The Synergism of Food Industry and the Local Economy in Addressing Rural-Urban Linkage in Semarang Regency

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Abstract. Industry in Semarang Regency is still dominated by the wearing apparel industry sub-sector which is labor intensive and footloose that tends to be located around urban areas. But, in certain potential sub-sectors such as food industry has a strong linkage with the agriculture and livestock, and geographically tends to be located around the periphery or rural areas. It establishes sectoral specialization at the local level, potentially to form industrial clusters and encourages spatial integration between rural and urban areas. This research aims: (1) to identify the synergism of food industry and local economy; and (2) to understand how the synergism address the rural-urban linkage in the region. The research was done in district and sub-district (meso) level during 2018-2019. The research uses data of Large and Medium Industries (LMIs), related Small Industries (SIs), and the local economy. Quantitative-qualitative descriptive analysis is used to identify the synergism of food industry and the local economy and how it addresses the rural-urban linkages. Result shows the synergism of food industry and local economy in Semarang Regencypotentially encourages the linkages between this sub-sector with livestock and horticulture or the agricultural sector in general. The linkage of food industry and agriculture region shows the proximity of industry to the source of raw materials in rural areas. This synergism increases positive externalities of industry such as job creation, increased investment value and knowledge transfer. Urban and metropolitan areas become the potential market for food industry products. Food industry encourages the spatial integration between rural and urban or mutual rural-urban linkages. It can explain the regional network based on the clustering model through providing opportunities for the development of local economic or endowment factors in the region. The cluster strategy approach is used in the development of this sub-sector in order to increase regional competiveness. The development of small towns in periphery regions or rural areas can be a counterbalance to the tendency of over-urbanization in the metropolitan areas.

Keywords: food industry; local economy; synergism; rural-urban linkages

1. Introduction
Food industry in Semarang Regency is spatially concentrated or clustered which shows the phenomena of industrial agglomeration. This sub-sector is strongly agglomerated that reflects the interrelationship among companies (including business cooperation), concentration of employment, and knowledge transfer that increase the positive externalities of industrial agglomeration. It also has sectoral specialization that potentially establish industrial clusters. The food industry that process primary products such as livestock products and plantations geographically tend to be located around the raw
material concentration. The spatial regression model show some local economic factors of livestock and horticultural regions significantly determine food industry agglomeration in Semarang Regency [1].

The phenomenon of food industry in Semarang Regency is different with industry in general. Industry in Semarang Regency is still dominated by the wearing apparel industry sub-sector which is labor intensive, footloose and tends to be located around urban areas. Based on study by Kuncoro (2002) [2], industrial agglomeration in Indonesia was concentrated in the metropolitan (urban) areas and generally had vertical relationships with global suppliers and access to international markets. In some industrial regions, poverty incidence has even emerged along with the growth of large and medium industry because its local economic base did not grow and local communities were marginalized [3].

Inward investments of industry should impact to the job creation and encourage local businesses so that they are significant in adding value locally. Investment in a particular industrial sector should encourage the growth of related industries [4][5]. Local economic development concerns in linkages, cooperation, or synergy among local economic actors. The synergism among the industrial sector that geographically concentrated with the local economy in order to increase the competitiveness of the local economy, as Porter (1990) argues that the local economy as the product of the competitiveness of the local economic actor such as local companies and local industries. In this context, the author sees that food industry potentially linking with the local economic factors and spatially linking the rural as producer and urban as market concentration.

This research on the synergism of food industry and the local economy in Semarang Regency focus on economic actors (the business sector) related to the main factors of the local economy. Business actors in the local economy include Large-Medium Industries (LMIs) and related Small Industries (SIs). Semarang Regency was chosen as the research area because the region is growing significantly with a significant peri-urbanization [6][7]. This research aims: (1) to identify the synergism of food industry and local economy; and (2) to understand how the synergism address the rural-urban linkage in the region.

2. Data and Methods
The synergism analysis of food industry and local economy is carried out on (1) 39 LMIs companies and 481 SIs; and (2) stakeholders related to food industry such as business operators, local government, associations, and universities). This research uses primary and secondary data for analysis. Primary data includes: (1) data on spatial and functional linkages of industries include raw materials, industrial labor and sub-contracting, were obtained through census surveys using questionnaires on LMIs companies of food industry; (2) data on the potential of leading industrial clusters, including related SIs data, were obtained through interviews with stakeholders; and (3) data on the competitiveness of food industry were obtained through questionnaires by stakeholders. Secondary data include: (1) the number of workers in each LMI company of food industry and data on types of investments, value of investments, and markets; (2) data on SIs related to food industry; and (3) data on the characteristics of the study area. Secondary data were obtained through institutional surveys at the Cooperative, SMEs, Trade and Industry Agency (PERINDAG); Statistic Agency (BPS); Planning Agency (BAPPEDA); and Investment and One Stop Service Agency (DPMPTSP).

