Territorial Cohesion Planning Based on Multiple-Stakeholder Demand: A Case study of KDW Region in China

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1. Introduction

Since reform and opening, with the rapid progress of urbanization, Chinese cities gradually stepped into territorial cohesion stage. Under the pressure of decentralization and free market economic policies, the stakeholders of regional spatial is becoming diversification. The territorial cohesion has been into a multi-actor arena involving government, market and social individuals.

The paper studies a case-- Kuitun-Dushanzi-Wusu Territorial Cohesion Planning . KDW distr locates at Xinjiang Autonomous region in China. It is an important national petrochemical base. Due to historical reasons, the administrative division is complex there, involving several governments, central and local enterprises and many other stakeholders. Recent years, although the rapid development of the petrochemical industry, it brings up the extensive growth, homogeneous competition, local barriers and etc. It exerts serious threaten to the environment of the overall region as well.

Firstly, this paper analyzes the development demands from multi-interest stakeholders in KDW district. The Matrix was built to describe the different stakeholders demand regional spatial, industry and resource environment. Secondly, this paper analyzes the complex interest relationship exerted from multi-interest demanding and the external driving force exerted from territorial cohesion development. Finally, under the premise of guaranteeing the environment quality, the paper uses scenario planning and set three kinds of scenario: transforming petrochemical industry, reducing the production of petrochemical industry and continuing petrochemical industry. What s more, it simulates three scenarios, based on go implementation orientation, and explores the plan of regional integration.

1. Background of regional integration development in China

After reform and opening-up, with the rapid progress of urbanization, the traditional urban development mode within administrative territory cannot catch up with the pace of rapid-changingsituation any more. More and more Chinese cities have initiated the new development mode of regional integration. When the region enters the stage of integrativedevelopment, frequent, close and diversified interaction will be generated among different cities (Friedman 1966). Under the promotion of political decentralization and economic marketization, the stakeholders of regional space

are becoming diversified. Regional integration has developed into a gameof multi-Stakeholder, involving government, market and various social entities.

1.1Decentralization promotes competition and cooperation among local governments

The essence of China s economic reform is to promote economic development through opening and administrative decentralization. (QIAN Yingyi and Weingast, 1996) By sta system of tax distribution in 1994, decentralization has effectively stimulated the development enthusiasm of local governments. It makes local governments pay more attention to the growth of urban economy. Meanwhile, the corporatization characteristic of local governments becomes increasingly obvious.

In the decentralization system, under the drive of land-for-budget fiscal strategy, China s urban space expands rapidly. As a result, the distance among cities is reduced day by day, the externality of spatial economy becomes increasingly prominent, and competition among local governments is hastened. On the other hand, resources of different level oflocal governments are limited, and administrative territory cannot be adjusted in a short term. Therefore, regional cooperation is required among the local governments.

1.2 Marketization drives integrative development of multiple parties

With the transformation from planned economy to market economy in China, free site selection of enterprises becomes possible. With the reform of household registration system, cross-regional population migration has already become a normal state. The increase of population mobility means the possibility of selecting residence and working place according to the market price mechanism. Under the stimulation of regional traffic improvement, inter-district development of regional integration is promoted through the market-oriented action of voting with feet .

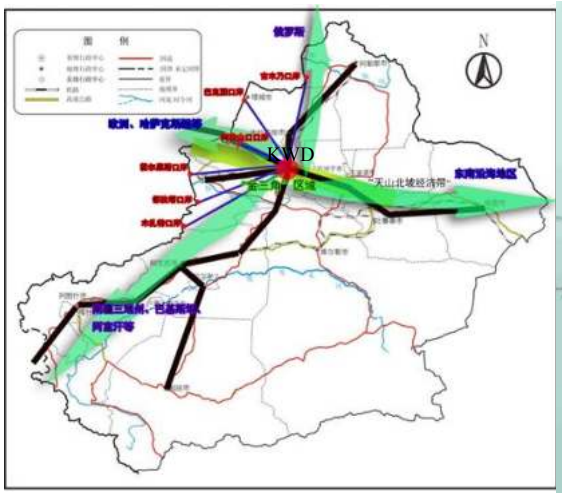
2. Foundation for competition among multiple stakeholders

In this paper, the research on regional integration is conducted by a case study of KDW region. This region is an important petrochemical industry base in China, and its economy grows rapidly in recent years. However, local barriers, extensive growth, and homogeneous competition are formed gradually in the development process. As a result, the environment of the overall region is severely threatened. Therefore, regional integration planning is urgently required to standardize development of local governments and promote positive, orderly and sustainable urbanization.

