Empirical Analyzing for a Financial Centre on the Economic Flows Network Space

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Abstract. This issue focused on a deep analysis of a financial center’s industrial economics structure and layout via researching methods of the flows network spatial economy, especially the method of economic scale model, based on geographic environment of economics network that the financial center is located. It also proposed various structural adjusted solutions in details, applied with the general constraint relation measure, economy driven force, economic scale degree and so on.

Introduction

"Financial Street" is an agglomerating economics center which contains a brand concept of financial industry and financial-related city service function, which is based both on geography location and crucial position in regional economic flows network core nodes. According to statistics, till end of last year, there were 173,000 employees in Financial Street, accounted for 70.1% of whole financial professionals in the city. Its district-level revenues came up to US$870 million stranded on an annual average growth of 29.5%.

Insisting on supporting Financial Street as a local economic development core area, the regional government offers optimal combination of policies guiding and organizational supporting, to form a virtuous cycle supporting chain that the financial sustains science & technology, culture, trade and business service industries, and then these supported industries promote the financial back. This situation will help to guarantee the synergetic and comprehensive development of integrating the whole regional economics and chain cluster, furthermore, to establish a regional economic flows network space related and supported by multiple agglomerating economics centers.

Flows Network Space Economy

Some theoretical foundation of the flows network spatial economy formed had been laid by these economic theories in the recent years. Now due to social economic development, the whole hierarchical network society had formed, so every economic activity had flowed in various networks. Though that spatial structure was described by its four elements, it was not so simple spatial formation that each of these elements corresponded to certain economic connotation and function. Given various economic flows constituted by some important economic impact factors, who participated in economic activities, it was no fully scientific expression about the general relation between them. Only were there some partitions on the natural property and scope of function, and attribution of factors in Weber's industrial location theory, these caused their partition processing to no integrated and unified, simplified and standardized system. Otherwise Weber put forward material, products, population and information flows, and together integrated the residential community of village and town, transportation site, business service and financial center, and others into an economic system, there were no whole systematic concept of economics space on flows network, and theoretical systematic research method. Though some economic geography scholars put forward 7 kinds of single and combination mode of economic development, they specifically studied that the coordinative theory about from the population to resources, to environment, to development, and the
measure-index-system of regional sustainable economic development, and spatial economics integrated system, and various relational flows, etc. The spatial economy presented the networks system that there were interdepending nodes, domains coordinated development, "tube" running management of ancillary facility, and various spatial economic entities with the interlaced and intensive, however it did not perfectly define a spatial theory about the general synergetic structure and researching methods of similar general nonlinear economic force control system on the interacting effect of various economic flows. Including the concept of network system, regional core and periphery, and various effect of social economic elements with the historical accumulative and genetic, it had no data show of various dynamic interweaved economic force flows from the source to converge on networks, also it did not construct a comprehensive, integrated, unified and systematic measure-index-system with main economic impacted factors, and no research methods of economic scale model with the regional & non-regional economic force on flows network.

Before now, a large proportion of studying on the regional and spatial economy, it was only to compare to their static formation and inter-contact effect between the different points in a certain time sequence. According to a spatial density for economic elements per unit geographical area, a single absolute quantity, it was proceeding with these static comparative analysis on the different time points before and after, but there was no studying analysis of the dynamic identified, differential ratio, comparative, and dynamic programming. Based on the density differential per spatial unit area or elastic coefficient changes in certain time sequence, etc., studying economic developing tendency with some suitable methods, did it nothing. The flows network spatial economy, with modern mathematical thought, firstly abstracted complex interweaved surface belts on which economic factors flowed into a flows network in certain objective geographical space. And it was essential that it abstracted the spatial location into the node, the flowing path into the link, what was a flows network space of various economic elements that it was interlaced and superimposed. Secondly proposed the definition of complete boundary stone of regional and non-regional economic factors, with its theory and method, it revealed complex and uneven internal rules between its nodes about the enclave economy and global economic integration phenomenon, and promoting the development of spatial economics research into a new era.


\(\mathcal{X}\) is an universal set of objective social economics. \(\mathcal{Z}\) is a spatial set in which each economic element has some activities, and so do \(\mathcal{A}\) of which economic activities unit. On the definition of general relation \(\propto\), it builds the general relation knowledge base \(\{\mathcal{K}, \propto | \mathcal{K} \subset \mathcal{Z}\}\) with scientific division. On the base it constructs \(\mathcal{K}_9^{33}\), namely, an index system of nine main economic factors which impacts regional economic development. On the definition of general nonlinear economic force control system, their moving trajectories (interweaving smooth curve \(\varphi(t)\)) on which economic activities bear show a formation of network in the \(\mathcal{X}\). Abstracting the curve \(\varphi_9(t)\) of 9 main economic factors, it also constitutes a space \(\mathcal{N}_9^{33}\) of the ones. According to economy \(\mathcal{E}_9^{33}\) proposed by Nobel Economic Prize winner Gerard Debreu, so does the economy \(\mathcal{E}_9^{33}\) of the ones. Therefore there is the flows network economic space \(\mathcal{N}_9^{33}\) including the \(\mathcal{E}_9^{33}\), both they are in the general relation.

