accommodation industry
		Added value of accommodation and catering industry
		Tourism contribution rate

5 Empirical analysis

5.1 Research on the interactive relationship between tourism income, tourism consumption and the output value of the tertiary industry in Liaoning

A.Unit root test. According to the VAR model set above, it is necessary to conduct stationarity test on the data, and the analysis of non-stationarity time series may lead to the problem of pseudo-regression, so it is necessary to conduct stationarity test on the data. In this paper, ADF test is used, and the lag orders of the three variables are determined according to the minimum criteria of AIC and SC.

From the results of unit root test shown in Table 3, it can be seen that the ADF statistic of variable LNINCOME is equal to -1.472591, which is greater than the critical value under the significance levels of 1%, 5% and 10%. Therefore, LNINCOME is a non-stationary series. Continue to test a difference series. It can be seen that the ADF statistic of D (LNINCOME) is equal to -4.581257, which is less than the critical value -3.673616 at the significance level of 1%. Therefore, the null hypothesis should be rejected at the significance level of 5%, and the series after first-order difference should be considered as a stationary series. In summary, it can be seen that the original sequences of LNACUS and LNSDP are not stationary, and the sequences after first-order difference are stationary. Therefore, the above three sequences reject the null hypothesis at the significance level of 5%, that is, they are stationary sequences.

Table 3. Results of unit root test.

Variable	Test form (C,T,K)	ADF statistics	Critical level		
			1%	5%	10%
LNINCOME	(C,T,0)	-1.472591	-4.498307	-3.658446	-3.268973
LNACUS	(C,T,0)	-3.44783	-4.498307	-3.658446	-3.268973
LNSGDP	(C,T,0)	-0.846474	-4.498307	-3.658446	-3.268973
D(LNINCOME)	(C,T,0)	-4.581257	-4.532598	-3.673616	-3.277364
D(LNACUS)	(C,T,0)	-4.202849	-4.571559	-3.690814	-3.286909
D(LNSGDP)	(C,T,0)	-3.58012	-4.532598	-3.673616	-3.277364

Note: D stands for first-order difference, C stands for intercept, T stands for trend, and K stands for order lag

B.Cointegration test. Through the above unit root test, it is known that the original data are all stationary sequences after first-order difference, so co-integration test and co-integration test can be carried out, mainly to test whether the linear combination of a group of non-stationary sequences is stable. If the linear combination of non-stationary time series is stable, that is, there is a cointegration relationship, and vice versa. Johansen test was used in this paper, and the test results are shown in Table 4 below.

Table 4. Results of cointegration test.

Null hypothesis	Eigenvalue	Trace statistic	5% critical value	p-value
None *	0.566745	38.53589	35.19275	0.021
At most 1 *	0.532738	22.64375	20.26184	0.0231

From the above cointegration test, the result shows that when the trace statistic of the null hypothesis that there is no cointegration relationship (NONE) is equal to 38.19275, the critical value of 5% is equal to 35.19275, so the null hypothesis should be rejected and a cointegration relationship should be considered. Continuing to look At at most one hypothesis (At most 1), the trace statistic is equal to 22.64375, and the 5% critical value is equal to 20.26184, so the null hypothesis should be rejected and two cointegration relations should be considered. The final hypothesis is At most two (At most 2), and the null hypothesis cannot be rejected at the 5% significance level. From the above, it can be seen that there are two co-integration relations among the three time series. There is a stable long-term equilibrium relationship between the three variables. Based on the results of the cointegration test, the cointegration equation can be obtained as follows (the data in parentheses represent the standard deviation):

$$LNINCONME = 1.152848LNSGDP - 0.843640$$
$$(0.22809) \quad (5.91805)$$
$$LNACUS = 0.260526LNSGDP - 1.050996$$
$$(0.07780) \quad (2.01871)$$

As can be seen from the above co-integration equation, the output value of the tertiary industry in Liaoning Province is positively correlated with the total tourism income of Liaoning Province, and the output value of the tertiary industry in Liaoning Province is also positively correlated with the per capita tourism consumption of urban residents. An increase of 1% in the output value of the tertiary industry in Liaoning Province will lead to an increase of 1.152848% in the total tourism revenue of Liaoning Province, and an increase of 0.260526% in the per capita tourism consumption of urban residents. It shows that the output value of the tertiary industry of Liaoning Province has a great driving effect on the tourism income of Liaoning Province, and also has a certain impact on people's consumption.

