Agriculture development based on regional potency in kulonprogro regency

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Abstract. Agriculture sector has important role in the economic stabilization from micro to macro level, it has quite strong role in the bottom level of peoples’ economic especially in the rural or marginal area. Indonesian agriculture is still dominated by food production such as rice, maize, cassava, peanut and soybean. These commodities can be consumed by farmers or can be sold, this reason make these are popular to be planted. This research aims to determine the programs to develop agriculture in Regency Kulonprogo, Yogyakarta. Cluster analysis was used to determine the development program based on potential commodity each area. Potential commodity was analyzed with location quotient analysis (LQ). Results show that paddy wetland, paddy dryland and peanut have average above one, it means these commodities have potency to be developed. Maize, cassava and soybean in average does not show LQ above one, but in some subdistricts show above one. 12 subdistricts were grouped by their similarity in to three clusters. Cluster 1 has similarity in rice wetland, non-agriculture land, agriculture shop, bank, cooperation, high school, higher school and farmers group. Cluster 2 has similarity in rice wetland, uneducated people, and non-farmers occupation. And cluster 3 has similarity in rice dryland, market, farmers’ occupation and basic school. Based on the LQ and cluster, the programs for developing agriculture are increasing human resource quality, organization and facilities.

1. Introduction
Agriculture sector in national economic development is main actor especially in the middle low people. Dominated by middle low people, Indonesia is still relying on agriculture as generator for economic movement. Focus on developing agriculture, means increasing people economic [1]. This sector also is being the part of todays and future development resource from local to national level [2]. Unavoidable option for Indonesia to develop his agriculture, even he has many sectors that support national economic. In 80’s, Indonesia could grow his agriculture to reach food security, especially in term of food availability. But todays agriculture challenge is different, economic turbulent is vary and has their unique pattern and solution [3]. Technological transformation is an evitable thing in agriculture development in the region [4].

Beside agriculture supports country economic, agriculture has function to provide food. Nation security can stable or unstable due to food condition. Food is considered as one strategic issue in Indonesia in the reason that food expenditure reached 58.81 percent of total household expenditure in 2014. Therefore, increasing food security and agribusiness development should be main program in agricultural and region development. One thing that can be done to improve food security and agribusiness development area is the development of comparative advantage of regional food commodities [5]. Indonesia Law regarding food No 18 year 2012 article 2 stated that national food
management must be managed based on independent, secure, useful, equity, continuously and fairness. Food security is the condition where food is available, accessible, and safe with affordable price [6].

Kulonprogo Regency is part of Special Region of Yogyakarta who become one of the food productions centers in this region. Food commodities that are produced in Kulonprogo Regency are paddy, maize and soybean.

Until today, the development programs regarding agriculture still focus on spatial development mainly in the commodity-based program. Todays, regional potency must be considered as material to create the development planning, because one region can support the other region. This study aims to determine the agriculture development program based on regional potency.

2. Methods
Secondary data in Kulonprogo Regency was used in this research. Kulonprogo Regency has 58,627.512 Ha area, consist of 12 sub-districts. To analyze the potential commodity in each region, Location Quotient (LQ) was used. This method is useful in quantifying how concentrated a commodities group are in a region as compared to the bigger administrative region. Below is the formula:

$$LQ_{ij} = \left( \frac{e_{ij}}{E_j} \right) / \left( \frac{e_i}{E} \right)$$

where,
- $LQ_{ij} = \text{location quotient for sector } i \text{ in the subdistrict } j$
- $e_i = \text{production of commodity in sector } i \text{ in subdistrict } j$
- $e = \text{production of commodity in regency}$
- $E_i = \text{total production of commodity in subdistrict } j$
- $E = \text{total production of commodity in regency}$

After the potential commodities are found, resources of every regions are analyzed using cluster analysis. Through this analysis, the weak and strong points of each region can be known, so the relation among region to support each other can be recommended.

3. Results and Discussion
Kulonprogo Regency as the one of food production center in Yogyakarta still developing his agriculture, beside to provide local consumption, the food production also for supporting Yogyakarta food security. In 2016, production of paddy wetland is 116,265 ton, paddy dryland 186 ton, maize 23,964 ton, cassava 58,812, peanut 1,620 and soybeans 4,247 ton. These production show that this regency has quite potency in the amount of production. Food commodity in the agriculture development still become favorite in this regency, beside it can be sold, some of the production can be consumed by farmer’s family. Other factor is the land condition that still suitable for producing food commodity.

Compare to other region, Kulonprogo Regency is not the most food produced region, but it has potency to be developed. This regency also one of the region that need to be developed in order to can develop like the developed region such as Sleman Regency, Bantul Regency and Yogyakarta City.

