SMEs agglomeration and its contribution to socioeconomic transformations in peri-urban area (Case study: Semarang City)

Y R Adhitama[1,2], M H Satria[1,2], G Pamungkas[1,2] and P Nugroho[1,2]

[1] Department of Urban and Regional Planning Engineering
[2] Universitas Diponegoro, Indonesia.

Email: yoshe.rezky17@pwk.undip.ac.id

Abstract. The rapid growth of Semarang City has triggered an agglomeration of small and medium enterprises (SMEs) in peri-urban areas. In addition to its impacts on the socio-economic state of the local community, the SMEs growth also affects to spatial transformation in the same area. Red brick industry in Pedurungan Kidul Village represents this phenomenon. Since 1990, its production activity has positively impacted on the local community's welfare improvement through increasing employment opportunity and household income. However, it also has threatened the existing spatial development change. By using sequential mixed method approach, the purpose of this research is to investigate the contributions of red brick industry growth towards peri-urban development, both spatially and socio-economically.

Keyword: *Peri-urban Area, SMEs, Socioeconomic Transformation*

1. Introduction

Urbanization has been a critical issue in recent urban development. In general, urbanization phenomenon is a process of population concentration from small areas (rural), forming urban activity due to rural-urban relations. Eventually, the activity triggered an urban transformation process both spatially and socio-economically [1][2]. One part of the urbanization process is peri-urban area creation [3]. The peri-urban area is defined as a transition zone from agricultural land to urban utility area. The settlements are not easily classified as urban or rural [4][5][6].

The background of the urbanization process emergence in a region is divided into two types [7]; the first is the result of urban industry diffusion spreading to the suburbs (the process is driven from outside the region), or the second is a process driven within the territory itself, which is the socio-economic development of the local industrial product. The existence of an industry will trigger the industrialization process. In some countries, industrialization contributes to the urbanization of the economic sector [8], since the essence of the industrialization process is the transformation of labor from agriculture to industrial sector [9]. This is in line with the urban level indicator which classifies urban areas into four zones based on population density, sex ratio, and farmers proportion [10]. Therefore, the industrialization process contributes to the urbanization process of the farmer's proportion variable in a region.

Unlike in most developed countries, Indonesia's industrial sector is characterized by small and medium enterprises (SMEs). It contributes up to 99.98% of the total existing businesses in Indonesia [11]. Theoretically, there is a positive correlation between spatial development, especially the urban transformation, and the industrial sector development. The industrial units tend to agglomerate and form clusters in relatively advanced urban areas following a center-periphery interaction model [12]. Interestingly, Semarang's leading SMEs grow in the suburbs or peri-urban, along with the urban development of Semarang.

One of the leading SMEs developed in Semarang peri-urban is the red brick industry in Pedurungan Kidul. The industry is expanding along the Babon River due to raw materials exploited from the irrigated soil available in the border. Initially, the red brick industry emerged in 1990 with only eight businessmen. In 2003, the local government endorsed it as one of the leading SMEs in Semarang City. Today, the industry in Penggaron Kidul has engaged 31 businessmen.

Many previous studies have discussed the industrial influence on urbanization, especially in China and European countries. However, the object was more focused on the large-scale industries, considering a number of large industries in those areas. Until now, only few research has discussed the impact of the small-scale industrial activity on urban development or peri-urban. This study aims to investigate the contribution of SMEs activities with the case of red brick industry on the development of peri-urban areas in Pedurungan Kidul. It assessed the urbanization impact variables which are divided into the environment, socio-economic, and spatial aspects. The socio-economic aspect was assessed from a comparison of the local social structure before and after the red brick industry establish. Meanwhile, the spatial aspect was assessed from any changes of land function that occurs as a result of red brick production activity in Pedurungan Kidul.

2. Data and Methods

This research used sequential mixed method approach by combining quantitative and qualitative methods of data collection and analysis technique. The quantitative method was initially used to analyze peri-urban development in Semarang City, which then used for analyzing the red brick industry growth in Pedurungan Kidul Urban Community. The analysis classified 177 villages into four peri-urban area zones. The classification took population density, sex ratio, and farmers proportion into account [10] as shown in Table 1. The next phase we measured the industry growth by focusing on the business development of each businessman, then classified them into SMEs categories [13] as shown in Table 2. Furthermore, the qualitative method applied for justifying the quantitative results in order to understand the reciprocal relationship between the red brick industry growth and peri-urban development in Semarang City.