C.Pulse analysis. On the basis of vector autoregression (VAR), impulse effect function and variance decomposition can be further used to analyze the established model. The impulse effect function describes the effect of one endogenous variable on the impact of one unit change of another endogenous variable, and provides information such as positive and negative direction, adjustment delay, and stability process of the system response caused by the impact[8]. In this paper, the Choleski[9] decomposition method proposed by Sims (1980) was used to analyze the interaction between urban residents' per capita tourism consumption and tourism income, urban residents' per capita tourism consumption and the output value of the tertiary industry, and the output value of the tertiary industry and the total tourism income in Liaoning Province.

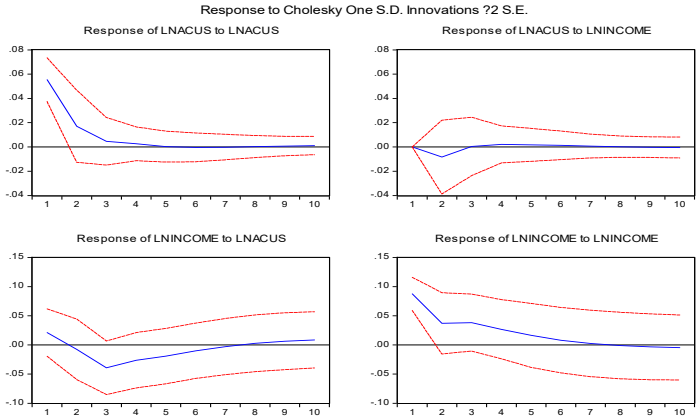

Figure 2. Pulse effect function of per capita tourism consumption and total tourism income.

From the pulse effect function in Figure 2, the per capita tourism consumption of urban residents in Liaoning Province has a great impact on itself, and the impact tends to be stable with the passage of time. The impact of per capita tourism consumption on the total tourism income of urban residents in Liaoning Province is 0 at the beginning, then negative, positive in the third period, and then tends to be stable, indicating that the per capita tourism consumption of urban residents in Liaoning Province has a lagging effect, and has little impact on the total tourism income of Liaoning Province. The impact of total tourism income on per capita tourism consumption of urban residents in Liaoning Province was positive at the beginning, then decreased, reached the minimum in the third period, and then began to increase, showing a "V" shape, indicating that the impact of total tourism income in Liaoning Province on per capita tourism consumption of urban residents is both current and lagging. The impact of the

total tourism revenue of Liaoning Province on itself was positive at the beginning, and then gradually decreased. It can be seen from the above that the impact of tourism consumption on the total tourism income in Liaoning Province is relatively small and negative, and the impact of the total tourism income on tourism consumption is relatively large.

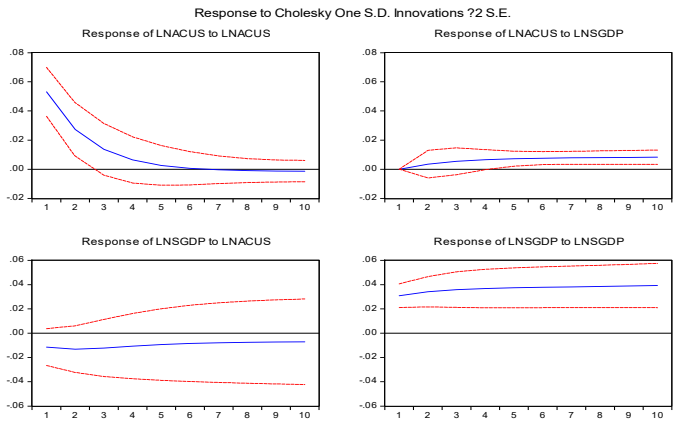

Figure 3. Impulse response function of gross output value of tertiary industry and per capita tourism consumption of urban residents.

From the pulse effect function on the upper left of Figure 3, the impact of per capita tourism consumption on urban residents in Liaoning Province is large at the beginning, tends to decrease with the passage of time, and finally becomes stable. As can be seen from the graph on the upper right, the impact of per capita tourism consumption of urban residents on the output value of the tertiary industry of Liaoning Province has always existed. At the beginning, it was 0, but the lag gradually increased and remained at a stable level. As can be seen from the graph at the bottom left, the impact of the output value of the tertiary industry on the per capita tourism consumption of urban residents in Liaoning Province was negative at the beginning, and then increased, but the impact was always negative. From the graph on the bottom right, the impact of the output value of the tertiary industry of Liaoning Province on itself was positive at the beginning, and then remained positive and maintained at a stable level. In conclusion, per capita tourism consumption of urban residents in Liaoning Province has a large impact on the output value of the tertiary industry, while the impact of the output value of the tertiary industry on the per capita tourism consumption of urban residents in Liaoning Province is relatively small.

