Article

Spatial-temporal characteristics and influencing factors of China's fishery industry development quality: a perspective from development economics

YAN Yong-zhe[1,2], CHEN Jun-hao [1], TIAN Peng[3] and LI Jia-lin [3,*]

1 Business School, Ningbo University, Ningbo 315211, China; nbuyyz@126.com
2 College of Science & Technology, Ningbo University, Ningbo 315300, China
3 Department of Geography & Spatial Information Techniques, Ningbo University, Ningbo 315211, China
* Correspondence: nbnj2001@163.com; Tel.:+86-574-87609531 (J.L.)

Abstract: By reviewing the research of development economics in recent years, five key terms of 'innovation, coordination, green, openness and sharing' are extracted, corresponding to the five dimensions of the New Development Concept advocated by China. Based on this, an evaluation index system of the development quality of China's fishery industry is constructed. The spatio-temporal characteristics of China's fishery industry development quality were analyzed by using the provincial panel data from 2007 to 2017. The results show that: i) China's fishery industry overall development quality continues to grow, while the variation of provincial quality is also increasing, and the contribution of innovation quality and sharing quality is increasing, becoming an important sub-dimension leading the overall development quality.ii) there is a significant spatial dependence among provincial quality, and the significance is further strengthening. The Hangzhou Bay area and Bohai Bay area have gradually become a dual-core area where the high-quality development of China's fishery industry agglomeration, and the radiation from the dual-core area to the peripheral areas may still be in the process of enhancement. The spatial and temporal distribution of China's fishery industry development quality keeps the trend of 'from northeast to southwest', which is almost parallel to Hu Huanyong line. The gravity center of its distribution is close to the gravity center of Chinese population and economy, and the development quality experienced a process from relatively concentrated to dispersed and then returned to concentrated, and the development speed in the later period was higher than that in the earlier period. iii) Capital accumulation level is the dominant positive influencing factors, while government support level is the dominant negative influencing factors respectively, and both have significant spatial differentiation among provinces.

Keywords: China's fishery industry; development quality; spatio-temporal characteristics;influencing factors

1. Introduction

Economic development is one of the most dynamic and innovative fields in economic research in recent years. The corresponding development economics topics include not only agriculture and industrialization proposed by Zhang(1949)[1], but also innovation[2], industrial coordination[3], resources and environment[4,5], opening to the outside world[6], market monopoly and competition[3], poverty and poverty alleviation[7,8], individual ability and all-round development[9], etc. This paper summarizes it into five concepts: innovation, coordination, green, openness and sharing, which is exactly consistent with the New Development Concept advocated by China in recent years[10].

In addition, more importantly, the unique industrial evolution process of developing countries, especially large developing countries, is often ignored by western scholars who study industry and industrialization process, although it belongs to the research scope of development economics [1,11]. Meanwhile, from the perspective of economic historical schools (such as British historicism economics and German historical School), economic laws and economic theories cannot maintain eternal appropriateness and always change with specific conditions [12]. Therefore, it is of sufficient value to study the evolution process and influencing factors of agriculture and industrialization in developing countries.

China is the largest developing country and the largest fishery producer in the world. Therefore, China's fishery industrial development is with typical research significance for global development economics. On the other part, the fishery industry plays an important role in ensuring China's food security, providing employment opportunities. Therefore, this paper takes China's fishery industry as the research sample. By reviewing relevant literature, the existing relevant research gradually focuses on the five concepts of the New Development Concept mentioned above. It includes total factor productivity of fishery belonging to innovation concept[13], fishery quota system and total fishery resources belonging to coordination concept[14,15], and aquatic export price belonging to open concept [16]. These studies play an important role in improving the development quality of fishery industry from their own dimensions. However, the evaluation of China's fishery industry development quality and the analysis of influencing factors remain to be further studied. It is important for Chinese policy makers, given that a major goal of development economics is to inform policy makers about knowledge gaps related to major policy issues [17]. In view of this, this paper uses provincial panel data to evaluate China's fishery industry development quality, and discusses its spatial- temporal characteristics and influencing factors based on the perspective of development economics.

2. Fishery industry development quality and its evaluation index system

2.1. Industry development quality from the perspective of development economics

The development economics has been evolving for nearly a century since the 1940s. Although the research objectives, methods, ideas and conclusions of relevant scholars from developed and developing countries are quite different, from the perspective of its development context, it has always been progressing mainly around the idea of "development". Romer(1992) once pointed out that 'Ideas are the instructions that let us combine limited physical resources in arrangements that are ever more valuable'[18]. Gerald (2000) summed up the evolution of development thinking into six aspects, while he also stressed that the final goal is that appropriate development ideas can be absorbed and implemented by developing countries, both at the macro level of development policies and at the micro enterprise level of technological progress[4] .On one hand, it can be understood as for developing countries, the 'applicable' thought is of guidance value in practical level, on the other hand we should also note that the development of economic scholars thought concerns both the macro level and the micro level, but less attention to the development of the medium level of ideas. However, the industry, as an important main body of the medium level, its development quality is the intermediate link that the development thought can be bridged from macro to micro level, but has been ignored by many scholars in the past. The research gaps in this domain include which dimensions can be measured for industrial development, how to measure and evaluation of development quality. Zhang (1949) has specially discussed the thought of industrialization in agriculture, and the transformation of industrial structure [3]. The theme of these writings has essentially concerned the issues of industrial development, that is industrialization, and a sub-dimension of industry development quality evaluation, that is industrial structure, However, there is a lack of qualitative and quantitative measurement of industry development quality. As mentioned above, it is not only a tradition of paying attention to the idea of 'development', but also the embodiment of development economics in the mesosphere thought. So the research of industry development quality, though rare, is with enough theoretical research significance.

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 20 January 2022 doi:10.20944/preprints202201.0302.v1

2.2. Construction of evaluation index system of fishery industry development quality

At present, there are few studies on the evaluation of fishery industry development quality as we known. In the introduction, this paper has compared the five concepts of the New Development Concept proposed by China with the related themes focused on development economics, and reached the conclusion that the two tend to be consistent (their corresponding relationship is shown in Table 1. Therefore, this paper chooses the five concepts(or sub-dimensions) of the New Development Concept as the five level-1 indicators in the construction of the fishery industry development quality evaluation index system. According to the selection criteria of scientific, typical, operable, and available data, the evaluation index system of China's fishery industry development quality was constructed. There are 5 first-level indicators to corresponding to the 5 sub-dimensions of the New Development Concept and 22 second-level indicators (Table 2).

Table 1. Correspondence between New Development Concept and development economics theme

New Development Concept	Corresponding development economics theme	Related works
Innovation	Innovation	[1], [2]
Coordination	Industrial Structure, Comprehensive Industrialization	[1]
Green	Resources and Environment, Sustainable Development	[4]
Openness	Opening to the outside world, Monopoly and Competition, Economic Separation	[1]
Sharing	Poverty Reduction, Equity, Personal Empowerment and Comprehensive Development	[4], [9]

Table 2. Evaluation index system of China's fishery industry development quality

Level-1 indicator	Level-2 indicator	Calculation method
Innovation quality	Proportion of added value of fishery industry	The proportion of added value of fishery primary industry in its output value.
	Yield per unit area in freshwater culture	Ratio of freshwater production to freshwater acreage
	Per capita output value of fishery labor force	Ratio of fishery industry output value to fishery labor force
	Service depth of aquatic technology extension agency	Ratio of the output value of fishery industry to the number of aquatic technology extension agencies
Coordination quality	Proportion of output value of secondary industry	Ratio of output value of fishery industry and construction to output value of fishery
	Proportion of output value of tertiary industry	Ratio of fishery circulation service output value to fishery output value
	Fisheries circulation and service sector growth	Fishery circulation service output value increased year on year
		See research Method 2.3.5 for details

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 20 January 2022 doi:10.20944/preprints202201.0302.v1