Here, an area \(\mathcal{X}_0 \subset \mathcal{X}\), its flows network space is for \(\mathcal{N}_9^{X_0} \subset \mathcal{N}_9^{33}\). On the basis of spatial economy, the flows network spatial economy replaced the effect of realistic geographical location to the aggregation economics node and flowing link in economic flows network abstracted, and on similar cost calculating principle of iceberg melting, transferred the effect to coefficient of retardation in its flowing link. It emphasized on researching analysis of their dynamic interaction and inter-influence between various economic flows and their changing development. Based on the general relation, synergetic structure, knowledge base on the general relation, regional and non-regional economic
Factors, index system of nine main economic factors, economic force and economic growth momentum, etc. [1, 2, 3], with the general nonlinear economic force control system, economics scale model, breaking-point theory, Steiner minimum weighting network, forward economic forecast on dynamic fuzzy logic system, optimal combination forecast on the general synergetic structure with ANP method, etc. [3], it researched and analyzed the internal rules of its economic phenomenon, and interaction and interrelation between its economic flows, meanwhile studying the dynamic locational formation and spatial layout of its abstraction about the production activities of its economic factors, and finally solving the complex economic problems in its space, such as the planning and layout of Chinese urban cluster, network layout of regional economic industrial node adding, disequilibrium support of the global economic integration, unbalanced exchange in international economics and trade network, heterogeneous flowing change in the international financial system, mapping problem between the objective spatial economic resources and financial monetary system.

**Flows Network Layout of Kernel Economic Power Nodes in the Area**

Throughout analyzing with economic scale model, nowadays regional space of the Financial Street headquarters that it is an economic flows network is mainly composed of financial, trade, sci-technology, communication, public service sectors and so on. Its structure embodies an economic flows network in general constraint relation, which it expresses comprehensive economic relation, but yet none is a network cluster of comprehensive industrial agglomeration centers. In figure 3, node 23, 24, and 27 for financial nodes supporting with IT technology service, meanwhile among them, 23 for communication nodes 29, 30 and 31 providing with the same one, 36 for financial node 35 performing to credit insurance service, 42 for these insurance nodes supporting with sale & marketing service, 38 for the other providing with reinsurance service, 9 for 30 with terminal service provided by one way, all they are in the contribution by one way. All nodes of unclosed circles in figure 3 referred to as the public service, they take double way in the contribution to the main business industry nodes. Node 29, 30 and 31 with node 22 respectively is the vertical correlation. Node 33, 34 and 39 with node 7, so does it. Node pair 2 and 3, 1 and 47, 8 and 37, respectively is also. Provided special services by node 23, node 4, 5, 6, 7, 10, 29, 30, and 31 are in interdependent relationship. Relative to node 22, node 29, 30, and 31 are in the dependence for each other. Provided by node 24 to special service, each other of node 5, 6, 7, and 10 is in the dependent. Node 42 to node 36, 38, and 39, are in the contribution, and node 38 to 36 and 39 are also. Node pair 1 and 8, 22 and 32 respectively is the same. Similar state's public service nodes of unclosed circles are in the dependence each other in figure 3, but so do different ones of them and so on. Deep analyzing 42 typical economic nodes within the center, it is concluded that some of them are in both contribution and dependent relation, or correlation, or interdependent. They are composed of complex economic flows network space in the general constraint relation.

![Figure 1. Headquarters' economic flows associated network layout diagram in Financial Street.](image)

Empirical and Data Analyzing on Economic Scale Model

According to researching result of well-known scholars on the stability of cooperative nodes in complex combination network, it is more than five nodes of different comprehensive economic industries that it could construct an approximate closed circulating flows network space with the general constraint relation, in the regional headquarters' economic core area, which it is able to defend against external various risk and crisis. Applied with researching methods of economic scale model [2, 3], empirical analysis combined with specific data in figure 3, it is concluded that although this area is composed to complex network (blue line) in the general constraint relation, which financial and mobile headquarters, and supporting on each other between industrial chains, it is a basis to promote the regional development. However, not yet it has constructed a richer stable headquarters' cluster in this network, namely agglomeration economics centers' cluster.

As a developing country mainly producing manufactured goods for the global, it is a priority that its core power is economic elements into its external, so collaboratively computing regional economic power that it is producing power combined with its external importing consumption, more appropriate to fully embody the dynamic performance in this regional economic development. In figure 3, it is shown that complex economic flows network space, according to the financial, communications, sci-technology, trade & business, public service, and so on, which these nodes are divided into different economic pools. The economic power data was shown in other papers, analyzing and calculating on the regional statistical data.

Empirical analyzing result, in the Financial Street that headquarters' economic area, it has shown that there is a lack this type of node to node supporting from education industry, especially international advanced high-end education park related to each of its industry, otherwise various seminars in international culture and education are in the same, especially on financial and economic investment, education management. On the health care, absence of personalized high-end service, especially a full consultancy of medical service on Internet & IT, and on the IT electronic commerce in headquarters' economic industry also, especially each of product selling or service chains for all headquarters, in brief a little of headquarters in sci-technology innovation, especially IT derived service supporting for them, so all they could promote to do main headquarters' economics and service development. Finally not yet what industrial category that has been fully integrated there, especially a lack of cultural education, health care, sci-technology, and IT headquarters economics. There still is little of strong professional public service park composed of vertical downstream
production and service chains associated to headquarters' economics, which guided by its government, especially none of agglomeration center, or large chain-cluster on the professional service.

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