2.1 Location and historical development

Including three adjacent cities of Kuitun, Dushanzi and Wusu, KDW region is located in the middle of Xinjiang Uygur Autonomous Region of China. It is an important node on Silk Road

Economic Belt and international energy channel. This region was the nomadic place of Mongolia Oyiradtribe at ancient times. Qing Government established Wusu county system here in 1761 and garrisoned this place. In 1897, petroleum was found in Dushanzi in the southeast of this region, and mine area was formed later. After liberation, the 7th Division Headquarter of Xinjiang Production and Construction Corps (XPCC) migrated to Kuitun in the northeast of this region in 1957. At that time, urban construction was started. In 1958, Dushanzi Mine Area was separated from Wusu County and managed by the newly founded petrochemical industry city, Karamay City. In 1975, Kuitun was separated from Wusu County and Kuitun City was established. In 1996, Wusu County was changed into Wusu City.



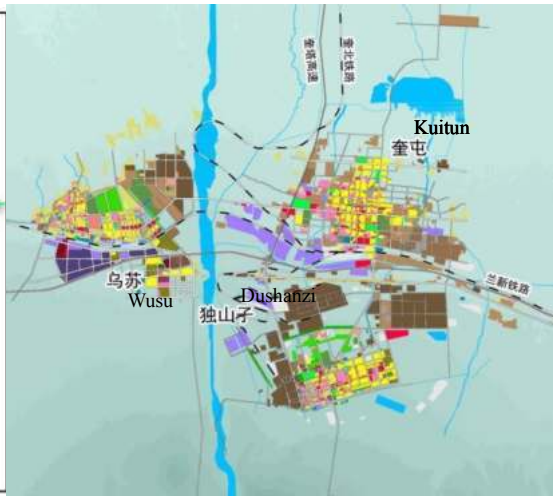


Fig. 1 Location of KDWFig. 2 Current situation about regional space of KDW

2.2 Complicated administrative and governance system

Due to historical reasons, the administrative system of KDW is quite complicated. Besides the three cities, it also covers multiple stakeholders such as the large-scale national enterprise Dushanzi Petrochemical Corporation of PetroChina Company Limited, XPCC and Tia District . Among them, Kuitun is the city of XPCC. Joint development will be conducted between it and XPCC for a long time and it represents the development demand and interest of XPCC to some extent. Dushanzi continues the management mode of unifying government and enterprises in planned economy period and represents the development demand and interest of central enterprises to some extent. In the population of Wusu, ethnic minorities occupy a high proportion (36.7% in 2013), and it represents the development demand and interest of minority autonomous regions to some extent.

3. Challenges faced by competition among multiple stakeholders

3.1 Industrial isomorphism and repeated construction

Processingpetroleum resources has created alike industrial structuresin this region. In 2013, the location quotient of petroleum processing industry in KDW region reached 3.52 in Sinkiang, while the location quotient of other industries was below 0.6,which reveals the fact of petroleum-processingis itspillar industry. In the past, Kuitun and Wusu had advantages in cotton spinning and featuredagricultural processing industries respectively, but these two regions begin to invest in petroleum refining industry construction by imitating Dushanzi in recent years. The phenomenon of industrial isomorphism and repeated construction is increasingly intensified. Almost all 6 industrial parks in KDW region treat petroleum refining as the leading industry. On the one hand, this is driven by the handsome profit of petroleum refining. On the other hand, the monopoly of Sino-Petro for petrochemical materials has controlled its pricing mechanism. As a result, Kuitun and Wusu were forced to make a fresh start and build their own industry systems. It is hard to form coordinatedupstream and downstream value-chain mechanism of petrochemical industry with differentiation in this region.

3.2Extensive growth of urban land

From 2006 to 2014, urban construction land of 93.4 square kilometers was newly increased in KDW region with rapid land expansion. On the contrast offast land expansion, the population growth is slow. From 2006 to 2014, the population was increased by only 217 thousand. Therefore, intensiveness of land utilization declines continuously. In this region (except Wusu), reserved land resources are severely insufficient. At present, relatively extensive urbanization is not sustainable.