	Location entropy of fishery industry	
Green quality	Energy consumption in per unit output value (-)*	Ratio of fishery production value to total energy consumption
	Pollution incidents (-)	
	Proportion of economic loss caused by pollution (-)	Ratio of fishery losses caused by pollution to fishery output
	Proportion of environmental spending	Ratio of environmental protection expenditure to total fiscal expenditure
	Freshwater fish farming sewage intensity (-)	Average COD (chemical oxygen demand) emissions of selected species in aquaculture
Openness quality	International Trade competitiveness index	Ratio of net exports of aquatic products to total foreign trade of aquatic products
	Foreign trade dependence of aquatic products	Ratio of aquatic product import and export value to fishery output value
	Proportion of non-state-owned fishery enterprises	Ratio of non-state-owned fishery enterprises to total number of fishery enterprises
	Turnover of aquatic products per unit area	Ratio of aquatic product sales to business area
Sharing quality	Number of aquatic technology extension agencies per capita	Ratio of the number of aquatic technology extension agencies to the number of fishery employees
	Per capita net income of fishermen	
	Aquatic product production price index (-)	Ratio of aquatic product output to year-end population
	Per capita output of aquatic products	Ratio of recreational fishery value to year-end population
	Per capita recreational fishery output value	

* Note :(-) denotes negative index

Description and explanation of index selection and calculation method are as follows:

1. Innovation quality

Schumpeter's explanation that innovation drives industrial development has been well known to all[2]. Zhang also pointed out that innovation is the ‘generating factor in industrial evolution’, including entrepreneurs' innovation ability and production technology[1]. Innovation quality can be measured by considering the input and output indicators of industrial innovation. From the perspective of the whole industry, total factor productivity, industrial added value, etc., and from the perspective of single factor, per capita output value, per unit area output value, and service output value of scientific and technological institutions, etc. are recommended. According to the Chinese investigation department in the statistics of fishery, in terms of added value of secondary industry and tertiary industry index, it is a way of using reference to calculate the corresponding index, only the primary industry is used to deduct the intermediate input output method, so this article chooses primary industry, as the representative of the Proportion of added value of fishery industry. The main access of aquatic products is divided into four categories, the sea fishing, aquaculture, freshwater fishing and fresh water aquaculture. But the most common access throughout China is the freshwater aquaculture, which generally use advanced technical equipment and management, has the typicality of technology innovation, therefore the freshwater aquaculture is chosen from the perspective of Yield per unit area in freshwater culture. The Per capita output value of fishery labor force and the Service depth of aquatic technology extension agency are the representation indexes of the per capita output value and the service output value of scientific and technological institutions respectively.

2. Coordination quality

Zhang (1999) put forward that 'agricultural countries must fully realize industrialization in order to achieve economic development, including the industrialization of agriculture and rural areas', moreover, he especially put forward that 'the smooth transformation of industrial structure... to a large extent determines the success or failure of industrialization'[3]. China's fishery industry is still in the development stage of large but not strong, so this paper mainly chooses the industrial structure for measuring its inner coordination quality, namely, the Proportion of secondary fishery industry and tertiary fishery industry [19]. Meanwhile, considering that the fishery tertiary industry still needs to be vigorously developed in China [20,21], its development potential can be measured by Fisheries circulation and service sector growth. On the other hand, considering that the total supply of domestic aquatic products in China is still less than the potential demand [22], the proportion of China's fishery industry in agriculture still has potential to increase. Therefore, this paper uses the Location entropy of fishery industry to measure the external coordination quality. All above four indicators are positive indicators.

3. Green quality

Sustainable Development concept is one of the major theoretical contributions of development economics to the world in recent years. It emphasizes the moderation of resources, recyclable use and concern about pollution [4]. Therefore, the green quality of fishery industry should pay attention to its performance in saving resources and mitigating environmental impact, which can be measured from two perspectives, resource consumption and environmental impact. In this paper, the Energy consumption per unit output value is used to represent its resource consumption level. According to its direction, environmental impact can be divided into two aspects, namely, the impact of external environment on industry and industry on external environment. In this paper, the Pollution incidents and the Proportion of economic loss caused by pollution are selected to represent the impact of external environment on industry. The Proportion of environmental spending and the Freshwater fish farming sewage intensity were selected to represent the impact of the industry on the external environment. For the latter, herring, grass carp, silver carp and carp were selected as the evaluation species for the sewage intensity of freshwater fish cultivation. Because their breed quantity is large, so they are typical representative. Besides, their breeding area are widely distributed, which is convenient for inter-regional comparison. The choice of COD (chemical oxygen demand) is because it is the most important and universal statistical index of freshwater fish production sewage water, the higher its value indicates the more serious organic pollution in water. Except for the Proportion of environmental spending, the other four indicators are negative indicators.

4. Openness quality

With the process of economic development and urbanization, the separation, including production location and consumption location, factor supply location and factor demand location, makes the opening of consumer market and factor market an inevitable requirement [1], so the openness quality becomes particularly important. The openness quality includes both external and internal opening-up. In the aspect of opening to the

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 20 January 2022 doi:10.20944/preprints202201.0302.v1

outside world, this paper selects two indexes, namely, the International trade competitiveness index and Foreign trade dependence of aquatic products. Internal opening mainly focuses on breaking the fragmentation and monopoly between regions and industries of factors and commodities[23]. As an important component of the non-public economy, private enterprises are the main force to break factor monopoly and realize China's internal opening-up [24]. In this paper, the Proportion of non-state-owned fishery enterprises is selected to represent the quality of internal opening-up. The Turnover of aquatic products per unit area can reflect the active trading degree of aquatic products, which is used to represent the internal openness quality of commodities.

5. Sharing quality

Development economists represented by Amartiya Sen emphasize the concept of fairness, individual ability and all-round development[9], which is a response to the previous criticism that development economics 'sees only things but no people'[4]. Fairness can generally be divided into opportunity fairness and outcome fairness[24], which can be further decomposed into two aspects: producers' access to factors and consumers' access to goods and services, so as to measure the fairness of the opportunity and outcome. Therefore, this paper selects the Number of aquatic technology extension agencies per capita to measure the opportunity fairness of producers in acquiring factors, the Per capita net income of fishermen represents the fairness of the result that producers get remuneration, the Aquatic product production price index represents the opportunity cost of consumers to obtain aquatic products, so it can be used to represent the opportunity fairness of consumers to obtain aquatic products, which is a negative indicator. Per capita output of aquatic product and Per capita recreational fishery output value are used to represent the outcome fairness of consumers' access to goods and services.

This paper takes 2007 to 2017 as the observation period. 2007 was the 30th anniversary of China's reform and opening up, and the fishery industry was one of the earliest industries to enter the reform pilot in the early stage of development[25]. In 2017, the concept of 'High-quality development' was formally proposed, representing a new stage of development. These two years were selected as the beginning and end of the observation period, which makes the data historically valuable for this paper. Relevant data were selected from China Fishery Yearbook, China Agricultural Yearbook, China Agricultural Product Price Survey Yearbook, China Basic Unit Statistical Yearbook, China Commodity Trading Market Statistical Yearbook, China Statistical Yearbook, China Energy Statistical Yearbook and the Announcement of China Fishery Ecological Environment etc. For the collected outlier data, it is inferred through cross-validation between different databases and statistical test[26], abnormal data is rejected, and missing data is filled by moving average method, linear interpolation method or trend extrapolation method. Due to lack of relevant data, only 29 provinces (including autonomous regions and municipalities directly under the central government) were selected, excluding Qinghai, Tibet and Hong Kong, Macao and Taiwan.

2.3. Research methods

2.3.1. Improved entropy method

The entropy is a measure of uncertainty. The entropy value can be used to judge the dispersion degree of an index, and the greater the dispersion degree of the index, the greater the influence of the index on the comprehensive evaluation. The advantage of the entropy method is objectivity. But the disadvantage is susceptible to indicator outliers. By comparing with other comprehensive evaluation methods, such as entropy TOPSIS method and principal component analysis method, entropy method is adopted in this paper to determine the weight of evaluation indicators for the development quality of China's fishery industry, and calculate the corresponding development quality of China, provinces, and sub-dimensions. The general calculation steps are referred to literature[27]. Considering that the entropy value in different years will fluctuate under the influence of outliers, resulting in high or low evaluation results, the range and weight of evaluation indexes in the calculation process of general entropy method are replaced by the range

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 20 January 2022 doi:10.20944/preprints202201.0302.v1

annual mean and weight annual mean of corresponding indexes, so as to suppress the fluctuation of entropy value in different years. Make sure to measure the temporal and spatial characteristics of the original indicator itself in different years.

