Regional Logistic Systems And Operation Mode Based On Industrial Cluster

Sun Shusheng 1, 2  Hai Feng 2
1. College of Management, Wuhan University of Science & Technology 430070
2. Economic and Management School, Wuhan University 430072

Abstract: the development of regional logistic is the pre-condition of the development of regional economy and formation of industrial cluster. Consequently, regional logistic can support the formation of industrial cluster. Further more, we discuss the components and principles as well as steps in building regional logistic systems. Finally, we present the operation mode of regional logistic.

Key words: industrial cluster/regional logistic system/operation mode

1 Introduction
Since open up and reform, clustering has been characterized China enterprises, especially private sectors, such as bow tie in Chengzhou, stockings in Datang, Zhuji, furs in Haining, leather shoes in Wenzhou, electronics in Dongguan, home appliances in Shunde, smallwares in Yiwu and Garments in Xiliu, etc. How to make use of the cluster advantages has been great concerns of local economy to upgrade industrial structure and shape great industry and great circulation.

Regional theoretic economics has turned to new economic geography. Oligarchic competition and diversification of optimum product (Dixit & Stiglitz, 1977) laid the milestones for new trade theory and new economic geography perspectives including transportation cost in analysis. To explain how the efficiency and benefit of regional logistics promote the formation and development of industrial clusters, the economy of cluster, externality and economy of scale resulting from the reduction of transportation are based on place selection, regional growth involving convergency and expanding. The great difference of regional economy and industrial clusters makes it an imperative theoretical and realistic problem to establish efficient logistic systems and logistic operation mode.

2 Analysis of logistic systems under industrial clusters
Industrial clusters refer to relevant firms, specialized providers, service providers, up and down stream firms, which belong to a specific field and geographically confined with competition and cooperation, together with other bodies such as universities, standardization organizations, and industrial associations. Consequently, industrial clusters not only break current industrial frontier but also provide a new cooperation practice between public and private sectors. Therefore, Port regarded industrial clusters as strong and sustainable competition advantage resulted from the concentration of inter-mingled industrial businesses with their supporting agencies.

Past studies generally implied same conditions for all industries to cluster. namely, the formation of industrial cluster is neutral to all industries, or to say very few about the preconditions of industrial clusters. But the fact is not true as it were.

Preconditions to form industrial clusters include: a) Separability of production process, or full specialization of activities through industrial value chain. Only if production process can be separated into different phase, can specialization realized respectively, further up and down firms, finally competition and cooperation as well as mutual learning. b) Transportability of final goods. Naturally, lack of transportability will lead to the distribution of suppliers depend on dispersed customer demands. Then it makes geographical concentration impossible, neither economy of scales. On the contrary, even the supply factors can not reallocated, with transportability of final goods, the different phase of production process make clusters possible, thus the whole industry.

The advantages of industrial clusters resulted from separability of production and transportability of final goods is as follows:
(1) Heterogeneous resources and capabilities constitute the long term competitive edge of industrial clusters.
   The specific resources owned and resources integrated capabilities are the bases of long term competitive edge.

(2) Resources spatial structure vs. competitive edge
   Resources spatial structure manifests itself by economy of cluster and external economy of scales. Economy of cluster is obtained through cost reduction by common infrastructure sharing to reduce extra investments and geographically neighborhood to decrease physical and informational transfer expense. External economy of scales is; Collective purchase, production, sale, marketing and government relations can be done by joint ventures/cooperation/alliances based on neighborhood or personal connections. Large scales increase market bargaining power decrease average cost, and help to build long term relations, Such as joint materials purchase and common selling center can greatly save transport and stock cost within cluster.

(3) Personal connection' impacts to resources structure
   Personal connections, shaped by kinship or neighborhood, exert significant effects on resources mobility and structure among firm clusters, such as physical flow and capital flow. Phyche-contract can be reached by personal connections. so do physical assets and capital allocation.