Table 1. *Peri-Urban Area Classification Criteria*

Variable	Classifications			
	Central City	**Primary Peri-Urban**	**Secondary Peri-Urban**	**Rural Peri-Urban**
Population Density	≥ 5000	3001 - 5000	1001 - 3000	≤ 1000
Sex Ratio	< 750	751 – 850	851 - 950	> 950
Farmers Proportion	< 20%	20% - 40%	40% - 60%	> 60%

Source: [10]

Table 2. *SMEs Classifications in Indonesia*

Enterprise Categories	Number of Employees	Total Assets	Total Annual Sales
Micro	< 3 employees	< Rp 50.000.000	< Rp 300.000.000
Small	5 – 9 employees	Rp 50.000.000 – Rp 500.000.000	Rp 300.000.000 – Rp 2.500.000.000
Medium	> 9 employees	> Rp 500.000.000	> Rp 2.500.000.000

Source: [13]

The unit of analysis in this research is a community group of Rukun Warga XII in Pedurungan Kidul Village. The research object is businessmen in the local red brick industry. The data collection completed in two weeks including surveys, interviews, observations, and field analyses. The key respondents are Mr. Jumar and Mr. Pardi who represent the initial business actors of the local red brick industry since 1991. Afterwards, we also collected data from the remaining 28 businessmen.

3. Discussion and Result

3.1 Peri-Urban Development in Semarang City

Semarang City is the capital of Central Java Province surrounded by the Java Sea in the north, Demak Regency in the east, Semarang Regency in the south, and Kendal Regency in the west. Administratively, the city comprises 16 subdistricts and 177 villages with the total area are 373,70 Km^2. The population size has achieved 1.595.267 inhabitants in 2015 [14] as a result of urbanization phenomenon.

As the capital city, Semarang carries out many attractive factors of urbanization such as high wage, job opportunity, and adequate urban facilities. To figure out the development of peri-urban areas in the city, it requires peri-urban development classification where Semarang was divided into four zones covering population density, sex ratio, and proportion of farmers to the total population variables.