3.3Increase of ecological environment pressure

Under the influence of wide inversion belt and high still wind frequency, diffusion conditions of atmospheric pollutants are poor in KDW region. Owing to the rapid expansion of upstreampetrochemical industries, the ambient air quality in this region declines year by year. From 2009 to 2013, the days of good atmospheric environment decreased by 12%, especially in Kuitun which is located in the downwind direction. The amount of coal quantity in winter will rise in this region, so the major atmospheric pollutants have exceeded corresponding national standards.

4. Analysis on multiple demands of various stakeholders

One Belt And One Road Strategy proposes that the unique regional advantages of Sinkiang should be expressed and Silk Road Economic Belt must be promoted. As a result, KDW region has developed into a hot spot of national and Sinkiang development in a short time. Resource conditions of the three cities are different. Kuitun has population and service advantages, but it is located in the downwind direction. Dushanzi possesses advantages of petrochemical industry base,

but its service support is insufficient and the space is limited. Wusu is equipped with advantages of space resources, but its industry development lags behind and the population congregationis insufficient. Faced with the same development opportunity, the three places have demands of both competition and cooperation.

4.1 *Industrialdemands*

Dushanzi is the site where large-scale national petrochemical enterprises are located, so its major development demand is to consolidate and expand petroleum refining capacity. With talent and service advantages, major development demand of Kuitun is to developemerging industries like downstream petrochemical industry and equipment manufacturing industry. At the same time, Kuitun possesses advantages in service industry like trade and logistics. Industry development lags behind in Wusu, but its space is huge. Therefore, development of petrochemical industry with high profit is naturally set as the major development demand. Besides, its late-mover advantage in service industry is also obvious.

4.2Spatialdemand

Limited space in Dushanzi has severely restricted the expansion of petrochemical production capacity. Therefore, it hopes to develop Kui-dong (east of Kuitun) region under the cooperation with Kuitun and expand its development space. Kuitun needs to keep a distance fromDushanzi in space, so as to prevent petrochemical pollution. Meanwhile, it plans to exploitKui-bei (north of Kuitun) and Kui-dong (east of Kuitun) regions which are far away from the downtown, so as to develop emerging industries. With a huge space in the south and north, Wusu hopes to develop the north region and promote petrochemical industry as well as to develop the south region and turn it into the new carrier of regional service agglomeration.

4.3 Environmental demand

Kuitun is in aunfavorable downwind and downstream geographic position, and its requirement for environment is quite urgent. It requires both Dushanzi and Wusu to reduce pollution of atmospheric environment and water environment. Dushanzi and Wusu require each other to reduce pollution for them.

Table 1 Demand matrix ofregional integration development in Kuitun, Dushanzi and Wusu

	Kuitun	Dushanzi	Wusu
Strength	High population; concentrated service	Upwind direction; good industrial base	Upstream of water source; huge space

	facilities		
Weakness	Downwind direction; downstream; under great influence of pollution	Limited space	Low population; low economic level
Industry demand	To develop emerging industries and service industry; to develop downstream chemical industry under the support of petrochemical industry in Dushanzi	To expand petroleum refining capacity	To develop multiple industry system dominated by petrochemical industry and to perfect service industry
Space demand	To develop Kuibei and Kuidong regions and promote emerging industries	Hope to develop Kuidong region together with Kuitun and expand the development space	To develop the north region and promote petrochemical industry; to develop the south region and turn it into the new carrier of regional service agglomeration
Environment demand	Require Dushanzi in the upwind direction to reduce atmospheric pollution and Wusu in the upstream to reduce water pollution	Require Wusu in the upstream to reduce water pollution	Require Dushanzi to reduce atmospheric pollution

5. Scenario analysis on regional integration under multiple demands of various stakeholders

Regional integration development involves multiple stakeholders and the external environment has great uncertainty. Therefore, it is necessary to introduce scenario planning into regional integration in KDW. Different from the traditional one-way and rigid planning thought, scenario planning puts forward multiple scenariosthrough setting scenario elements and premises. It tries to simulate multiple scenarios, carry out evaluation, and provide intellectual support for development decision-making.