(4) Network and competitive edge of clusters
   As a networking state, which has various structural hierarchy and links, Cluster reflect the ownership, distribution of resources, synergetic path and knowledge& information channels. Individual firm’s competitive edge within cluster can be enhanced by network effects , namely, network leads to structural competitive edge which can make use of own resources as well as others resources indirectly. This effect equals to the expansion of firms resources frontier. Similarly, individual productivity frontier can be expanded by quick response mechanism based on long term relations.
   So we can learn from above that cluster is a large logistic system in practice. Inter-woved up and down firms cover factors of package, transport, download, inventory, storage, and information management that make a logistic system. Network structure of cluster integrates transport and logistics. Spatial concentration effects reduce cost of transport and stock. Trust and contract mechanism of personal connections accelerate flow of capital and information.
   Consequently, clusterized activities cut operation cost down greatly. It is easier to form comprehensive logistic chain within the same cluster. Supply chain from material supplier to end consumers made up of individual firms within the same cluster ensures the continuity of logistics. Meanwhile, each stage can be regarded as a independent node which matches supply and demand. These nodes then establish material flow distribution systems of cluster.

3 Supportive role of modern logistics to industrial cluster
   Modern logistics is a economic process that matches supply and demand, narrow time and space gaps of goods/services to satisfy customers, whose purpose is to deliver customers the right goods/services, the right quantity at the right time and right place in the right way and at the right cost. Rights specify the basic activities of logistics and emphasize the importance of time and space. Basic activities cover transport, storage, package, processing, distribution, logistic consulting and etc. Modern logistics represents the coordinated flow and integration of people, goods and information.
   Based on the above analyses, we can conclude that the building of regional logistic systems is the key support to separability of production process and transportability of final goods in industry clusterizing. To guarantee an industrial cluster smooth operation, logistic system should fit the specific industrial nature. Besides transport, especially transport cost, industrial cluster is related to various products from different industry whose dependence on transport varies.
   In sum, supportive logistic system should be a must when we build advantageous industrial clusters. To maintain long term harmonious economic development, industrial structure adjustment should, on the one side build great industry, on the other side, foster great circulation, and establish a good state of great industry propelling great circulation with great circulation promoting great
4 Regional logistic systems building based on industrial clusters

Regional logistic systems concern about railway, water carriage, highway, warehouse, stack, management system, information and etc. Therefore, the building of a harmonious developing and smooth running regional logistic system, for the most part, beyond the forces of market and to a large extent rely on local government planning as a whole.

(1) Components and building principles of regional logistic systems

Regional logistic system, being a complicated network, should be carefully planned and developed harmoniously from 3 aspects: first is infrastructures including airports, railways, road and water networks, pipelines, warehouse, logistic center, distribute center, stack, parking lots, ports and docks, internet, and etc. Second is equipment including various internal transportation vehicles in logistic centers and distribution centers, uploading and downloading machines, conveying tools, automatic equipment, circulation processing machines, information process units and other things. Third is standards such as terms, panel, package, truck, encapsulation, shelf, goods code, quality, lists and documents, information exchange, warehouse, processing and etc.

The building of regional logistic systems can be divided into the building of its components. The complication of systems makes it a tough work to manage and implement. There are several principles to follow during the building course:

① Consistency. Equipments specification, technical performances and information standards should be consistent among departments and links.

② Coordination. Information, time and space should be well coordinated among logistic departments and every stage.

③ Compatibility. The complementarities between regional economies mandates logistic systems’ compatibility to explore their advantages and features.

④ Systematic efficiency. Regional logistic system, being systematized and integrated, should be assessed on the whole efficiency and maximize the system output. Then we can solve the bottlenecks of sub-systems for critical problems.

⑤ Acommadation. Infrastructures such as railways, highways, stacks, docks and warehouses should be planned ahead of time and accommodate future development for their construction nature.

(2) Systematization and assessment criteria

Logistics systematization is rationalization of logistics that structuring sub-systems into a big system and optimizing its design, organization, management to full function with best synergy effects. It is in a high level and a ideal target that study the combined logistic infrastructure of city main roads, concentration center and disperse center, linkage between city and countryside, firm warehouses, and inter-regional channels. Systematization and optimization distinguish modern logistics from old simple storage and transport logistics. The systematization assessment criteria are as follows:

① Reachability of network. Complying with the requirements of quantity, time and place, timely transport and distribution are the stickyard of logistic service. When designing regional logistic system, network layout, distribution center position, transport vehicle, path upgrading, automation of loading, information system should be carefully considered to ensure the connection and reachability between regions.

② Integration of logistic activities. Modern logistics is no more combination of single functions. Rather it is a synergic activity by all components. Integration of logistic activities is also a key characteristic distinguish modern logistics from old simple storage and transport logistics. The organic connection between ever independent transport, loading, storage, packaging, circulation processing and distribution emphasize all rounded optimum. Regional logistic systems should be built in favor of integration of logistic activities.

