Harmonious Economic Development Model in the Niyang River Valley under Environmental Constraints

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Abstract We select gross national happiness (GNH), per capita GDP, the number of tourists received in rural areas, waste gas emission and other indicators that are closely related to harmonious economic development. Using the indicator data, we establish the multiple linear regression model that is in line with the harmonious economic development model in the Niyang River valley, and conduct empirical analysis. According to the analysis results, the following recommendations are put forward: adhering to laying equal stress on protection and development; improving the quality of the population; protecting environment and curbing environmental pollution; speeding up the construction of ecological environment relying on technology; increasing investment in poverty alleviation to eradicate poverty; extensively mobilizing the public to participate in ecological and environmental protection; coordinating the relationship between the ecological environment and economic development.

Key words The Niyang River valley, Economic harmony, Model

"Economic harmony" was first put forward by the American economist Carey [1], who believed that the economic distribution law had the feature of harmony, and the accumulation of capital was the most important factor of economic harmony. French economist Bastiat more systematically expounded economic harmony in his book *Economic Harmony*. He believed that capitalism was always a "harmonious social order", dominated by the internal natural law, and this law of economic harmony determines the distribution of social benefits [2]. Carey and Bastiat's idea of economic harmony is based on the capitalist system, having obvious limitations. Hume, Adam Smith, Marshall, Hayek and other economists advocated the free development of economy, and suggested that we should respect the harmony of natural laws, and reduce the government's rights. Friedman, Buchanan, *et al*. realized that there was disharmony in the market economy, but they still believed that government interference was not a wise choice [3-4]. Keynes and rational constructivist held that the government could not only correct market imperfections, but also consciously reconstruct the whole society according to rational principles. Solow's viewpoint of productivity from the harmonious whole of various types of behavior and mind, strengthened the role of rationality in the economic and social harmony [5], so that "the third factor" of economic development was added. The researches on the problems of harmonious economic development, not only involve the internal coordination problems of economic development, but also involve behavioral subject, social relations, and harmony problems of humanistic spirit, thereby further expanding the theoretical basis of research on harmony. With the advent of industrialization and many social contradictions arising from economic development and transformation in China, the harmony analysis provides an ideal tool for social development. The domestic scholar Li Dianbin, one of the earliest scholars researching thoughts of harmony, believed that harmony was the unity of differences in the nature of things; a state of existence and development of things [6]; the dialectical category reflecting the contradictory unity's features of coordination, consistency, balance, integrity and regularity, shown between contradictions in the course of its development; one of the manifestations of the unity of contradictions.

The western development strategy has promoted overall economic development of the Niyang River valley in southeastern Tibet. Economic development needs the comprehensive utilization of various resources, and resource development is of great significance to economic development. Therefore, in-depth development of rich resources in the Niyang River valley, will be bound to become a new growth point of economic development in the southeastern Tibet. However, due to special geographical environment, the Niyang River valley has become one of areas with fragile ecological environment in China. In addition, in recent years, to promote regional economic development, natural resources are exploited irrationally and ecological environment is damaged in varying degrees, therefore, in some areas of the Niyang River valley, desertification and the potential desertified grassland have begun to emerge. In the process of economic development, the ecological environment problems in the Niyang River valley must not be ignored. If we can not effectively deal with some contradictions between economic behavioral subject and ecological environment in the process of economic development, it is bound to affect the healthy development of the economy. Therefore, carrying out the researches on harmonious economic development in the

Received: May 9, 2012 Accepted: July 2, 2012
Supported by General Project of Humanities and Social Sciences Research of the Ministry of Education (10XZJA790001); Youth Fund Project of Tibet Agricultural and Animal Husbandry College.
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Niyang River valley, is of great significance to the protection of ecological environment, continuous economic development, and China's ecological security barrier.