5.1Scenario elements and scenario premises

The core issue of KDW region is the relation among industry development, space and environment. Therefore, major scenario elements cover industry, space and environment.

KDW region is still at the stage of resource driving development, and positive externality of economy is formed due to the rich petroleum resources and large-scale petrochemical enterprises in Dushanzi. Meanwhile, there is a lack of necessary supervision means and transaction rules. Moreover, excess emission of pollutants is the concentrated reflection of negative economic externality. Therefore, scenario premise of regional integration development in KDW is to adopt the same technical measures of energy-saving and emission reduction for pollutant enterprises on the basis of a uniform development bottom line (bottom line of atmospheric pollutantemission). At the same time, different scenarios must be established on the system of combining the government with the market. Either simple government intervention or laissez-faire market is undesirable.

5.2 Scenario scheme

5.2.1 Scenario 1: Transformation and comprehensive elimination of pollution

The current situation where upstream petrochemical industries take up a dominant position should be comprehensively changed by grasping the opportunity of national economic transition and relying on the construction of Silk Road Economic Belt. Petroleum refining projects under planning should be stopped immediately and existprojects must be relocatedto external regions gradually. Replacement with equipment manufacturing and modern service industry should be reachedstep by step. The upstream petrochemical production capacity must decrease by 50% till 2030. In this way, substantial elimination of pollution sources will be realized.

5.2.2 Scenario 2: Optimization and moderate elimination of pollution

The development foundation of the existing petrochemical industry should be consolidated, and petroleum refining industry must be positively guided to develop toward the direction of downstream fine chemical engineering. Thethreshold of industry project development can be set up, and petroleum refining projects with a total investment amount of less than RMB 500 million Yuan should be relocatedto outside regions gradually.Upstream petrochemical production capacity must decrease by 20% till 2030. In this way, elimination of some pollution sources will be realized.

5.2.3 Scenario 3: Continuity and control for newly increased pollution

The existing development trend of petrochemical industry should be continued. Production capacity of large-scale petrochemical projects must be expanded and small-scale petroleum refining projects should be controlled. The newly increased pollution sources must be controlled effectively in the aspect of environmental protection.

5.3 Scenario simulation

5.3.1 Simulation of scenario 1

Economic industry: Due to the large range of industrial adjustment and transition, economic growth in recent period will slow down. However, after 2020, a new round of rapid growth will be realized. The economic aggregate in 2030 will be 4.2 times more than that during the current period, and proportion of the tertiary industry will increase from 23% to 42%.

Population and land use: Development of modern service industry and new-pattern industries will boost employment, vigorateurbanization of local regions and attractlabor force outside the region. By estimating the employment posts based on the industry scenario, urban population in 2030 will double the current situation. With adjustment for industrial structure and decrease of land occupation demand, growth of land use will slow down and construction land index percapita will be reduced substantially when compared with the current situation. Thus intensiveness and consolidation of landcan be realized.

Pollutant emission: Pollutant emission model is established according to industry development and capacity in various regions. As per the calculation results, the emission load of SO2, NOX, PM10 and VOCs in 2030 will decrease by 51.48%, 64.14%, 43.20%, and 57.80%.

5.3.2 Simulation of scenario 2

Economic industry: Due to moderate transition of industries, economic growth in the region is relatively gentle. The economic aggregate in 2030 will be 3.1 times more than that during the current period, and proportion of the tertiary industry will increase from 23% to 36%.

Population and land use: The employment posts will rise. The population urbanization demand of the region can be met and a few labor forces outside the region will be absorbed. By estimating the employment posts based on the industry scenario, urban population in 2030 will increase by 40% when compared with the current situation. Construction land index percapita will be reduced to some extent.

Pollutant emission: The emission load of SO2, NOX, PM10 and VOCs in 2030 will decrease by 33.89%, 48.15%, 19.84%, and 13.90%.

5.3.3 Simulation of scenario 3

Economic industry: It is still dominated by traditional competitive industries. In recent period, the economy will grow rapidly and the growth will slow down during a long term. The economic aggregate in 2030 will be 3.0 times more than that during the current period, and proportion of the tertiary industry will increase from 23% to 30%.