2.3.2. Exploratory spatial data analysis

The entropy is a measure of uncertainty. The entropy value can be used to judge the dispersion degree of an index, and the greater the dispersion degree of the index, the greater the influence of the index on the comprehensive evaluation. The advantage of the entropy method is objectivity. But the disadvantage is susceptible to indicator outliers. By comparing with other comprehensive evaluation methods, such as entropy TOPSIS method and principal component analysis method, entropy method is adopted in this paper to determine the weight of evaluation indicators for the development quality of China's fishery industry, and calculate the corresponding development quality of China, provinces, and sub-dimensions. The general calculation steps are referred to literature[27]. Considering that the entropy value in different years will fluctuate under the influence of outliers, resulting in high or low evaluation results, the range and weight of evaluation indexes in the calculation process of general entropy method are replaced by the range annual mean and weight annual mean of corresponding indexes, so as to suppress the fluctuation of entropy value in different years. Make sure to measure the temporal and spatial characteristics of the original indicator itself in different years.

2.3.3. Kernel density analysis

Kernel density analysis, as a common method for hotspot analysis of geographical elements, can be used to reflect the spatial distribution characteristics of a geographical element, and intuitively display the agglomeration form of geographical elements and their status under the spatial distance attenuation. See reference for the calculation formula of nuclear density[29].

2.3.4. Standard deviation ellipse and center of gravity transfer method

The standard deviation ellipse(SDE) model can be used to visually analyze the spatial distribution characteristics of a geographical element in a region. The analysis content mainly includes the gravity center of ellipse, major axis and minor axis, and rotation angle. The barycenter represents the relative central position of a geographical element in space distribution. The major axis and minor axis reflect the direction and range of spatial distribution of geographical elements respectively. The greater the difference between the major and minor axis, the higher the flattening value, and the more prominent the direction of spatial distribution of geographical elements. The rotation angle represents the spatial development direction of geographical elements. With the passage of time, the barycentric coordinates may shift, and the flattening value and rotation angle will also change correspondingly, so it can accurately present the spatio-temporal evolution characteristics of industrial development. Standard deviation ellipse model refer to the literature [30].

2.3.5. Location entropy method

The method of location entropy is often used to compare the concentration of output or input of a particular industry in a particular region with that of the whole country. This paper uses location entropy index to measure the proportion of fishery industry in agricultural economy in a specific region. The calculation formula is:

$$L_i = \frac{e_i/e_t}{E_i/E_t}$$

Where, e_i is the total output value of fishery industry in a region. e_t is the total agricultural output value of the region. E_i is the total output value of national fishery industry. E_t is the total agricultural output value of China. And L_i is the location entropy of fishery industry in this region.

3. Spatial-temporal characteristics of China's fishery industry development quality

3.1. Temporal variation characteristics of China's fishery industry development quality

3.1.1. Temporal variations of fishery industry development quality in China and provinces

This paper choose the entropy method to calculate the development quality of fishery industry in provinces (provincial quality), and the mean value of provincial quality is used to represent the overall development quality (ODQ) of China's fishery industry (Table 3). As shown in Table 3, from 2007 to 2017, the ODQ of China's fishery industry increased from 0.348 to 0.499, and the coefficient of variation(C.V.) also increased. It shows that the ODQ of China's fishery industry shows a trend of stable growth, while the quality gap between provinces is also expanding. In terms of provincial quality, Jiangsu, Hubei, Shandong, Shanxi, Shanghai, Hainan, Liaoning, Beijing, Fujian and Jilin improved faster (with an increase of more than 0.2). Anhui, Jiangxi, Ningxia, Guangdong, Zhejiang, Tianjin, Hunan, Yunnan, Sichuan, Guizhou and Guangxi saw moderate increases (between 0.1 and 0.2). The provinces with the slowest improvement (less than 0.1) were Heilongjiang, Xinjiang, Inner Mongolia and Hebei. While levels fell in Chongqing, Henan, Gansu and Shaanxi.

Table 3. China and provincial fishery industry development quality

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
ODQ	0.348	0.343	0.353	0.358	0.370	0.388	0.405	0.422	0.439	0.478	0.499
C.V. *	0.341	0.390	0.384	0.412	0.420	0.403	0.420	0.430	0.423	0.462	0.440
Beijing	0.282	0.305	0.304	0.300	0.329	0.351	0.361	0.385	0.391	0.408	0.517
Tianjin	0.358	0.288	0.313	0.348	0.377	0.437	0.488	0.506	0.552	0.478	0.487
Hebei	0.371	0.313	0.346	0.345	0.337	0.346	0.352	0.359	0.381	0.379	0.404
Shanxi	0.261	0.262	0.339	0.207	0.208	0.230	0.251	0.244	0.242	0.400	0.568
Inner Mongolia	0.182	0.187	0.251	0.246	0.242	0.250	0.265	0.260	0.270	0.236	0.229
Liaoning	0.483	0.551	0.534	0.614	0.625	0.627	0.656	0.688	0.650	0.728	0.755
Jilin	0.264	0.246	0.247	0.270	0.257	0.245	0.262	0.260	0.393	0.442	0.472
Heilongjiang	0.214	0.221	0.224	0.230	0.228	0.234	0.261	0.264	0.250	0.262	0.282
Shanghai	0.311	0.344	0.302	0.300	0.324	0.347	0.358	0.364	0.360	0.562	0.610
Jiangsu	0.395	0.439	0.474	0.460	0.475	0.504	0.573	0.597	0.624	0.947	0.979
Zhejiang	0.526	0.545	0.538	0.553	0.575	0.597	0.610	0.639	0.660	0.674	0.676
Anhui	0.300	0.279	0.298	0.317	0.336	0.383	0.409	0.434	0.436	0.447	0.474
Fujian	0.579	0.599	0.615	0.633	0.691	0.693	0.722	0.754	0.783	0.809	0.795
Jiangxi	0.397	0.455	0.488	0.429	0.443	0.471	0.489	0.512	0.530	0.541	0.561
Shandong	0.526	0.547	0.557	0.570	0.582	0.610	0.647	0.668	0.703	0.841	0.871
Henan	0.408	0.356	0.345	0.346	0.334	0.317	0.299	0.308	0.299	0.314	0.328
Hubei	0.427	0.530	0.528	0.559	0.584	0.591	0.631	0.678	0.744	0.834	0.818
Hunan	0.261	0.258	0.279	0.328	0.348	0.340	0.394	0.403	0.431	0.432	0.384
Guangdong	0.452	0.456	0.489	0.523	0.525	0.531	0.551	0.551	0.562	0.590	0.608
Guangxi	0.346	0.378	0.406	0.440	0.444	0.454	0.463	0.468	0.460	0.457	0.446
Hainan	0.604	0.595	0.611	0.631	0.667	0.714	0.753	0.837	0.854	0.908	0.881
Chongqing	0.317	0.264	0.253	0.255	0.266	0.284	0.278	0.285	0.294	0.298	0.315
Sichuan	0.266	0.273	0.254	0.263	0.283	0.299	0.331	0.321	0.335	0.353	0.373
Guizhou	0.205	0.160	0.240	0.175	0.173	0.230	0.166	0.196	0.231	0.231	0.311
Yunnan	0.224	0.221	0.212	0.196	0.212	0.223	0.243	0.303	0.298	0.312	0.339
Shaanxi	0.457	0.193	0.193	0.168	0.187	0.188	0.207	0.221	0.216	0.218	0.240
Gansu	0.279	0.236	0.162	0.173	0.164	0.230	0.199	0.199	0.220	0.212	0.152

Ningxia	0.241	0.244	0.243	0.252	0.254	0.258	0.281	0.292	0.313	0.316	0.399
Xinjiang	0.160	0.206	0.197	0.252	0.264	0.264	0.237	0.246	0.246	0.234	0.211

* Note: C.V. = (standard deviation of provincial quality/mean of provincial quality

3.1.2. Temporal variation of sub-dimensional quality contribution of China's fishery industry

The proportion of the five sub-dimensions to the ODQ of China's fishery industry is taken as the contribution to the ODQ (Table 4). The results showed that the contribution of five sub-dimensions to the ODQ of China's fishery industry in 2007 were 22.79%, 19.48%, 17.09%, 22.60% and 18.05%, respectively. The contribution of innovation quality and openness quality was slightly higher, while that of coordination quality, green quality and sharing quality was slightly lower. By 2017, the contribution of innovation quality and sharing quality basically maintained a steady growth trend, increasing to 27.8% and 30.7% respectively, while the contribution of coordination quality, green quality and openness quality decreased to 13.72%, 13.32% and 14.44% respectively. It indicates that innovation quality and sharing quality improved faster during the observation period, leading China's fishery industry development quality.