Analysis on the synergism of food industry and local economy focuses on spatial and functional linkages to increase value added and regional competitiveness. We use quantitative and qualitative descriptive analysis to explain: (1) the linkage of raw materials; (2) linkage of labor supply; (3) linkages among companies (sub-contracted); and (4) potential industrial clusters, including related SIs. Then analysis was followed by assessing the competitiveness of leading industry sub-sector using the Diamond Porter model framework [8][9].
3. Result and Discussion

3.1. The Synergism of Food Industry and Local Economy

Industrial agglomeration in Semarang Regency shows high sectoral specialization in certain sub-sectors that potentially establish industrial clusters, as occurred in the food industry (Figure 1). High specialization in certain industry will accelerate the growth of the industry, that means potential industrial agglomerations will lead to positive externalities. The results of the spatial regression analysis showed that local economic factors significantly determine the LMI of food industry. The livestock associated with horticulture region and the horticultural region has positive effect on the agglomeration of food industry. It means the increase in production of livestock and horticultural commodities can increase the agglomeration of food industry [1].

![Figure 1. Location and specialization region of food industry in Semarang District](image)

The results of the LMI of food industry survey in terms of the place of origin of the main raw materials are: (1) 44% of companies use the main raw materials from within the province (not limited to within the district), such as tubers, yam, fish, tapioca, rice flour and wheat flour; (2) 32% of companies use the main raw materials from the local (sub-district) and district areas, which consist of around 9% in sub-districts and around 23% in district (dairy milk, chicken, coffee, coconut, herbal product, and mushrooms); (3) 21% of companies use raw materials from outside the province or national level, such
as sugar, milk powder and eggs; (4) about 3% of companies use the main raw materials derived from imports such as soybeans.

Food industry companies in terms of their labor origin are: (1) 24% of companies use local (sub-district) labor; (2) 61% of companies use workers from within the regency; (3) 15% of companies use labor from other regencies. Data from PERINDAG of Semarang Regency in 2016 shows the LMIs of food industry generate totally 3,046 workers, or 38 workers per company on average.

Food industry companies in terms of the interrelationship or sub-contracts among them are: (1) 97% of companies have low sub-contract, it is only 1%-30% of the production process being sub-contracted, such as raw materials supply, transportation services, product packaging, and joint marketing; (2) 3% of companies have a sub-contract percentage of 31%-65% of the production process. The small number of sub-contract percentage in the LMIs of food industry shows small linkages among companies because of the diverse or various types of food industry products.

The influence of local economic factors on food industry agglomeration can be seen in Getasan Sub-district as a center of dairy milk production (production up to 20.7 million liters or 80% of total regency production). 5 of 8 cooperatives/groups of dairy farmers/collectors in Semarang Regency are located in Getasan Sub-district. LMI companies in dairy milk processing are CV. Cita Nasional in Getasan Sub-district and PT. Cimory in Bergas Sub-district.

Food industry that produce meat / eggs product are related to livestock businesses in Semarang Regency. Producer of chicken products (fresh meat, sausage and nugget) namely PT. Ciomas Adisatwa in Pabelan Sub-district and CV. Indocipta Mitra Sejahtera in Getasan Sub-district get raw material from the surrounding area. Semarang Regency is a potential region of the livestock sub-sector, such as chickens, with a total production up to 3,888 tons [10].

PT. Java Egg Specialties in Bergas Sub-district produces eggs and mayonnaise products get supply of eggs from a group of farmers in Tuntang Sub-district, despite competing with egg suppliers from East Java Province. Eggs are a potential product in Semarang Regency, with production up to 228 million [10]. The growth of the livestock sub-sector in the region encourages the breeding industry, PT. Japfa Comfeed Tbk. in Tengaran Sub-district that produces DOC to supply farmers in the region and to other regions in Central Java Province.