1 Indicator selection, data source and model establishment

1.1 Indicator selection and data source Based on the principle of correlation, we select the following indicators on harmonious economic development model in the Niyang River valley: gross national happiness (GNH), per capita GDP (X_1), the number of tourists received in rural areas (X_2), waste gas emission (X_3). In order to ensure authenticity and reliability of the data, better reflecting the situation of economic harmony in the Niyang River valley, we quote the data from *Tibet Statistical Yearbook* during the period 2005 – 2011, and conduct field survey. The main computing idea of GNH in the Niyang River valley is as follows: happiness index = (this year's social health index × previous year's social health index) + (this year's social welfare index × previous year's social welfare index) + (this year's social civilization index × previous year's social civilization index) + (this year's ecological environment index + previous year's ecological environment index). The indices are scored by assigning the weight, and the scores are in (0,1); then indicators on 3 counties of the Niyang River valley are calculated; the number of tourists received in rural areas (X_2) is obtained by conducting field survey of family hotels and small family shops in rural areas; waste gas emission (X_3) = the share of GDP of 3 counties in Tibet's GDP × Tibet's waste gas emission and waste water discharge amount. Specific data can be seen in Table 1.

Table 1 Indicator data of harmonious economic development model in 3 counties of the Niyang River valley

Year	Region	GNH	X_1 10^4 yuan	X_2 // number of people	X_3 // t
2005	Nyingchi	0.443 0	1.22	2 800	2 410.78
	Gongbo'gyamda	0.389 5	0.50	2 986	686.92
	Milin	0.381 0	0.51	2 563	496.56
2006	Nyingchi	0.480 0	1.13	2 806	1 949.27
	Gongbo'gyamda	0.427 0	0.50	2 900	555.42
	Milin	0.414 0	0.51	2 667	401.50
2007	Nyingchi	0.487 0	1.27	2 821	1 939.70
	Gongbo'gyamda	0.468 0	0.57	2 935	553.86
	Milin	0.432 5	0.63	2 773	441.68
2008	Nyingchi	0.515 5	1.45	2 836	1 942.38
	Gongbo'gyamda	0.492 5	0.57	2 970	496.99
	Milin	0.469 5	0.57	2 880	363.02
2009	Nyingchi	0.580 0	1.30	3 043	1 923.98
	Gongbo'gyamda	0.514 5	0.59	2 952	554.59
	Milin	0.498 0	0.69	3 059	474.92
2010	Nyingchi	0.567 0	1.22	3 250	1 662.60
	Gongbo'gyamda	0.393 5	0.61	2 934	509.16
	Milin	0.546 5	0.65	3 239	405.04

1.2 Establishment of multiple linear regression model of harmonious eco-economic development model Due to lack of strong constraints and regulation mechanism on integrated valley development and protection in the Niyang River valley, economies within the valley are in one-sided pursuit of local interest maximization, reacting up on economic development in the Niyang River valley, which has seriously affected coordination and sustainability of the valley development. So it is necessary to establish a composite eco-economic model. According to the data distribution characteristics, we establish the Cobb-Douglas production function model:

$$y = A \cdot X_1^{b_1} \cdot X_2^{b_2} \cdot X_3^{b_3} \quad (1)$$

After calculating the natural logarithm on two sides of expression (1), we get the multiple linear regression function model:

$$\ln y = \ln A + b_1 \cdot \ln X_1 + b_2 \cdot \ln X_2 + b_3 \cdot \ln X_3 \quad (2)$$

2 Results and analysis

We conduct parameter estimation on the expression (2), and the estimation result of model is as follows:

$$\ln y = -8.671 + 0.393 \cdot \ln X_1 + 1.120 \cdot \ln X_2 - 0.137 \cdot \ln X_3 \quad (3)$$

$$(-3.411)\quad (3.277^{***})\quad (3.778^{***})\quad (-2.033^{*})$$

$***$, $**$, and $*$ signify that the statistical value passes 1%, 5% and 10% significance level test, respectively. Through selecting the indicators having strong impact on the happiness index for analysis, statistical test value of adjusted R^2 is 0.715, meeting the requirements. F value is 15.184, and the statistical results are very significant, indicating that the fitting effect of the model is satisfactory.

The estimated results of model show that t statistical test results of per capita GDP (X_1), the number of tourists received in rural areas (X_2) and waste gas emission (X_3), are significant, indicating that 3 explanatory variables have significant effects on residents' well-being index.

The parameter estimation value of per capita GDP is 0.393, indicating that for each additional 1% in per capita GDP, the residents' happiness index will be increased by 0.393 percentage points. After the per capita GDP is increased, issues concerning people's food and clothing, housing and health care, will be resolved, consequently, people's living happiness index will naturally increase.