Table 4. Contribution of sub-dimensional quality to ODQ (%)

	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Innovation	22.79	22.40	21.47	22.86	23.98	24.22	24.56	25.07	24.89	26.93	27.76
Coordination	19.48	18.11	18.46	17.91	17.09	16.47	15.70	14.94	15.35	14.14	13.72
Green	17.09	17.83	18.06	18.05	16.84	15.78	15.28	14.67	14.70	13.32	13.32
Openness	22.60	20.42	19.96	18.82	19.07	19.36	19.05	18.62	17.93	15.50	14.44
Sharing	18.05	21.23	22.06	22.36	23.24	24.17	25.41	26.70	27.13	30.11	30.74

3.2. Spatial characteristics and variations of China's Fishery industry development quality

3.2.1. Spatial characteristics and variations of provincial quality

In order to analyze the spatial characteristics and variations of the provincial quality, ArcGIS10.5 was used to conduct spatial visualization analysis on the provincial quality in 2007, 2012 and 2017 (Figure 1). The results showed significant differences. 29 provinces (autonomous regions and municipalities directly under the central government) were divided into three regions, east, central and west, according to the location classification standard of the National Bureau of Statistics and the provincial quality. In the east it covers Beijing, Tianjin, Hebei, Liaoning, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong and Hainan; The central part includes Hubei, Hunan, Henan, Anhui, Jiangxi, Shanxi, Jilin and Heilongjiang; In the west are Sichuan, Yunnan, Guizhou, Chongqing, Shaanxi, Gansu, Xinjiang, Ningxia, Inner Mongolia and Guangxi. The provincial quality gradually decreases from the east to the central and western regions, and the quality gap among the three regions has a further trend of widening as time goes by.

 doi:10.20944/preprints202201.0302.v1

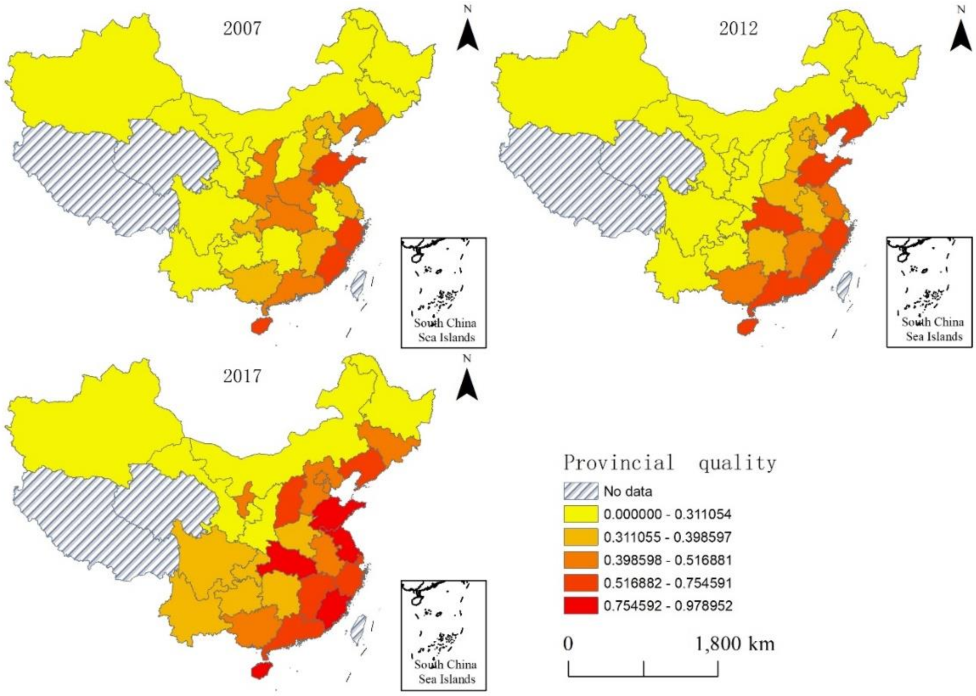

Figure 1. Spatial distribution of provincial quality

Note: All maps are made based on the standard map No.GS(2016)1598 downloaded from the standard map service website of National Administration of Surveying, Mapping and Geographic Information, and the base map is not modified.

The global Moran's I was used to evaluate the agglomeration of provincial quality (Table 5). The results showed that in 2007, 2012 and 2017 provincial quality presents significant spatial dependency, namely high quality provinces is surrounded by high quality provinces, while low quality provinces is surrounded by low quality provinces. The global Moran's I and the Z value increase gradually, while the P values decline gradually, show spatial dependency tends to further strengthen.

Table 5. Global Moran's I of provincial quality

	2007	**2012**	**2017**
Moran's I	0.228	0.235	0.262
Z value	2.384	2.444	2.687
P value	0.017	0.014	0.007

In order to describe the agglomeration form of fishery industry development quality and its variation in spatial distance attenuation, the kernel density analysis of provincial quality was carried out (Figure 2). According to the kernel density value, the province was divided into different circles, and the analysis results showed that the difference between the circles was gradually clarified. In 2007, three circles appeared in the province, but no obvious core circle was formed. In 2012, the Hangzhou Bay area and the Bohai Bay area began to form an obvious core area, while the scope of the secondary core area moved southward. It shows that these two bay areas have become a dual-core area with high-quality clustering. In 2017, the kernel density value of the dual-core area was further increased, and the circle area around the Hangzhou Bay area was larger, while the other circle area except the outermost circle increased. This indicates that the degree of high-quality agglomeration in the dual-core area is further improved during the observation period, and its radiation to the peripheral areas may still be increasing.

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 20 January 2022 doi:10.20944/preprints202201.0302.v1