Jambu, Banyubiru, Bandungan, Ambarawa and Sumowono sub-districts are horticultural regions that produce commodities such as herbal plants, mushrooms, cassava, and yam to supply the raw materials for producers of herbal and food products such as UD. Wijaya and UD. Pertiw in Jambu Sub-district, UD. Bumi Lestari in Sumowono Sub-district, and KUB. Makmur Sentosa in Ambarawa Sub-district. The supply of raw materials of horticulture products also occurs across sub-districts, even across districts, as happened in the PT. Sumber Boga Abadi and PT. Mangkok Mas in Bergas Sub-district.

Synergism in this research can be reflected in inter-sector collaboration and relationship between food industry and agriculture, livestock or tourism. Collaboration of food industry and livestock occurs in the commodity of dairy milk, although only reach around 30% of total dairy milk product. LMI companies in dairy milk processing are CV. Cita Nasional in Getasan Sub-district and PT. Cimory in Bergas Sub-district. Business cooperation or linkage among companies and dairy milk farmers can be described in Figure 2. From interview with stakeholders and study by Asih et. al. (2013) [11], it shows that Semarang Regency’s dairy milk production reached 77.3 tons per day that is around 70% supply the dairy milk processing industry outside the region such as PT. Frisian Flag in Jakarta, PT. Sari Husada in Yogyakarta, PT. Indomilk in Semarang and Solo, and GSKI in Boyolali. The problem in dairy milk business in the region is the quality of local dairy milk has not fully met the quality standards. Problems are also found in the egg processing industry such as conducted by PT. JES in Bergas Sub-district that the supply by local eggs suppliers has not been able to meet the quantity needed by industry continuously. The price from local farmer is not competitive compared with producers from other region such as from East Java Province.
The synergy between food industry and livestock sub-sector was found in the partnership between local farmers with PT. Ciomas Adisatwa in Pabelan Sub-district. The company produces fresh chicken by collaboration with 80 local farmers to supply chicken up to 18,000 chicken per day. The partnership is carried out with the core-plasma model where chicken processing industry as the core industry and local farmers as plasma. Plasma farmers provide place (cages), facilities and labor for chicken livestock. PT. Ciomas Adisatwa as core company provides DOC, feeds, medicines and technical guidance, then the core company buys the livestock products. The core-plasma partnership model facilitates the development of livestock businesses in the local level, reduces business risks and guarantees the market. The partnership model also guarantees the sustainability of supply for the chicken processing industry. Business cooperation or linkage among the company and chicken farmers can be described in Figure 3.
The inter-sector relationship also occurs in food industries that processing the agricultural, horticultural and plantation commodities. The coffee and brown sugar processing industry use the supply of local raw materials. However, some food industry has not been fully supplied with the raw materials such as tubers or yam, ginger and other herbal commodities by local farmers. Some food industries still depend on the supply from other regions in Central Java Province.

The spatial synergism becomes potential to be developed as a food industrial cluster characterized by sectoral specialization and involving LMIs companies and related or similar SIs, as well as relevant stakeholder to support increasing value added and sectoral competitiveness as well as regional competitiveness. The variables of competitiveness of the food industry to be considered are collaboration among actors (including collaboration with the tourism sector), increasing the productive capacity and workers, appropriate technology and increasing value added in the value chain. The potential of the food industrial cluster covers 39 LMIs companies and 481 SIs business units as core industries.

We find the synergism of food industry and the local economy in Semarang Regency in two types: (1) spatial synergism can be developed as food industry clusters regarding the sectoral specialization consist of LMIs companies and SIs business units as core industries; and (2) functional synergism in the food industry development focus to increase in some aspects of competitiveness of this sub-sectors.

The findings of this study can be described in Figure 4.
3.2. The Synergism of Food Industry and Local Economy in the Rural-Urban Linkage Context

In the perspective of rural-urban linkages, the linkages can be defined as a flow or an interaction between rural and urban areas. Rondinelli (1985) described some elements of economic linkage such as market patterns, raw materials and intermediary materials flows, capital flows, forward and backward linkages, and sectoral commodity flows. Meanwhile, Douglass (1998) concerned to the main linkages between rural and urban areas economically in production, commodity and capital flows. Pradhan (2003) also concerned on importance of economic linkages toward the balance in the development among rural and urban areas [12].