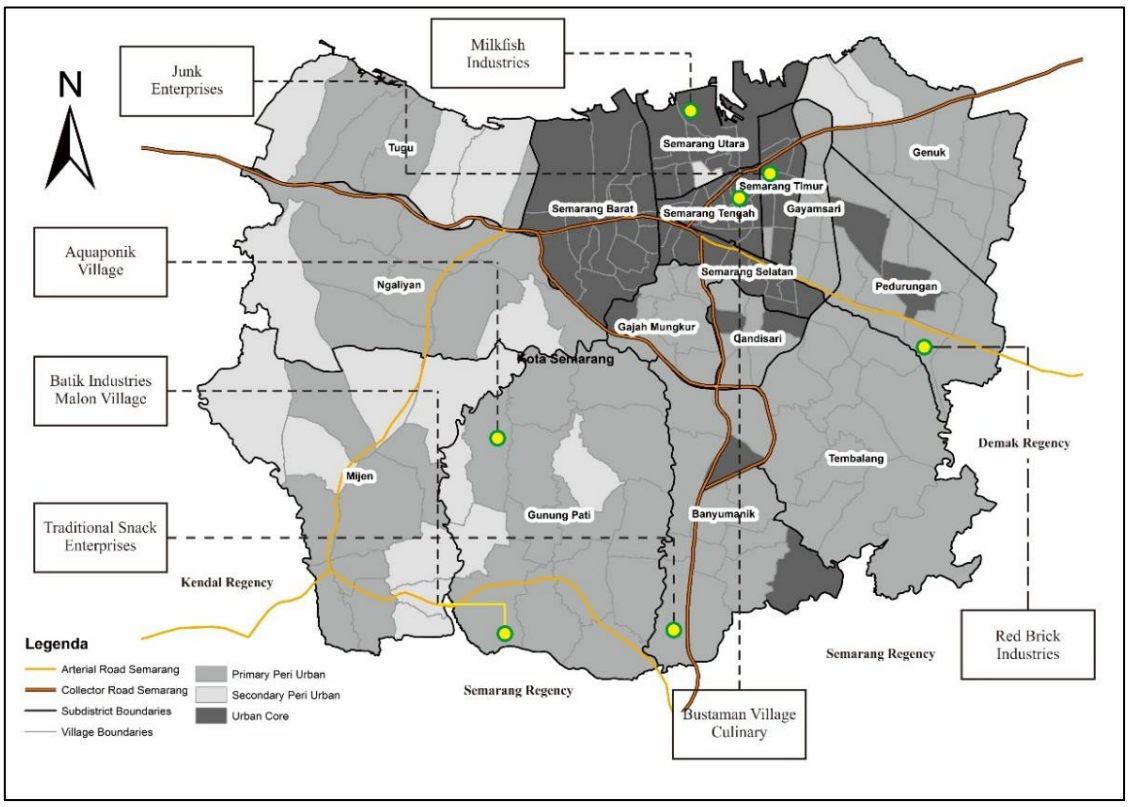

Figure 1. Classification of Peri-Urban Zone and Developed SMEs in Semarang City

Based on Figure 1**,** the city development direction moves outward to the peripheral areas. Pedurungan Kidul is one of the peri-urban areas which is located in Pedurungan Subdistrict and directly adjacent to Demak Regency in the east. After being classified as the rural peri-urban zone in 1990 and secondary peri-urban zone in 2011 [15], the current development of Pedurungan Kidul classifies it to primary peri-urban zone. It affects immediately to land-use change from the moor, agriculture, and plantation to residential and trade service facility.

3.2 The Growth of SMEs in Peri-Urban Area Semarang City

The red brick industry is one of the growing SMEs in Semarang, which is located in the Pedurungan Kidul. It reaches popularity labeled with the "SUPER" red brick because of strong stone quality. This industry has established since the 1990s initiated by the local citizen through soil exploitation around the Babon River. Initially, there were eight businessmen in the industry who were attracted to exploit the large natural resources potential of clay from the riverbanks of Babon River. Based on the SMEs classification, the red brick industry belongs to micro enterprise category due to the employment size of and total assets.

Table 3. The Production Process of Red Brick Industry

	Activity	**Descriptions**
Input	Raw Material	The raw materials in red brick making are clay, brush and firewood. The clay is the potential of natural resources in the Pedurungan Kidul village located on the banks of the Kali Babon River. While the brush and firewood obtained from Grobogan, Boja, and Gunungpati. In one transport of wood and firewood using trucks, can produce 10,000 red brick.
	Labor	The labor of red brick business center are mostly from the local community. The labor that required for every red brick business are 3 people. The division of labor are divided into two parts: the manufacture and the parts done by the men and the arrangement of the red brick is done by the women.
	Capital	The assets used by every business actor is obtained through selling rice fields, loans from siblings / family and loans from the bank. The assesta is used to buy a plot of land, build a linggan, pay for labor and buy raw materials.
Process	Make the dough	The first process of making red brick is digging the soil. Land that has been excavated will be mixed with the brus
	Molding	The diadonic soil will be formed into a red brick using 24 x 10 cm mold. The manufacture land of red brick are about 2000 meters. The size of the land can make up to 800 red brick a day with 1 worker.
	Drying	The soil that has been formed into a red brick then dried for 3-4 days.
	Displacement (Langsir)	Red brick that has been dried are transferred to the linggan. Linggan is a storage and combustion place for red brick. The linggan are about 100-250 $m^{2.}$
	The preparation of	Red brick that are in the "linggan" will be arranged to form like a temple. Red brick is usually prepared by the mothers as much as 2 people.
	Combustion	Red brick that have been arranged will be burned with firewood for 5 days by 1 person labor
	Set Back	Red brick that has been burned and then rearranged for sale
Output	Marketing	Red brick are sold to the area around Semarang and Demak. Red brick are not sold to the building store because it is expensive so it can not be sold back to the consumer. Red brick

Activity	Descriptions
	are usually sold directly to individual consumers who will build houses / other buildings.