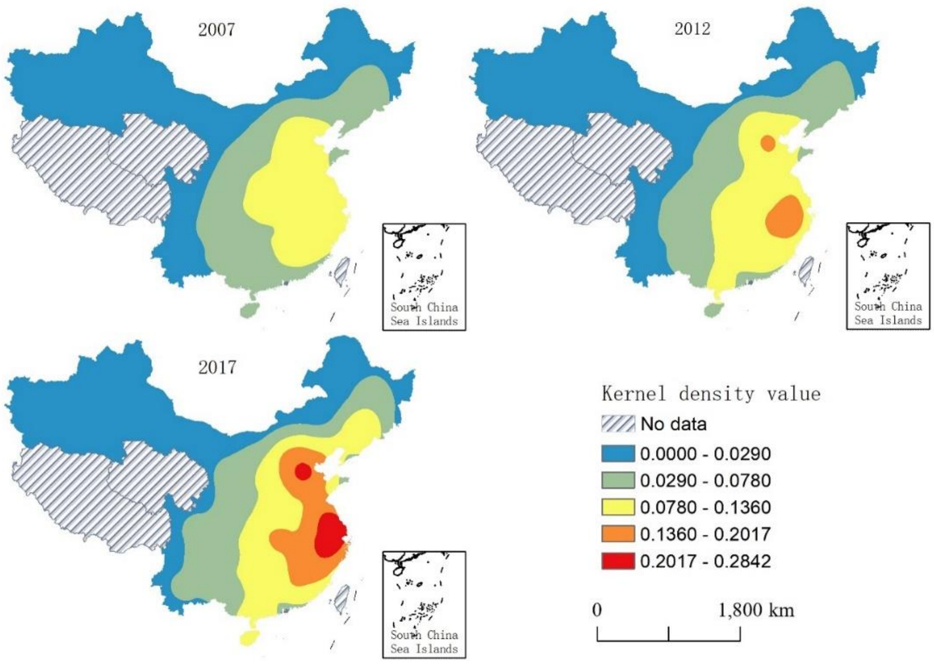

Figure 2. Kernel density variation of provincial quality

3.2.2. Spatial distribution pattern and variation of China's fishery industry development quality

The standard deviation ellipse (SDE) and gravity center migration method were used to analyze the spatial distribution patterns and growth sources of China's fishery industry development quality (Figure 3). The results show that the standard deviation ellipse is mainly distributed in the southeast of Hu Huanyong Line, accounting for about 30% of China's land area. Its gravity center is close to the gravity center of population and GDP of China [30], and its rotation angle is basically stable and approximately parallel to Hu Huanyong Line. It is suggested that the distribution of China's fishery industry development quality may be mainly affected by 'secondary natural' factors such as population and economy [31], leading to the high-quality regions mainly distributed in the southeast provinces of China, resulting that the distribution direction is from northeast to southwest. From 2007 to 2012, the major axis of the standard deviation ellipse extended from 1151.564km to 1171.013km, indicating that the China's fishery industry development quality tended to be polarized in the direction of northeast to southwest during the period. However, from 2012 to 2017, the major axis has been shortened to 1163.577 km, indicating that the distribution is concentrated again. The minor axis is also prolonged first and then shortened, which also indicates that the distribution level has undergone a process from concentration to dispersion and then returned to concentration. However, the flattening value decreased from 1.342 to 1.293 and then rose to 1.435, indicating that the trend of the distribution of 'northeast to southwest' tends to be clear.

In terms of gravity center, it moved from southeast to east by north. It shows that from 2007 to 2012, the growth of the ODQ mainly comes from the southeast provinces of the gravity center. While growth from 2012 to 2017 was mainly from the east and north provinces of the gravity center. In terms of moving distance, the distance in the latter half of the stage is larger than that in the first half of the stage, indicating that the moving speed of the gravity center in the latter half of the stage is accelerated, reflecting that the development speed in the later stage is higher than that in the earlier stage.

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 20 January 2022 doi:10.20944/preprints202201.0302.v1

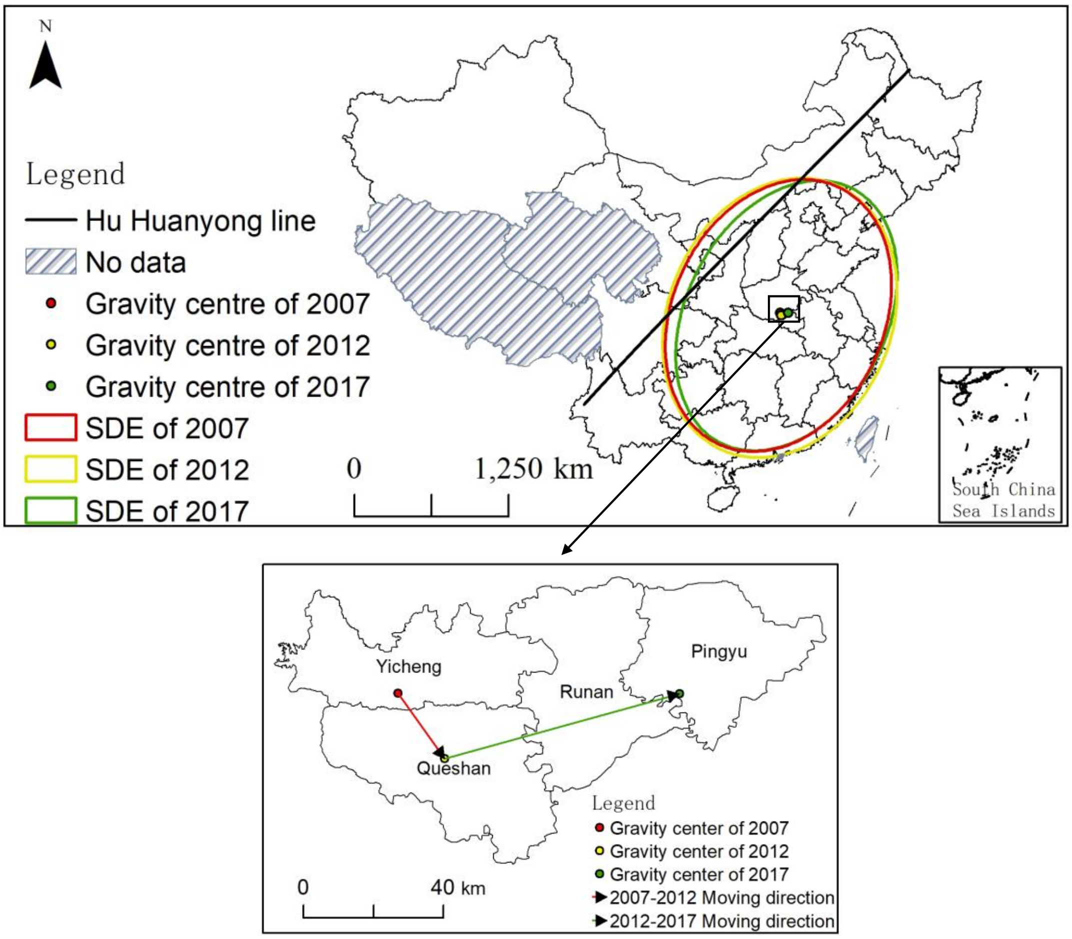

Figure 3. Standard deviational ellipse and barycenter forward path of ODQ

4. Analysis of influencing factors

4.1. Selection and analysis steps of relevant influencing factors

From a macro level, the general factors affecting the industry development quality can be divided in four dimensions, namely. society, economy, science & technology, and the environment. This paper refers to development economics about macro impact factors in the developing countries, as well as the corresponding and related theory, combined with related literature which influenced the development of China's fishery industry [32-36]. Nine factors are selected subsequently(See Table 6 for influencing factors and literature sources), including urbanization level, infrastructure level, government support level, economic development level, residents' consumption level, capital accumulation level, industrial structure level, informatization level, scientific & technological development level and environmental capacity level, and their represented variables are: proportion of urban population (UBR), road mileage per capita (RDM), proportion of public budget expenditure in GDP (PBE), per capita GDP (GDP), proportion of resident consumption level in GDP (HCE), proportion of foreign direct investment in GDP (FDI), proportion of output value of secondary and tertiary industries (IND), total per capita postal and telecommunications business (TPT), R&D expenditure as a percentage of GDP (RD), and wastewater emission intensity (POL). Data are from China Statistical Yearbook and China Low Carbon Cycle Yearbook from 2008 to 2018. A multiple linear regression model is constructed:

$$ODQ=\alpha+\beta_1 UBR+\beta_2 RDM+\beta_3 PBE+\beta_4 GDP+\beta_5 HCE+\beta_6 FDI+\beta_7 IND+\beta_8 TPT+\beta_9 RD+\beta_{10} POL+\varepsilon$$

In the formula, ODQ is China's fishery industry development quality estimate calculated from independent variables, α is the constant term, β1, β2, ..., β12 is the partial regression coefficient of each variable, and ◎ is the error term. In the analysis procedure,

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 20 January 2022 doi:10.20944/preprints202201.0302.v1

the thinking of Fu Zhanhui et al. (2019) was used for reference (Fu Zhanhui, Mei Lin, Liu Yanjun, & Zheng Rumin, 2019). The dominant factors were screened out by multiple stepwise regression method, and then the spatial differentiation of the dominant factors was analyzed by geographically weighted regression method, and the influencing mechanism was reviewed.