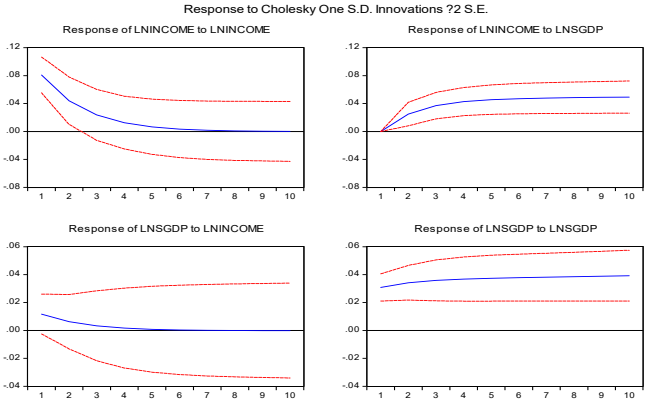

Figure 4. Pulse effect function of gross output value of tertiary industry and total tourism revenue.

From the pulse effect function in Figure 4, the total tourism revenue of Liaoning Province has a big impact on itself at the beginning, and then a small impact. The impact of total tourism revenue on the output value of the tertiary industry in Liaoning Province was 0 at the beginning, and then the impact increased and remained at a stable level. The impact of the output value of the tertiary industry on the total tourism income of Liaoning Province is positive at the beginning, then gradually decreases, and finally tends to zero. The impact of the total output value of the tertiary industry of Liaoning Province on itself was positive at the beginning, and then gradually increased. In summary, it can be seen that the tourism income of Liaoning Province has a great impact on GDP, and the impact of the tertiary industry on the output value of the tertiary industry is gradually decreasing.

5.2 Time series evolution analysis of coupling coordination degree between scientific and technological innovation and tourism development in Liaoning Province

The coupling degree and coupling coordination degree formula were used to analyze the temporal changes of the coupling coordination degree between scientific and technological innovation and tourism development in Liaoning Province from 2005 to 2019, and the relevant data were obtained as shown in Table 5 below:

Table 5. Coupling coordination degree of scientific and technological innovation and tourism development in Liaoning Province from 2005 to 2019.

Time	Scientific and technological innovation contribution degree G1	Tourism contribution degree G2	Coupling degree	$T=\alpha G_1+\beta G_2$	Coupling coordination degree
2005	0.0027	0.0654	0.3907	0.0404	0.1255
2006	0.0368	0.1211	0.8457	0.0874	0.2718
2007	0.0864	0.2093	0.9096	0.1602	0.3816
2008	0.1482	0.3550	0.9116	0.2723	0.4982
2009	0.2268	0.3685	0.9713	0.3118	0.5503
2010	0.3239	0.45835	0.9852	0.4045	0.6312

2011	0.4166	0.5749	0.9872	0.5116	0.7106
2012	0.5616	0.6480	0.9975	0.6135	0.7822
2013	0.6050	0.6933	0.9977	0.6579	0.8102
2014	0.6668	0.72954	0.9990	0.7043	0.8388
2015	0.6417	0.7155	0.9986	0.6859	0.8276
2016	0.4645	0.5991	0.9920	0.5452	0.7354
2017	0.5306	0.6035	0.9980	0.5743	0.7571
2018	0.6450	0.6438	0.9999	0.6442	0.8026
2019	0.7002	0.7649	0.9991	0.7389	0.8592

As it can be seen from the data in Table 5, from 2005 to 2019, the coupling coordination degree between scientific and technological innovation and tourism development in Liaoning showed a gradual rising trend, increasing from 0.1255 to 0.8592, both within the range of 0.1 to 0.9. This indicates that the coordination degree of these two systems is mainly distributed in the two relative stages of severe misalignment and good coordination, and also means that there is still a certain optimization space and potential in the future. In addition, by observing the time series change of the coupled coordination mean of the two systems in Liaoning (0.645), it can be found that the coupling coordination degree of scientific and technological innovation and tourism development shows a good trend of fluctuation and rise during the period from 2005 to 2019, and the overall coordination level is constantly improving.This shows that the synergies between the two systems in Liaoning are gradually increasing. In order to better observe the development trend of the coupling coordination degree of the two, we drew the curve of coupling coordination degree changing with time, as shown in Figure 5 below.