The parameter estimation value of the number of tourists received in rural areas is 1.12, indicating that for each additional one unit in the number of tourists received by residents in the Niyang River valley, the residents' happiness index will be increased by 1.12 units. This shows that this explanatory variable is an important factor for improving the residents' happiness index. Increase in this explanatory variable will increase the non-agricultural income of the residents, increasing residents' income not by manual labor. Thus naturally a feeling of happiness will arise from people's heart.

The parameter estimation value of waste gas emission is −0.137, indicating that this explanatory variable has significant negative impact on the residents' happiness index. For every 1% increase in this explanatory variable, the residents' happiness index will fall by 0.137%. The reason is as follows. (i) The vegetation is damaged seriously. Indiscriminate mining and

serious waste is the most principal factor responsible for the damage to the ecological environment in the Niyang River valley in recent 20 years. The alluvial gold resources in the side of Niyang River are widespread. In May each year, there are tens of thousands of people flocking to high mountains and woodland digging Chinese caterpillar fungus, so that the resources and ecology suffer serious damage, and the land desertification is grim. The land desertification in 3 counties of the Niyang River valley is expanding year by year. (ii) The living conditions of species deteriorate. Driven by economic interests, at present, some phenomena are increasingly serious, such as poaching wildlife resources, indiscriminate hunting and wasteful mining, and blind fishing. The number of many rare and unique wildlife species has experienced steep decline and even extinction. Due to excessive hunting and excavation, many rare wild animals and medicinal plants distributed widely have declined greatly, such as Tibetan antelope, wild yak, Chinese caterpillar fungus, *Rhodiola*, *Saussurea*, and rhubarb. Currently, many of the world's unique plateau plant and animal species in the Niyang River valley are on the brink of extinction, and the population is drastically reduced. (iii) The natural disasters are frequent. Due to environmental degradation, the climate is abnormal and the natural disasters occur frequently, such as hail, frost, floods, and dust storms, doing damage to farming and animal husbandry and causing great losses. The frequent disasters arising from environmental degradation have seriously hampered the economic and social development in the Niyang River valley. (iv) The pollution in the Niyang River valley is increasingly serious. With the industrial development within the valley, the amount of sewage is increasing.

3 Countermeasures for harmonious economic development in the Niyang River valley

The empirical results show that in order to better achieve the harmonious development in the Niyang River valley, we should focus on the following aspects.

3.1 Adhering to laying equal stress on protection and development It is necessary to vigorously implement the strategy of sustainable development, and adhere to the guideline of laying equal stress on protection and development; pay equal attention to economic, ecological and social benefits, strive to protect and restore the ecological environment in development and foster new economic growth point in the protection and restoration of ecological environment; focus on infrastructure construction, environmental protection and construction, industrial restructuring, and acceleration of development of science and technology; give full play to regional advantages of the Nyingchi River valley, so that the regional population, resources, environment, economy and society achieve coordinated development, thereby organically combining ecological protection and economic development from the policy. Through comprehensive governance, the virtuously circular water body ecosystem where fish and bird coexist, will be gradually established. Furthermore, we should pay close attention to the construction of ecological environment in the Niyang River valley with towns, industrial and mining areas and oasis agricultural areas as the focus; make every effort to carry out afforestation and construct desertification control projects to curb the trend of increasingly expanding desertification area; strengthen the riverside ecological governance, control soil erosion and landslide, increase water conservation, and reduce the amount of sediment, so that the expanding trend of soil erosion and desertification is basically arrested, and sustainable development capacity is further enhanced.

3.2 Improving the quality of the population Ecological society is not only the society where the man and nature are in coordinated and harmonious development, but also the society where man and man, man and society, are in coordinated and harmonious development. It is also the society where the man's physiology and psychology are in coordinated and harmonious development. Population and resources are the basic conditions for achieving sustainable development; environmental governance and recycling of resources are ultimate factors restricting sustainable development. Improving the quality of the population is conducive to speeding up economic construction. So we should strengthen the awareness of environmental protection, and develop circular economy, truly achieving harmony between environmental protection and economic development, between man and nature.