Table 6. Influencing factors, related topics and literature sources

	Influencing factors	**Related topics and theories**	**Literature sources**	**Characterized variables**
Society	Urbanization level	Dual-sector theory, Developmental pattern theory	[36], [37]	Proportion of urban population
	Infrastructure level	New Development concept, Big push theory	[38], [39]	Road mileage per capita
	Government support level	Effective Government theory, Government failure theory, Growth pole theory	[3], [8], [38]	Proportion of public budget expenditure in GDP
Economics	Economic development level	New development concept, New growth theory	[38],[40]	Per capita GDP
	Residents' consumption level	New development concept	[38]	Proportion of resident consumption level in GDP
	Capital accumulation level	Accumulation of tangible capital, Advantage of backwardness, New development concept	[4],[38], [41]	Proportion of foreign direct investment in GDP
	Industrial structure level	Developmental pattern theory, Comprehensive industrialization	[1], [37]	Proportion of output value of secondary and tertiary industries
Science &Technology	Informatization level	Personal opportunity	[9]	Total per capita postal and telecommunications business
	Scientific & technological development level	Innovation theory, Driving factors of industrialization, New growth theory	[1], [2], [40]	R&D expenditure as a percentage of GDP
Environment	Environmental capacity level	Sustainable development	[4]	Wastewater emission intensity

4.2. Multiple stepwise regression analysis and results of influencing factors

Multiple stepwise regression analysis was used to regress the relevant data for 2007, 2012, and 2017. The results showed that the goodness of fit (R2) of the three years were 0.596, 0.463, 0.482, t value, F value and Sig. all passed the significance test at 1% level (Table 7). The dominant factors in 2007 and 2017 were the PBE and FDI. The PBE was negatively correlated with ODQ, while the FDI was positively correlated with ODQ. The dominant influencing factor in 2012 was the PBE, which was still negatively correlated.

Table 7. Multiple stepwise regression model of the influencing factors

	2007		2012		2017	
	coefficient	**t value**	**coefficient**	**t value**	**coefficient**	**t value**
Constant	0.586	9.271	0.620	8.100	0.887	8.303
β5	0.421***	3.859***	-*	-	1.289***	2.554***
β8	-1.406***	-4.685***	-1.031**	-3.219**	-1.368***	-3.560***
Sig.	0.000		0.003		0.000	
F value	19.152		10.361		12.095	
R2	0.596		0.463		0.482	

*Note: "-" indicates no such item.

To test the robustness of the analysis results, data of 8 other years, excluding 2007, 2012 and 2017, were regressed. The results shows that the regression coefficients of the PBE were significant at 5% level in 8 years, while the regression coefficients of the FDI in 4 years (2008, 2009, 2010 and 2016) were significant at 5% level. Replace the PBE with per capita fiscal expenditure and the FDI with per capita foreign direct investment. Repeat the regression of the relevant data of 2007, 2012 and 2017, and the result is still significant at the level of 5% (no longer listed due to space limitations, available). It shows that the conclusion above is credible.

4.3. Spatial differentiation analysis of dominant influencing factors

In order to determine the spatial heterogeneity of the dominant factors, ArcGIS10.5 was used to conduct geographically weighted regression (GWR) for the dominant factors in 2007, 2012 and 2017. The indicators of model fitting, such as Akaike information criterion (AIC) and fit degree (R^2), reflect significant spatial heterogeneity, and the GWR model can better explain the spatial heterogeneity than the multiple stepwise regression model (Table 8).

Table 8. Parameter estimation and test results of the GWR model

Parameter	2007	2012	2017
Bandwidth	1501129	1501129	2404023
Residual square	0.137	0.283	0.658
Effective number	6.768	6.870	5.040
Sig.	0.078	0.113	0.166
AIC	-56.139	-34.372	-14.376
R2	0.666	0.600	0.531
Adj R2	0.579	0.494	0.452

The results of GWR (Figure 4) show that in 2007, the regression coefficient of the provincial FDI kept an increasing trend from east to west. In 2017, the increasing trend was more obvious, while all the regression coefficient increased. The low value area mainly included three northeastern provinces, while the high value area mainly included Xinjiang, Sichuan, Yunnan, Guizhou, Guangxi and Hainan. It shows that the FDI plays a more significant positive role in promoting the fishery industry development quality in these provinces. The positive role of FDI, on the one hand, reflects its important role in promoting China's fishery industry development quality as a common means of capital accumulation in developing countries, and further indicates that the development of China's fishery industry is still in the 'early stage of capital deepening' [5]. On the other hand, it also indirectly suggests that human capital, intellectual capital, social capital and other necessary capital in the middle and late industrial life cycle do not have a great impact on China's fishery industry (due to the availability and length of research data, this paper fails to measure their specific contributions).

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 20 January 2022 doi:10.20944/preprints202201.0302.v1

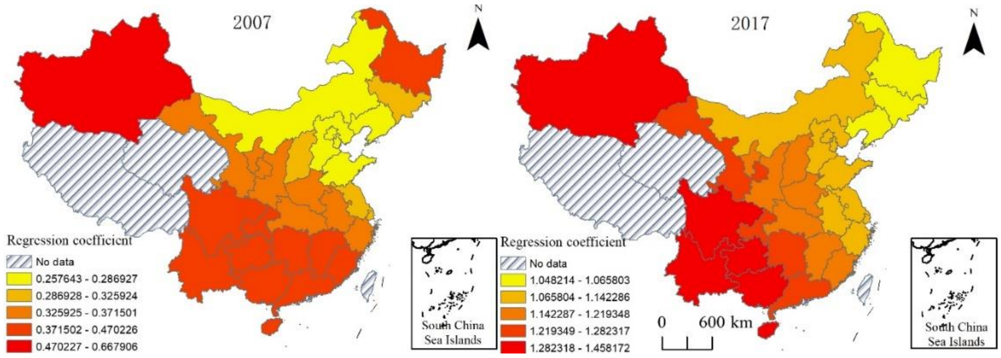

Figure 4. Spatial differentiation of FDI’s regression coefficient

In recent years, the positive impact and spatial differentiation of foreign direct investment on the quality of China's economic development have been confirmed by many studies [34,41]. Existing literature shows that foreign direct investment can play a positive role in enterprise innovation [42], energy saving and emission reduction [43], export volume [44], urban-rural income gap [45], and other variables through various ways, and these variables are basically corresponding to the level-2 indicators adopted above to measure fishery industry development quality. In addition, through its profitability, management level, technology spillover and industry flow, foreign direct investment not only has a significant impact on the quality of economic development, but also shows different rules in different regions [41]. Theoretically, development economics also contributed to relevant studies on the different pulling effects of capital in different regions in theories. Gerald (2000) once proposed that how capital is allocated is more important than the capital accumulation level[4]. And capital allocation and capital accumulation level are obviously different in different regions, so their impacts on regional development are also different. To sum up, this paper believes that the capital accumulation level represented by FDI has a positive impact on the China’s fishery industry development quality, and it has spatial heterogeneity.

On the other hand, the regression coefficient of PBE remains negative and basically keeps increasing from east to west (Figure 5). In terms of spatial distribution, the low value area mainly includes three northeastern provinces, while the high value area mainly includes Xinjiang and Yunnan. The results show that the PBE has a stronger negative inhibition effect on the three provinces in northeast China, but a weaker negative inhibition effect on Xinjiang and Yunnan. The government support level is an important variable of the quality of China's economic development. While affirming the positive role of the government, some studies also put forward that the rationality and appropriateness of its behavior should be standardized [46,47]. Fiscal expenditure is the main economic behavior of the government, because ‘fiscal decentralization structure’, ‘expenditure bias’ and ‘local government competition’ [46,48,49] are intermediary variables and moderating variables. The possible inhibitory effect on enterprise production efficiency [50], environmental pollution [51], net export [52], urban-rural income gap [53,54] and other variables related to development quality has also been continuously confirmed by relevant studies. In this regard, Zhang has put forward ‘effective government theory’. He proposed that developing countries need active leadership and participation of government, but too much intervention will hinder the process of industrialization [55]. Gerald also made a review of the study of ‘political economy in development decision-making’, looking at the political decision-making process of developing countries from the perspective of institutional selection and change. He claimed that: “political economy theory continues to predict failure in efforts to promote policy and institutional change”, these failures could be in areas of redistribution as well as innovation nurturing. In short, he believed that: "Good governance is one of the scarcest resources in developing countries". So they want ‘most of that out of the government's hands’. Therefore, this paper argues that the government support level represented by the PBE has a negative impact on China’s fishery industry development quality, and it has a significant spatial heterogeneity.