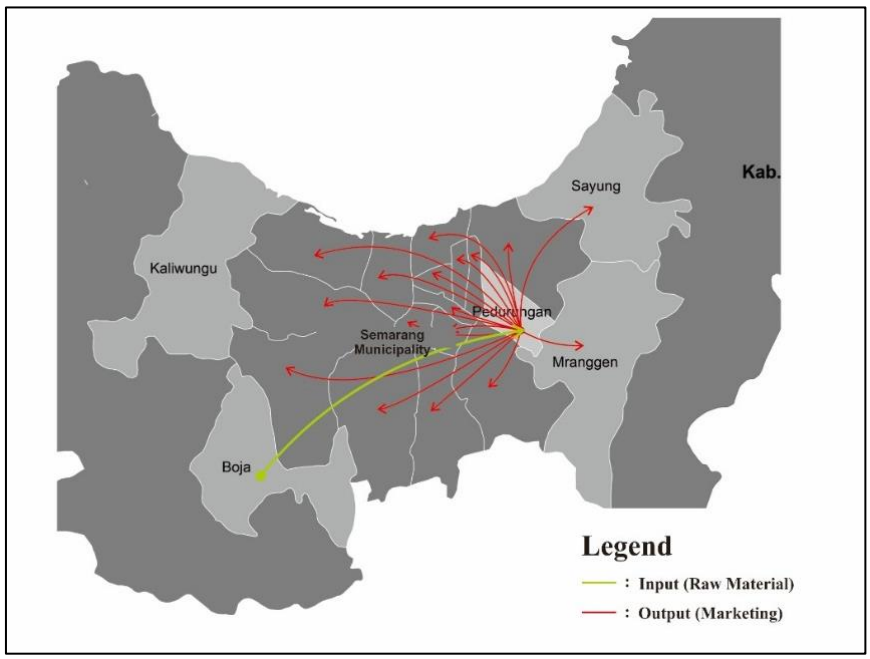

Figure 2. Spatial Interaction of the Red Brick Industrial Activity

3.3 The Impact of SMEs Agglomeration to Landuse Change

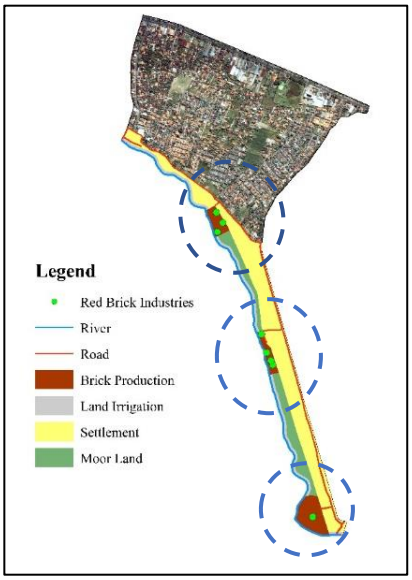

Figure 3. Landuse of Pedurungan Kidul in 2000

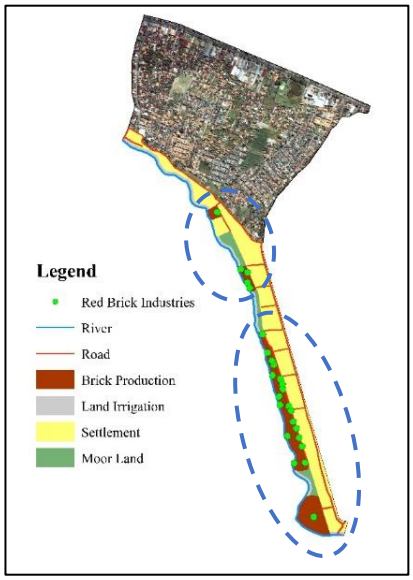

Figure 4. Landuse of Pedurungan Kidul in 2016

Referring to Figure 3 and figure 4, the growth of the local red brick industry affects to spatial land-use change in Pedurungan Kidul. The production process or system is consuming space including various activities such as doughing, molding, and drying. The spatial land-use change occurs along the riverbanks of Babon River. The most visible spatial land-use change found from the irrigated agriculture

land to space for the red brick production process. Unlike tile fabrication which also uses soil as the raw material, the red brick industry in Semarang City does not restore the agriculture function in rainy season, so that the land-use change is permanent. Another land-use change is from moor land to "Linggan" building, which is functioned as storage. "Linggan" building has the average size of 100-250 m^2 for keeping about 10.000-80.000 pieces of red brick and firewood.

The production activities of red brick industry also stimulate infrastructure development like new roads. The length of new roads is 250 m^2 in forms of paving stone construction as a demand for the growing industry. The increasing number of red brick industry is also followed by the increasing needs for firewood and bran as the raw materials. Consecutively, such increasing demand leads to accessibility improvement since the raw materials transported from other locations by a lot of trucks. The roads ease an access for the red brick industry to distribute raw materials from suppliers and the final products to buyers.