Population and land use: The employment posts provided by the industry system dominated by upstream petrochemical industry are limited. By estimating the employment posts based on the

industry scenario, urban population in 2030 will increase by 10% when compared with the current situation. Construction land index percapita will rise substantially.

Pollutant emission: The emission load of SO2, NOX, PM10 and VOCs in 2030 will rise by 14.57%, 4.29%, 35.14%, and 22.30%.

5.4Scenario assessment

Scenario assessment is conducted from two aspects: (1) to evaluate whether different schemes can promote economic development & prosperity, intensiveness and high efficiency of landland usage, and improvement of environmental quality by directing at the development objectives; (2) to evaluate from the aspects of implementation cost and transaction cost by directing at planning implementation. Meanwhile, due to the existence of multiple stakeholders, operation of any scenario will affect various stakeholders. From the angle of welfare economics, KDW region has already broken the critical point of Pareto Optimality and Karldor-Hicks efficiency is more acceptable. If a reform is enough to make the beneficiary s income compensat party s loss, such reform is called Karldor-Hicks efficiency. According to the standards of Pareto Optimality, in multiple subjects, the reform cannot be continued once one subject is damaged. However, according to Karldor-Hicks efficiency, the reform can be continued as long as the compensation transfer can increase income of the overall region. Therefore, Karldor-Hicks efficiency is an important standard of evaluating the possibility of scenario implementation.

Scenario 1: Ideal scheme; low implementation feasibility

Through comprehensive industrial transformation and elimination of pollution, economic development & prosperity, intensiveness and high efficiency of land and improvement of environmental quality can be promoted. Therefore, it is an ideal scheme under goal orientation. However, its implementation cost is high. Meanwhile, powerful administrative means of the government is required to advance relocation and adjustment of petrochemical production capacity. There is a lack of market cultivation, which goes against reduction of transaction cost.

Scenario 2: A feasible and implementable scheme suitable

Through moderate industrial transformation and effective control for pollution sources, it plays a positive role in economic development, spatial intensification and improvement of environmental quality. Meanwhile, the implementation cost is moderate. By giving consideration to the demands of three parties, it meets Karldor-Hicks efficiency.

Scenario 3: Breaking the bottom line; not recommended

Implementation cost of this scenario is low, but the environmental quality has broken the bottom line of ecology according to the simulation. Therefore, it is not recommended.

Table 2: A list for simulation of three scenarios

	Goal orientation			Implementation orientation		
Evaluation factor	Environmental dimension	Economic dimension	Spatial dimension	Economic cost	Transaction cost	Karldor-Hicks efficiency
	Emission load of SO2, NOX, PM10 and VOCs	Economic aggregate and growth rate	Changes of population and land density	Enterprise Relocation cost andopportunity cost of reducing capacity	Administrative intervention and marketization degree	Whether Karldor-Hicks efficiency is reached
Scenario 1	Decrease by 51.48%, 64.14%, 43.20% and 57.80%	The economic aggregate is high; growth at the earlier stage is slow; growth during the later period is fast	Population rises rapidly, the density increases substantially, and the space is intensive	High	Strong administrative intervention is required, and the marketization degree is low	Yes
Scenario 2	Decrease by 33.89%, 48.15%, 19.84% and 13.90%	The economic aggregate is high; growth is steady	Population rises moderately, the density increases, and the space is relatively intensive	Moderate	Administrative intervention of a certain degree is required, and the marketization degree is moderate	Yes
Scenario 3	Rise by 14.57%, 4.29%, 35.14% and 22.30%	The economic aggregate is high; growth at the earlier stage is fast; growth during the later period tends to be gentle	Population rises slowly, the density decreases, and the space isextensive	Low	There is a lack of administrative intervention and market failure exists	No

6. Conclusion

The case of KDW region represents the typical phenomenon of regional development when administrative intervention reduces and the imperfectmarket rule exists in the process of transformation from planned economy to market economy in China. In regional integration of multiple participants, scenario planning will provide effective schemes for decision-making under complicated and uncertain environment. According to the regional integration planning in KDW, key points of realizing multi-party regional integration are summarized. Firstly, based on uniform cognition about the bottom line of regional development, the game rule is formed and external effect is internalized. Secondly, effective compensation mechanism should be established by facing multiple stakeholders, Karldor-Hicks efficiency must be realized, and increase of overall benefit in the region should be promoted.

7. References

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