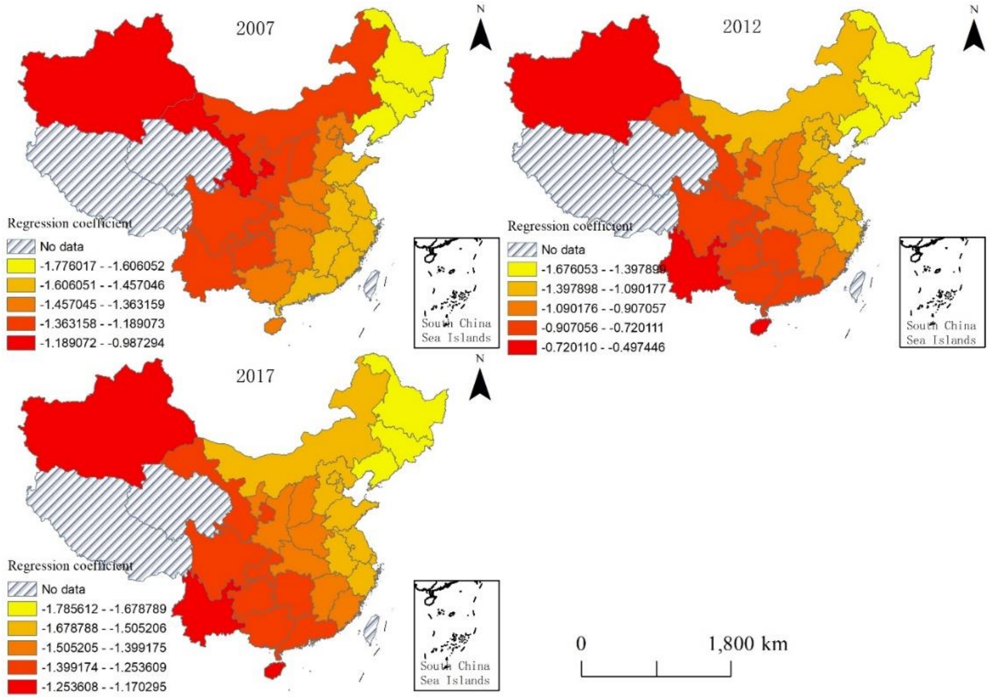

Figure 5. Spatial differentiation of PBE's regression coefficient

5. Main conclusions, recommendations and limitations

1. In terms of temporal characteristics, the ODQ of China's fishery industry continues to grow, but the differences among provincial quality are also increasing. In terms of sub-dimensional quality, the contribution of innovation quality and sharing quality to China's fishery industry development quality is increasing. It shows that innovation quality and sharing quality led development, which are the important characteristics of China's fishery industry development quality during the observation period.
2. In terms of spatial characteristics, the provincial quality presents a significant spatial dependency, and the trend is further enhanced during the observation period. The Bohai Bay area and the Hangzhou Bay area have gradually become a dual-core area of the high-quality agglomeration of China's fishery industry. The increase of the core density value and the increase of the area of the peripheral layer indicate that the radiation of the dual-core area to the peripheral area may still be increasing. The spatial distribution of China's fishery industry development quality keeps the trend of 'northeast to southwest', which is approximately parallel to the Hu Huanyong Line. Its gravity center is close to population and economic gravity center of China. The change of the gravity center indicates that the growth of development quality mainly comes from the southeast provinces of the gravity center in the early observation period, while the growth of development quality mainly comes from the east and north provinces of the gravity center in the late observation period, and the growth rate of development quality in the latter half of the observation period is faster than that in the early observation period.
3. The capital accumulation level is the positive dominant influencing factor, and the government support level is the negative dominant influencing factor, and both of them have significant spatial differentiation among provinces. It is suggested that the decision-making departments should pay attention to the possible negative impact of public budget expenditure on fishery industry development quality, correct the unreasonable arrangement of fiscal expenditure in structure and direction, and avoid the inhibiting effect bringing from excessive competition among local governments through coordination mechanism. At the same time, it is recommended to guide the positive effects that foreign direct

 doi:10.20944/preprints202201.0302.v1

investment may bring, such as promoting innovation cultivation, export expansion, energy saving and emission reduction, narrowing the income gap between urban and rural areas, and finally promote China's fishery industry development quality.

The above conclusions reflect that China's fishery industry development quality has significant spatial non-equilibrium both in terms of spatial-temporal characteristics and influencing factors. As for the imbalance of regional development, Francois Perroux, a French development economist, once proposed the theory of 'regional growth poles', argued that growth does not appear everywhere, but first appears on some growth points or poles with different intensities, and these growth points or poles spread outwards through different channels, shaping different end effects on the economy[38]. This insight helps to understand the conclusion of the above analysis, that is, the unbalanced development and dynamic changes of China's fishery industry development quality and its influencing factors during the observation period are consistent with the general laws of industrial evolution in most developing countries. Of course, due to the limitation of space, more in-depth analysis of its influencing factors and the study of its influencing mechanism are not analyzed in this paper, which needs further research.

Funding: This research was funded by National Natural Science Foundation of China, No.41976209;National Social Science Foundation of China, No.21BJL077;Zhejiang Provincial Soft Science Research Program, No.2022C35101; Ningbo Social Science Research Base project, No.JD5-ZD21

References

1. Zhang, Peigang. Agriculture and Industrialization. Harvard University Press, Cambridge,Massachusetts,U.S.A., 1949.
2. Schumpeter, J.A. *Business Cycles*; McGraw-Hill: New York, 1939.
3. Zhang Peigang;Yang Jianwen. *New Development economics*;Henan People's Publishing House: Zhengzhou,China, 1999.
4. Meier, G.M.; Stiglitz, J.E. *Frontiers of Development Economics the Future in Perspective*; World Bank and Oxford University Press: New York, U.S.A., 2000.
5. Perrings, C. Environment and development economics 20 years on. *Environment and Development Economics* **2014**, *19*.
6. Krugman, P. *Policymaking in the Open Economy: Concepts and Case Studies in Economic Performance*; Oxford University Press: New York, U.S.A., 1993.
7. Banerjee, A.V.; Duflo, E. Growth theory through the lens of development economics. *Handbook of Economic Growth* **2005**, 473-552.
8. Hayami; Yujiro; Godo, Y. *Development Economics:From The Poverty To The Wealth of Nations*, third edition ed.; Oxford University Press: Oxford, U.K., 2005.
9. Sen, A. *The Concept of Development*; Amsterdam, North Holland, 1988.
10. Xi Jinping. Speech at the Second Plenary Session of the Fifth Plenary Session of the 18th CPC Central Committee (Excerpt).*Seeking truth from facts*, **2016**, 1, 1-5.
11. Śledzik, K. Schumpeter's theory of economic development: an evolutionary perspective. *Young Scientists Revue, (ed.) Stefan Hittmar, Faculty of Management Science and Infor-matics, University of Zilina* **2015**.
12. Zhang Xukun. *A new history of Western Economic Theory: from Hammurabi to Keynes*;Zhejiang University Press: Hangzhou,China, 2015.
13. Liu Pan;Yang Zhengyong. Research on China's fishery transformation and development from the perspective of total factor productivity: An empirical analysis based on SFA.*Ocean Development and Management*, **2017,** 34, 98-106.
14. Bai Yang. Origin, characteristics and prospects of fishery quota system.*Journal of Natural Resources*, **2012**, 27, 522-528.
15. Li Jiuqi;NieXiaoJie;Ye Changchen;Yin Zengqiang. Dynamic evaluation and analysis of fishery resources in Bohai Sea based on Bayes method.*Journal of Natural Resources*, **2012**, 27, 643-649.