3.4 The Impact of SMEs Agglomeration to Socio-economic Transformations

The representation of regional development figured as a transformation process and characteristic change of the regional components in the certain periods of time, as an impact of reciprocal relationship between its components [16]. It means that the regional transformation encompasses multidimensional variables. The most visible transformation in peri-urban areas is land-use change, mostly showed by the decrease in agriculture land-use for industrial or trade and service purposes. The land-use change is often followed by the change in socio-economic structure. The most prominent social-economic structural change in peri-urbanization process is the increasing change of livelihood and population density [17].

Pedurungan Kidul has 12.498 population size [18]. Of this number the 17,5% of the total population works in industrial sector, while the agricultural sector contributes only 1,53%. The red brick industrial activity has contributed for the proportion of livelihood population. Our survey resulted that the average number of workers in each industrial unit is three workers, and the other fact is, almost 90% workers is the local residents living in Pedurungan Kidul. This means that one red brick industry contributes more or less for four residents who have chosen the industry as their livelihood source. Currently, there are 31 red brick firms in Pedurungan Kidul which contribute to about 124 residents or equal to 5% of 2.194 industrial preferred residents. The red brick industrial activity also contributes to the declining number of farmers. Based on our survey, there are many business owners and workers who previously worked as a farmer due to more profitable prospect of the industry.

Then, peri-urban area can be classified from population density, sex ratio and farmer proportion level [10]. The impact of red brick activity to peri-urban development in Pedurungan Kidul is the declining number of farmers due to employment shift to the red brick industry. Thus, the red brick industry has positively impacted on peri-urbanization process.

3.5 The Impact of SMEs Agglomeration to Peri-Urban Environment

Urbanization process can affect to the river system, especially for hydrology and water quality [19]. The other impact is flooding, which is caused by modification of the drainage network in peri-urban areas [20]. All of waterscapes problems can be solved by preservation, maintenance, and creations of green infrastructure within urban and peri-urban areas. In Semarang City, flooding has become a problem for the past five years. It caused by the urban activities like industries and housing activities which increase garbage production and sedimentation. But, not all the industry activities can destroy the river flow in Semarang City as exemplified by the red brick industry case in Pedurungan Kidul.

As we already known that the red brick industry exists in the riverbanks of Babon River. The river is part of Banjir Kanal Timur River system, which is one of three main rivers in Semarang City. Based on the government regulations, all activities in riverbanks along 10 meters from riverside is prohibited or illegal [21]. But the red brick industry in Pedurungan Kidul helped the local government work plan to do the normalization process [22]. It is because the production process of red brick industry requires clay from the river sediments. As a result, the government program in reducing the flood becomes easier.

Moreover, the production process does not use chemicals, so that it does not pollute the water quality of the Babon River. The next problem is if the government has set the standardization, the production activity of red brick industry must be stopped, which is counter-productive to the local livelihood.

4. Conclusion

The rapid growth of Semarang City has triggered an agglomeration of SMEs in peri-urban areas. It is proved by the development of Pedurungan Kidul as the peri-urban area which is followed by the growth of the red brick industry. Its emergence is based on the potentials of Babon River in providing a good clay structure. In 1990, the red brick industry had eight businessmen and now become 31 businessmen. The production activity of the red brick industry turned out to affect the development of peri-urban area in Pedurungan Kidul both socio-economically and spatially. The impact of the red brick industrial activity to peri-urban development in Pedurungan Kidul is the declining number of farmers due to employment shift to the industry. As the farmer proportion is one of variables that affect peri-urbanization level, so that the red brick industry has positively impacted on peri-urbanization process. Spatially, the most visible land-use change is from the irrigated agriculture land to the red brick production space for doughing, molding, and drying. Furthermore, the production activities of the red brick industry also stimulate infrastructure development such as new roads beneficial to transporting raw materials from the suppliers and the final products to buyers. Even though the production activity is illegal, the red brick industry in Pedurungan Kidul has helped the local government in undertaking river normalization process and it does not pollute the environment because it does not use chemicals. Thus, the contribution of the red brick industry is in line with the urbanization process in Semarang City especially the development in Pedurungan Kidul as peri-urban area.

Based on theory, urbanization is an urban transformations due to rural-urban relations. From this research, we known that the background of the urbanization process in Pedurungan Kidul is driven within the territory itself, which is the red brick industry. But, the exsistance of the red brick industry only affect the transformations locally and doesn't attract migrants who are increasing the density populations of Semarang City. So, it needs more research related to the overall SMEs in Semarang City for understanding their contribution comprehensively.