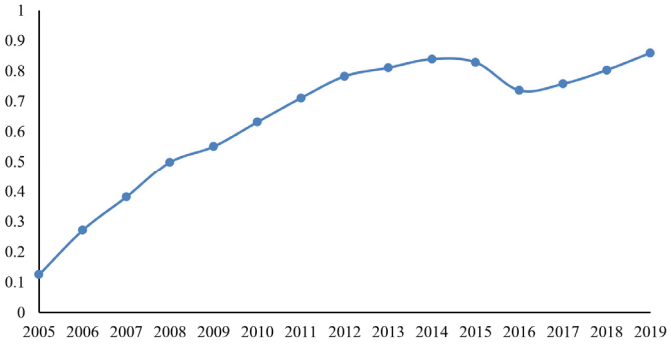

Figure 5. Coupling coordination degree of scientific and technological innovation and high-quality tourism development in Liaoning from 2005 to 2019.

According to the evaluation criteria of coupling coordination degree and the change trend of the mean value of coupling coordination degree between scientific and technological innovation and tourism development in Liaoning as shown in Figure 5, the analysis can be divided into the following three stages:

The first stage (2005-2009) : During this period, the coupling degree of scientific and technological innovation and tourism development was on the verge of imbalance, the coordination was low, and the interaction between the two was not close enough.

The second stage (2010-2016) : In this period, the coupling coordination degree of scientific and technological innovation and tourism development has improved, from the primary

coordination stage to the moderate coordination stage. This may reflect a greater understanding of the harmonious interaction between the two, as well as an improvement in the mismatch between technological inputs and outputs.

The third stage (2016-2019) : In this period, the coupling coordination degree of scientific and technological innovation and tourism development has jumped to the stage of good coordination. This is mainly due to the guiding and guiding policy documents issued by the Department of Culture and Tourism and the Department of Science and Technology of Liaoning Province, while the new development concept continues to deepen. The promotion of these policies and concepts has raised the requirements for the development level of scientific and technological innovation and the quality of tourism development, thus enhancing the coordination between the two.

Taken together, these data and trends show that Liaoning Province has made remarkable progress in science and technology innovation and tourism development, while also highlighting the importance of continuing to improve and optimize the coordination between the two systems. The sustainability of this trend can be ensured only through close monitoring of changes in the degree of coordination. This will also help to better achieve the goals and vision set out in the policy document, providing a solid foundation for achieving more sustainable tourism development and supporting economic growth.

6 Research result and recommendations

6.1 Research result

This study takes Liaoning region as the case object, firstly through in-depth analysis of the mutual relationship and current status between scientific and technological innovation and tourism development, and then makes a comprehensive assessment by using the coupling coordination degree model.This study draws the following conclusions:

A.The development of tourism in Liaoning can promote regional economic development. By establishing the VAR model, it can be concluded that the output value of the tertiary industry in Liaoning Province is positively correlated with the average tourism consumption of urban residents and the total tourism income of Liaoning Province, and the output value of the tertiary industry in Liaoning Province has a relatively obvious driving effect on the tourism income of Liaoning Province.

B.There is a coupling mechanism between scientific and technological innovation and tourism development. There is a significant mutual promotion relationship between scientific and technological innovation and high-quality development of global tourism. Correctly sorting out the coupling mechanism between the two (as shown in Figure 6) is a key link to effectively coordinate scientific and technological innovation and high-quality development of global tourism.

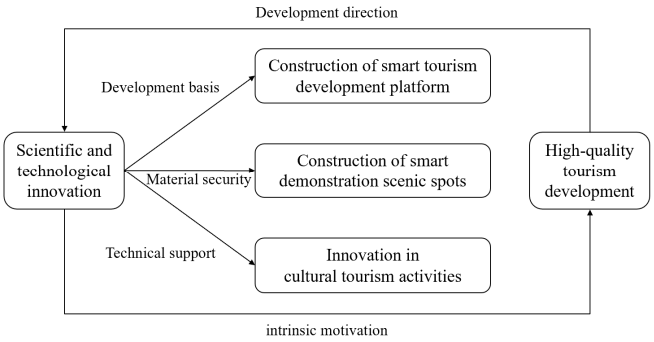

Figure 6. Coupling mechanism between scientific and technological innovation and high-quality development of global tourism.

6.2 Recommendations

A.Coordinate the development of urban and rural tourism and increase residents' income. The per capita tourism consumption of urban residents in Liaoning Province has a certain impact on the output value of the tertiary industry and the total tourism income, so it should promote the income generation of residents. In recent years, with the accelerated pace of urbanization, rural tourism has developed rapidly. As a new tourism growth pole, we should pay attention to the overall development of urban and rural tourism, vigorously develop rural tourism, and create conditions for residents' income. This can not only increase residents' income, but also promote the development of tourism. With the increase of residents' income, the level of consumption will increase, and the willingness of tourism consumption will increase.