16. Zhang Ying cheung.*Du Wenting*. Price fluctuation of Aquatic products and resources trade between China and ASEAN: a case study of frozen mackerel export price.*Journal of Natural Resources*, **2020**, 35, 2191-2204.
17. Rodrik, D.; Rosenzweig, M.R. *Preface: Development Policy and Development Economics: An Introduction*; 2010.
18. Romer, P.M. Two Strategies for Economic Development: Using Ideas and Producing Ideas. *The World Bank Economic Review* **1992**, *6*, 63-91, doi:10.1093/wber/6.suppl_1.63.
19. Li Zhengxin; Xu Weixiang;Liu Chengjun. Spatial characteristics and dynamic mechanism of coordinated development of three industries at county level in Yangtze River Delta.*Chinese Economic Geography*, **2021**, 41, 136-143.
20. Liu Chunxiang;Zhu Liyuan. Comparative study on fishery competitiveness in Zhejiang Province.*Problems in Agricultural Economy*,**2014**, 35, 102-109.
21. Yu Jinkai;Mo Dandan. Adaptive optimization of Marine fishery spatial layout from the perspective of Marine carrying capacity: based on response surface methodology.*Journal of Ocean University of China (Social Science edition)*, **2015**, 1-7.
22. Zhao Mingjun; Sun Hui-wu; Wang Yu-guang;Liu Longteng; Zhu Xuemei;Liu Zifei;Wang Xiaohu. Study on the supply and consumption of aquatic products based on residents' nutritional demand.*China Fisheries Economics*, **2019**, 37, 1-14.
23. Yu Miaojie;Wang Binluo. Reform externally and opening internally to promote industrial upgrading.*International Economic Review*, **2014**, 49-60+45.
24. Meng Tianguang.Public perception of distributive justice in Transitional China: Outcome justice and Opportunity Justice.*Chinese Society*, **2012**, 32, 108-134.
25. Huang Xiangqi.Policy review of aquaculture development in China during the 30 years of reform and opening up.Fisheries Economics of China, **2008**, 26, 11-15.
26. Kannan, K.S.; Manoj, K. Outlier Detection in Multivariate Data. *Applied Mathematical Sciences* **2015**, *9*, 2317-2324, doi:http://dx.doi.org/10.12988/ams.2015.53213.
27. The Denver post;Cheng-xin wang;[Li Bo. Spatial differentiation and influencing factors of urban economic elasticity in three northeastern provinces.*Human Geography*, **2019**, 34, 7.
28. Siyang Hong;Hong-rui wang;Jeremy levin state;[Zhu Zhongfan. Decoupling analysis of spatial characteristics and coordinated development of energy consumption in China.*Journal of Natural Resources*, **2017**, 32, 800-813.
29. Peng Tian;Jialin Li;Xiao-li shi;Wang Lijia;Liu Ruiqing. Analysis of temporal and spatial characteristics and influencing factors of rural settlements: A case study of Xiangshan County, Ningbo City.*Journal of Mountain Science*, **2019**, 37, 271-283.
30. Zhao lu;Zhao Zuoquan. Research on spatial differentiation of Chinese economy based on characteristic ellipse.*Scientia Geographica Sinica*, **2014**, 34, 979-986.
31. Paul, K. First nature, second nature and metropolitan location. *Journal of Regional Science* **1993**, *33*, 129-144.
32. Lv Hui;Shao Jiao. Transfer payment, tax system structure and high-quality economic development: An empirical analysis based on 277 prefecture-level city data.*Economist*, **2020**, 32, 5-18.
33. Liu tao.Li Jixia;[Huo Jingjuan. Spatio-temporal pattern and influencing factors of high-quality agricultural development in China.*Journal of Arid Land Resources and Environment*, **2020**, 34, 1-8.
34. Zhongbao Zhou;Deng Li;Shaw and record;Shi-jian wu;Wenbin, L. The impact of foreign direct investment on China's high-quality economic development: Based on Index DEA and panel quantile regression analysis.*Chinese Journal of Management Science*, **2020**, 17,1-12.
35. Zhao Ruyu;Chang Zhongli. The spatial difference of high quality economic development and the identification of influencing factors.*Research on Financial and Economic Issues*, **2020**,28 22-29.
36. Lewis, W.A. *Economic Development with Unlimited Supplies of Labor*; The Manchester School, 1954.
37. Chenery, H.B. *Structural Change and Development Policy*; Oxford University Press: New York, U.S.A., 1979.
38. Francis Peroux.*New Development concept*;Huaxia Press: Beijing, China, 1987.
39. Rosenstein-Rodan, P.N. Problems of Industrialisation of Eastern and South-Eastern Europe. *The Economic Journal* **1943**, *53*, 202-211, doi:10.2307/2226317.

40. Barro, R.J. Economic Growth in a Cross Section of Countries. *The Quarterly Journal ofEconomics* **1991**, *106*, 407-443, doi:10.3386/w3120.
41. Xue-ping hu;[Xu Pei. Research on the impact of FDI quality characteristics on the high-quality development of Chinese economy.*International Trade Issues,*, **2020**, 458, 31-50.
42. Zhu Zhujun;Huang Xian sea;Wang Yi. Solving the dilemma of foreign investment and Chinese-style innovation.*Economic Research Journal,* **2020**, 55, 99-115.
43. Zhou Jieqi;[Zhang Ying. Foreign direct investment, economic agglomeration and green economic efficiency: theoretical analysis and Chinese experience.*Exploration of International Economy and Trade,* **2021**, 37, 66-82.
44. Zhengyan Pan.Regional distribution of Foreign direct investment in China after the financial crisis.*International Trade,* **2013**, 374, 35-41.
45. Zheng Lei;[Wang Xuhui. Does the inflow of foreign direct Investment increase the inter-provincial urban-rural income gap in China: Based on the spatial perspective.*Journal of Macroeconomic Research*, **2018**, 62-80.
46. Feng wei;Su Ya. Fiscal decentralization, government competition, and the quality of Economic growth in China: an analytical framework based on political economy.*Journal of Environmental Science and Technology*, **2019**, 7, 73-87.
47. Kunrong Shen;King Kong. The driving force of China's economic growth for 40 years: From the perspective of Local Government behavior.*Journal of Economics and Management*, **2018**, 39, 3-13.
48. Wei Dongming;Nai-hua gu;Wei Jiahui. Vertical fiscal imbalance, public expenditure bias and high-quality economic development.*Economic Review*, **2021**, 23-43.
49. Xie Guogen;Zhang Ling;Zhao Chunyan. Fiscal decentralization, local government competition and high-quality economic development.*Statistics and Decision,* **2021**, 37, 124-128.
50. Li Ming.Feng Qiang;Wang Mingxi. Misallocation of financial funds and production efficiency of enterprises -- Also on the effectiveness of financial expenditure.*Chinese Management World,* **2016**, 279, 32-45+187.
51. Hongyou Lu;Du Yixuan;Qi Yu. Fiscal expenditure structure and consumption-oriented environmental pollution in China: theoretical model and empirical test.China Population, *Resources and Environment*, **2015**, 25, 61-70.
52. Lin F. Inter-provincial trade opening, net export and fiscal expenditure spillover.*Finance and Trade Research,* **2015**, 26, 53-60.
53. Li chao;Shang Yuping. The effect of local fiscal expenditure structure on urban-rural income gap: A grouping comparison based on economic development level.*Journal of Xi 'an University of Finance and Economics*, **2018**, 31, 5-12.
54. Liming Dong;Man Qinglong. Research on the effect of local fiscal expenditure on urban-rural income gap.*Fiscal Research,* **2017**, 413, 43-55.
55. Wang Chuanbao.A review of Zhang Peigang, the father of development economics and his thoughts on development economics.*Social Science Front,* **2008**, 229-236.