③ Logistic information codification and networking transfer. To build a functionary regional logistic systems, we should based information network and EDI systems on mobile communication, GPS, computerized on-line management, internet, intranet and public economic information net in order
to realize the target of information share and integration of commercial, material and information flow.

①High efficient network  Logistics firms have their own operation goals because of its economic nature. Thus, both service firms and productive firms, upon fulfilling the logistic activities, are trying to make the most from the least. That is to say, we should primary focus on, in building regional logistic systems, enhancing quality, cut time and lower quantity in transit, increase profit.

The building of regional logistic systems is aimed at serving the development of modern logistics. By infrastructures, the system building of transportation, storage, information exchange and transfer networks, together with their scope, functions and local bottlenecks, will produce significant impacts on the quickness of national or regional material flowing. By logistic facilities, their standardization and modernization, an effective regional logistic system should guarantee the continuity of every logistic stage and the setup and development of firms, especially the firms in the third party logistics and those logistic economic organizations to restructure. Of modern logistics, being the medium of supply and demand, the only output is “modern logistic service”. Its success or failure will fully reflected in the productive efficiency and costs.

(3) **Measures to building regional logistic systems**

At present there are some structural, managerial and technical limits in China logistics systems, and these problems embody as follows: hard to set up system; or lower level system not catch high efficiency. Although firms of manufacturing, sales and circulation are eager to develop the logistics system, it turns out to be a harsh task because of unfavorable conditions. Therefore if we want to establish China regional logistics systems, the top priority is to solve problems as follows:

①Predicament resulting from isolated management for the coordinate development of logistics systems. The key to modern logistics systems is systematic management. Very complicate as it is, to harmonize the different links of logistics system, which consists of highway, railway, water carriage, air-ferry, warehouse, port, cargo site, stack, and etc. it is imperative. Work schedules and long-term plannings of logistic concerned sectors, are almost independent, lack consideration of system and integration, especially on the part of the comprehensive characteristic of multi-transport form. All this will bring severe problems for the harmonious development of logistics industry.

②The problem of compatibility among various tache of logistics system brought by its nonstandardized facilities and component. The essence of logistics system should integrate those dispersive circulation taches and pursue the optimization of the whole system which will accelerate the primary circulation channels and also save the energy at the same time. It is not easy to realize the compatibility of logistics system currently because there exist some mutual competition, self-supporting, repellent, and self-governed among its subsystems. It should have a uniform work criterion not only for the establishment, machine equipment and special implements of the inner subsystems of logistics system, but also for the casing, assemble and unassemble, stack code and transportation of each subsystem. Only avoiding those criteria which is not universal in industry from original management and trying to push national and international criteria will the expedite logistics system come true.

③Actively push the assets restructuring inside regional logistics system. The abundant resources of logistics system have been directly or indirectly formed through the long-term economy construction and reform and opening of integrated transport network, manufacture enterprises and commercial corporations (including wholesales and retail, etc.). To developing the modern logistics need to restructuring the current assets of logistics system according to its development rules and also need to change the past management patterns which is extensive and separate in work.

5 **Operation mode of regional logistics based on industrial clusters**

Regional logistic mode with integrated supply chain is industrial chains around key industries which have more stable supply links within certain region. By that definition, regional logistic activities should stress integration and JIT. The flow, variety, process, and direction are defined relatively in an industrial chain. The point is velocity of flow, namely, to realize JIT of purchase (supply), distribute, storage and transport by orders from information platform (figure 1).
JIT supply logistics means logistic firms receive from supplier and provide transport and storage as per clients’ purchase orders.

JIT productive distribution logistics means logistic firms deliver materials to workplace complying with clients’ production schedules accurately and timely.

JIT storage and transport of final goods means logistic firms deliver final goods to points of sale according to client’s sale orders and forecast.

This logistic mode is very strict with time with the quality of information as the key to success. Path, quality, times are strictly planned and standardized. Road condition is a main environment problem. Transfer Chemical of Zhejiang and Wuhan Steel Plant are 2 cases to adopt such logistic mode.

6 Conclusion

The building of regional logistic systems is the key support to separablity of production process and transportability of final goods in industry clusterizing. It is the basis of modern logistics development. Government functional bodies concerned should well plan and clearly set short, mid and long term targets for regional logistic systems in order to make full use of current infrastructures while encouraging productive, commercial, circulating firms to enter logistics. At the same time, government coordination can help link up relevant establishment for the systematization and integration of logistic systems.

References