The strong relationship of food industry agglomeration and horticultural and livestock region in Semarang Regency shows the proximity of industry to the source of raw materials. As shown in the results of the LMIs of food industry survey that 32% of companies use the main raw materials from the local (sub-district) and district areas such as dairy milk, chicken, coffee, coconut, herbal product, and mushrooms. Besides 44% of companies use the main raw materials from within the province (not limited to within the district), such as tubers, yam, fish, tapioca, rice flour and wheat flour. It means the proximity of food industry agglomeration to rural areas. Food industry agglomeration encourages spatial integration or mutual linkages between rural and urban areas. It addressed the concepts of rural-urban linkages as Rondinelli (1985), Douglass (1998) and Pradhan (2003) argued above. The mutual spatial industrial linkage indices show that the region has a balanced rural-urban linkage, which is characterized by bridging the market in urban areas and the rural sectors [13].

Spatial integration or rural-urban linkage also can explain the interdependency theory which bridging the modernization theory and dependency theory by reducing the gap between regions. An approach the interdependency theory focuses on developing regional network based on the clustering model through

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**Figure 4.** Model of synergism of food industry and the local economy in Semarang Regency
providing opportunities for the development of local economic factors (endowment) in a region. The development of small towns in periphery regions or rural areas can be a counterbalance to the tendency of over-urbanization in the metropolitan area [14].

In addition, in the perspective of rural development, food industry development can be integrated with the rural economic development based on the agricultural sector (including the livestock and horticulture sub-sectors). Food industry companies in Semarang Regency generates significant number of local workers. As shown from survey, 24% of food industry companies use local (sub-district) labor; and 61% of companies use workers from within the regency. In this context, the industrial and agricultural development can be carried out within the framework of the rural diversification concept. This concept emphasizes the importance of non-agricultural employment opportunities and the increased income of rural households as a consequence of the relative increase in industrial and commercial activities both related or not to agricultural activities [15].

4. Conclusions

Industrial agglomeration in food industry sub-sector in Semarang Regency establishes sectoral specialization at the local (sub-district) level and potentially to form industrial clusters. This sub-sector geographically tends to be located around the raw material area and has a strong linkage with the horticulture and livestock sub-sector or the agriculture sector which is generally located in rural areas.

The synergism of industrial agglomeration and local economy in Semarang Regency potentially encourages the linkages between the food industry sub-sector with livestock and horticulture sub-sectors or the agricultural sector in general in order to increase positive externalities of agglomeration such as job creation, increased investment value and knowledge transfer. The cluster strategy approach is used in the development of this sub-sector in order to increase regional competitiveness. The metropolitan areas become the potential market for food industry products.

Food industry agglomeration encourages spatial integration or mutual rural-urban linkages that can explain the interdependency theory by reducing the gap between regions. It focuses on developing regional network based on the clustering model through providing opportunities for the development of local economic or endowment factors in a region. The development of small towns in periphery regions or rural areas can be a counterbalance to the tendency of over-urbanization in the metropolitan areas.

The result of the study can provide implications both theoretically and policy. The theoretical implications in the scientific field of geography and regional development are as follows.

- The synergism of food industry and the local economy in the metropolitan region can complement the concept of spatial integration or rural-urban linkages (Rondinelli, 1985; Douglass, 1998). The spatial synergism model that works in peri-urban and rural areas can be a counterbalance to the tendency of over-urbanization in metropolitan areas [16][17][6][14][18][13].
- The synergism of food industry and the local economy based on cluster model opens up opportunities for the development of local economic endowment factors in a region[8], so that further studies on cluster dynamics are suggested, particularly in the prospective commodities of food industry sub-sector (e.g. cow milk processing, meat and egg processing, or horticulture products processing).

Policy implications based on the results of the study can be input for regional development, particularly in Semarang Regency as follows.

- Food industry sub-sector which processes local agricultural products (horticulture and livestock) potentially to be developed in rural and peri-urban areas, therefore it is recommended to develop competitive and industry-oriented local agricultural commodities, such as dairy milk, beef, chicken, eggs, fruits, vegetables, and herbs. In the other side, the industrial sector development needs to be focused on the investment of industries that functionally related with the local economy.
- Spatial synergism in the form of spatial integration requires reliable regional infrastructure, particularly to improve the accessibility of rural and urban areas, so that it is necessary to improve transportation network system among sub-districts as well as regional economic zones.
- Functional synergism in increasing regional competitiveness requires collaboration among stakeholders, so that it requires facilitation of cooperation and collaboration of elements in the local economic development in the region including academia, business sector and governments to create common values, strategies, action plans and implementation.

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