5. References

[1] Long, R., 1998. Urbanization Sociology. Ecyclopedia Brittanica Article 28, 1417–1444.
[2] Liu, J., Liu, Y., Yan, M., 2016. Spatial and temporal change in urban-rural land use transformation at village scale—A case study of Xuanhua district, North China. Journal of Rural Studies 47, 425–434. doi:10.1016/j.jrurstud.2016.07.003
[3] McGee, T.G., 1991. The emergence of Desakota regions in Asia:expanding a hypothesis, in: Ginsburg, N., Koppel, B., McGee, T.G. (Eds.), The Extended Metropolis: Settlement Transition in Asia. University of Hawaii Press, Honolulu, pp. 3–25.
[4] Rakodi, C., 1998. Review of the Poverty Relevance of the Peri-Urban Interface Production System Research. Report for the DFID Natural resources Systems Research Programme (2nd draft).
[5] Willis, A.M., 2005. From peri-urban to unknown territory. Paper presented at the State of Australian Cities National Conference.
[6] Tian, Li., 2014. Land use dynamics driven by rural industrialization and land finance in the peri-urban areas of China: "The examples of Jiangyin and Shunde". Land Use Policy 45, 117-127
[7] Wang, D., 1999. Socioeconomic characteristics of rural urbanization in Southern Jiangsu, China. International Journal of Social Economics, Vol. 26 No. 1/2/3, pp. 290 - 297
[8] Bairoch, P., 1988. Cities and Economic Development: From the Dawn of History to the Present. University of Chicago Press, Chicago.
[9] Lewis, W.A., 1954. Economic development with unlimited supplies of labour. The Manchester School 22, 139–191

[10] Singh, R.P., 2011. Changing Rural Landscapes in The Peri-Urban Zone of Varanasi and Strategies for Sustainable Planning, in: In Prosiding International Symposium "Sustainable Rural Landscape and Planning in Asia Pacific Region. IFLA APR Cultural Landscape Committee Dan Korean Society of Rural Planning. pp. 169–184.
[11] Tambunan, T.T.H., 2006. Development of small and medium enterprises in a developing country The Indonesian case. Journal of Enterprising Communities: People and Places in the Global Economy Vol. 5 No. 1, pp. 68-82
[12] Danson, M., 2009. New regions and regionalisation through clusters. International Journal of Public Sector Management 22, 260–271. doi:10.1108/09513550910949235
[13] The President of Republic Indonesia., 2008. Undang-undang Nomor 20 Tahun 2008 tentang Usaha Mikro, Kecil, dan Menengah. Jakarta City.
[14] Statistics of Semarang City., 2016. Kota Semarang Dalam Angka 2016. Semarang City.
[15] Rudiarto, I., Handayani, W., Pigawati, B., Pangi, P., 2013. ZONA PERI-URBAN SEMARANG METROPOLITAN: PERKEMBANGAN DAN TIPOLOGI SOSIAL EKONOMI. Jurnal Tataloka 15, 116. doi:10.14710/tataloka.15.2.116-128
[16] Giyarsih, S. R., 2010. Pola Spasial Transformasi Wilayah di Koridor Yogyakarta - Surakarta. Forum Geografi, Vol. 24 No, 28–38
[17] Kurnianingsih, A., & Rudiarto, I., 2014. Analisis Transformasi Wilayah Peri-Urban pada Aspek Fisik Sosial Ekonomi (Kecamatan Kartasura). Jurnal Pengembangan Wilayah Dan Kota, vol 10 (3), 265–277.
[18] Statistics of Semarang City, 2016. Kecamatan Pedurungan Dalam Angka 2016. Semarang City.
[19] Deng, X., Xu, Y., Han, L., Song, S., Yang, L., Li, G., & Wang, Y., 2015. Impacts of urbanization on river systems in the Taihu Region, China. Water (Switzerland), 7(4), 1340–1358. https://doi.org/10.3390/w7041340
[20] Rojas, O., Mardones, M., Rojas, C., Martínez, C., & Flores, L., 2017. Urban growth and flood disasters in the coastal river basin of South-Central Chile (1943-2011). Sustainability (Switzerland), 9(2), 1–21. https://doi.org/10.3390/su9020195
[21] The President of Republic Indonesia., 2011. Peraturan Pemerintah Nomor 38 Tahun 2011 tentang Sungai. Jakarta City.
[22] The Local Government of Semarang City., 2016. Rencana Kerja Pemerintah Daerah (RKPD) Kota Semarang Tahun 2016. Semarang City.