3.3 Protecting environment and curbing environmental pollution There is a need to extensively publicize *Environmental Protection Law*, *Land Management Law*, *Forest Law*, *Water Law*, *Water and Soil Conservation Law*, *Wildlife Protection Act*, and other laws, in order to constantly improve the legal concept of society as a whole, and form the social atmosphere of consciously protecting environment and beautifying environment; gradually establish and perfect the legal system based on relevant laws, supplemented by various administrative regulations, strengthen supervision over law enforcement, and crack down on various criminal acts, making the ecological environment protection and construction take the law-based road.

3.4 Speeding up the construction of ecological environment relying on technology Scientific and technological progress is a fundamental path to sustainable development. Thus it is necessary to pay attention to training of ecological environment construction personnel; publicize and popularize scientific knowledge on afforestation, soil and water management, desertification control, *etc.*; around the key issues of ecological construction, organize scientific research and tackle the key research project, increase investment in scientific research, and actively introduce, absorb, digest and innovate the advanced foreign technology; vigorously foster and promote good forest species to adapt to different regional characteristics, promote advanced applicable technologies; establish and improve ecological environment monitoring; accelerate the exploration of new technologies, new ways for construction of ecological environment; promote the construction of ecological environment to develop towards the direction of high-level intensive manage-

ment, scientific management.

3.5 Increasing investment in poverty alleviation to eradicate poverty In order to pursue economic interests, the most poverty-stricken areas often develop the small and medium-sized enterprises with the characteristics of investment, good economic returns, quick effect but serious pollution. Although this short-term behavior brings the backward regions economic interests, they also bear a heavy environmental burden. Poverty is also a major obstacle to the environmental pollution control and implementation of environmental protection. Thus, it is necessary to increase investment in poverty alleviation, improve the ecological environment, living and production conditions in the poverty-stricken areas, strengthen the building of poverty alleviation capacity, and unify ecological benefits, economic benefits and social benefits.

3.6 Extensively mobilizing the public to participate in ecological and environmental protection Effectively strengthening ecological environment construction and protection from policies, and improving the ecological environment in the Niyang River valley, is the foundation for economic development in the Niyang River valley. It should well implement the project of afforestation, water conservancy and desertification control, actively help farmers and herdsmen to solve practical problems, and guide the farmers and herdsmen to change the backward production and living modes that are not conducive to the ecological environment. The public are the main body in participating in the sustainable strategy. From the public initially learning the concept of sustainable development to understanding and participating in it, it is a process of transformation from unconsciousness to consciousness, which needs to be guided. The main measures to be taken include media publicity, universal education, training implementation, constant improvement in public participation mechanism, *etc*.

3.7 Coordinating the relationship between the ecological environment and economic development Any human material production activity has the problem of mutual coordination and common development of natural reproduction and economic reproduction. The law of " load rating" believes that any ecosystem will have an approximate load (carrying) capacity limit, and we should maintain the balance of the ecosystem. Population, resources, environment and development is an extremely enormous complex and open " nature-economy-society" system with broad spatial and temporal scale. In order to ensure continuous operation of economic reproduction, the necessary condition is not to beyond the load capacity of natural reproduction. On the basis of existing knowledge, we must seriously address issues concerning the coordination between the three and development. The main measures to be taken include establishing the national economic system featuring recycling of resources, strengthening the scientific and technological innovation capacity, developing the introducing environmental protection technologies to control environmental pollution, adjusting energy use structure, and adjusting the industrial structure, so that the ecological environment in the Niyang River achieves sustainable development.

4 Conclusions

The harmonious economic development in the Niyang River valley can not be separated from ecological economy, therefore, the key to ecological economic development lies in the innovation of concept. The first is economic innovation, which is the core of ecological economic development. In economic development of the Niyang River valley, we must completely abandon the former material-centered development concept, pay equal attention to quantity increase and quality improvement of economic development, implement innovation in the mode of production and economic operation, and include the entire economic activity in the coordinated " nature-economy-nature" system. The second is the environmental innovation, which is the key to the development of ecological economy. Infinite human development needs and limited natural resources are clearly a contradiction. In face of this sharp contradiction in reality, we must constantly make breakthroughs in the specific connotation of finiteness of natural resources in terms of depth, breadth and ideology; not only pay attention to the environmental protection, but also take the initiative to find useful resources for human development in the ecological environment; carry out environmental innovation, to promote positive interaction and coordinated development of human and environment, better achieve harmonious economic development in the Niyang River valley.

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