B.A number of measures will be taken to promote steady coordination between scientific and technological innovation and high-quality development of global tourism. In order to steadily improve the coordination level of scientific and technological innovation and high-quality development of global tourism in Liaoning, we must take various measures to promote the realization of this goal. We need to pay attention to top-level design, that is, in the process of high-quality development of global tourism, establish a more perfect system and mechanism, plan and promote the development of tourism innovation. With the "14th Five-Year Plan" of Tourism Development in Liaoning Province as the general outline and the "Liaoning Provincial Tourism Development Plan" as the guidance, we should think from the perspective of the healthy development of the tourism industry in the province.Such a method can provide strong support for the high-quality development of global tourism in Liaoning Province, promote the regional economic activity and prosperity, and the driving effect of scientific and technological innovation on tourism. By taking a variety of measures, we can comprehensively promote the steady and coordinated development of scientific and technological innovation and high-quality tourism development in Liaoning.

C.Accelerate the penetration of scientific and technological innovation in the development of global tourism. In order to better promote the high-quality development of global tourism, we need to accelerate the penetration of scientific and technological innovation in the tourism industry. According to the results of empirical analysis, the impact of scientific and technological innovation on tourism development still has great growth potential. Therefore,

we should fully seize the opportunity of high-quality development of global tourism and enhance the penetration of scientific and technological innovation. This requires us to actively promote the digital strategy of the cultural and tourism industry, deepen the "Internet + tourism" model, and improve the application level of 5G, artificial intelligence, Internet of Things, big data, cloud computing, Beidou navigation, blockchain and other advanced technologies in the field of culture and tourism. Through the implementation of these measures, we can realize the scientific and technological revolution of Liaoning cultural tourism industry and promote the realization of high-quality development of the whole region tourism. This will bring more opportunities and challenges to the Liaoning region, while also paving the way for the future development of tourism.

All in all, the scientific and technological innovation and high-quality development of global tourism in Liaoning have shown broad development prospects under the background of digital economy. The deep integration of the two has become the main trend of the development of The Times. Through the coordinated development of scientific and technological innovation and tourism, we have the opportunity to promote the overall level of Liaoning's all-regional tourism to continue to improve, thus accelerating the realization of high-quality development goals. This development direction is full of potential and will bring more opportunities and challenges to the Liaoning region.

7 Conclusion

This study aims to explore how scientific and technological innovation in Liaoning promotes the high-quality development of global tourism, and uses the VAR model and the coupling coordination degree model to conduct an empirical study. The results show that the tourism income of Liaoning Province contributes significantly to the tertiary industry, and there is an obvious coupling mechanism between scientific and technological innovation and global tourism development, and the overall coordination level shows an upward trend. This shows that the high-quality development of Liaoning tourism is an inevitable trend, and scientific and technological innovation has played a positive role in promoting it.

Acknowledgement. This work was supported in part by the Liaoning Provincial Social Science Planning Fund Project with Grant No. L22BJY029.

Reference

[1] Xiaolan-Jiang. Research on the influence of digital economy development on high quality economic development[D]. Guangxi Normal University,2022.

[2] Xing-Hao. Research on the realization path of digital economy empowering the high-quality development of Anhui manufacturing [D]. Anhui University of Finance and Economics,2021.

[3] Zhengguang-Yuan. The digital revolution: a new economic war[J]. Scientific and technological trend,1994(05): 22-24.

[4] Paul Miller & James Wilsdon. Digital future: an agenda for a sustainable digital economy[J]. Corporate Environmental Strategy, 2001(08).

[5] Yu Wang. The development path of smart tourism under the background of Interne[J]. Chinese market,2019(18):189-190.
[6] Yeoryios Stamboulisa, Pantoleon Skayannisb. Innovation strategies and technology for experience based tourism[J]. Tourism Management, 2003,24(1):35-43.
[7] Haisheng Zhong. Study on the renovation system of technolgoy and seience in tourism industry[J]. Tourism Tribune, 2000(03):9-12.
[8] Shang Tao, Tao Yunfang. A study on the relationship between the openness of productive service trade and the international competitiveness of manufacturing industry in china: analysis based on pulse effect function method [J]. Journal of World Economics, 2009(5), 52-58.
[9] Christopher A. Sims. Macroeconomics and reality[J]. Econometric, 1980,48(1).