Food production in Kulonprogo Regency is dominated by paddy wetland, and the most produced subdistrict is Nanggulan Subdistrict with 17,625 ton. Meanwhile, paddy dryland is most produced in Samigaluh Subdistrict with 40 ton, Maize in Sentolo Subdistrict with 8,867 ton, Cassava in Girimulyo Subdistrict with 12,729 ton and soybean in Nanggulan with 1,880 ton (as seen in Table 1).
Tabel 1 Food Production in Kulonprogo Regency 2016.

| No. | Subdistrict | Paddy wetland | Paddy dryland | Maize | Cassava | Peanut | Soybean |
|-----|-------------|----------------|---------------|-------|---------|--------|---------|
| 1   | Galur       | 13691          | 73            | 22    | 1,077   | 6,8    | 1,061   |
| 2   | Girimulyo   | 5423           | 29            | 1,107 | 12,729  | 353    | 73      |
| 3   | Kalibawang  | 8899           | 0             | 1,429 | 12,553  | 91,1   | 695     |
| 4   | Kokap       | 871            | 0             | 338   | 5,895   | 232,5  | 14      |
| 5   | Lendah      | 7,406          | 0             | 3,180 | 4,437   | 32,6   | 257     |
| 6   | Nanggulan   | 17,625         | 0             | 1,326 | 4,463   | 4,1    | 1,880   |
| 7   | Panjatan    | 10,904         | 10            | 1,767 | 1,070   | 93,5   | 13      |
| 8   | Pengasih    | 7,646          | 18            | 4,754 | 10,776  | 480    | 18      |
| 9   | Samigaluh   | 9,498          | 40            | 366   | 764     | 66     | 0       |
| 10  | Sentolo     | 13,479         | 7.3           | 8,867 | 3,640   | 54     | 207     |
| 11  | Temon       | 12,343         | 0             | 641   | 1,252   | 151    | 5       |
| 12  | Wates       | 8,476          | 7.3           | 556   | 156     | 54     | 24      |
|     | Total       | 116,265        | 186.5         | 23,964| 58,812  | 1,620  | 4,247   |

Source: Badan Pusat Statistik

3.1. Location Quotient

Potential commodity to be developed is different from every region. It can be caused by their comparative advantage which is the potential commodity come from their natural resources that support it, or competitive advantage which is the potential commodity come from their ability to compete with others.

Tabel 2 Location Quotient

| No. | Subdistrict | Paddy wetland | Paddy dryland | Maize | Cassava | Peanut | Soybean |
|-----|-------------|----------------|---------------|-------|---------|--------|---------|
| 1   | Galur       | 1,52           | 5.09          | 0.01  | 0.24    | 0.05   | 3.22    |
| 2   | Girimulyo   | 0.49           | 1.62          | 0.48  | 2.25    | 2.27   | 0.18    |
| 3   | Kalibawang  | 0.66           | 0.00          | 0.52  | 1.85    | 0.49   | 1.42    |
| 4   | Kokap       | 0.21           | 0.00          | 0.39  | 2.80    | 4.00   | 0.09    |
| 5   | Lendah      | 0.85           | 0.00          | 1.78  | 1.01    | 0.27   | 0.81    |
| 6   | Nanggulan   | 1.23           | 0.00          | 0.45  | 0.62    | 0.02   | 3.59    |
| 7   | Panjatan    | 1.43           | 0.89          | 0.87  | 0.28    | 0.88   | 0.05    |
| 8   | Pengasih    | 0.57           | 0.84          | 1.72  | 1.59    | 2.57   | 0.04    |
| 9   | Samigaluh   | 1.56           | 4.10          | 0.29  | 0.25    | 0.78   | 0.00    |
| 10  | Sentolo     | 0.91           | 0.31          | 2.89  | 0.48    | 0.26   | 0.38    |
| 11  | Temon       | 1.51           | 0.00          | 0.38  | 0.30    | 1.33   | 0.02    |
| 12  | Wates       | 1.61           | 0.87          | 0.51  | 0.06    | 0.74   | 0.12    |
|     | Total       | 1.05           | 1.14          | 0.86  | 0.98    | 1.14   | 0.83    |

Location quotient value more than one means the commodity in specified region has potency to be developed. Higher the value means the higher potency. Paddy wetland become the potential commodity to be developed in Galur Subdistrict, Naggula Subdistrict, Panjatan Subdistrict, Samigaluh Subdistrict,
Temon Subdistrict and Wates Subdistrict (as seen in Table 2). Paddy dryland become potential commodity to be developed in Galur Subdistrict, Girimulyo Subdistrict, Samigaluh Subdistrict. Maize become potential commodity in Lendah Subdistrict, Pengasih Subdistrict, and Sentolo Subdistrict. Cassava become potential commodity in Girimulyo Subdistrict, Kalibawang Subdistrict, Kokap Subdistrict, Lendah Subdistrict, Pengasih Subdistrict, Peanut become potential commodity to be developed in Girimulyo Subdistrict, Kokap Subdistrict, Pengasih Subdistrict and Temon Subdistrict. Soybean become potential commodity to be developed in Galur Subdistrict, Kalibawang Subdistrict and Naggulan Subdistrict.

3.2. Cluster result
Cluster analysis come out with 3 clusters; cluster 1, cluster 2 and cluster 3. Each cluster has similarity inside, and has different with outside of the cluster (as seen in Table 3 and figure 1). Cluster 1 consist of Galur Subdistrict, Lendah Subdistrict, Nanggula Subdistrict, Panjatan Subdistrict, Pengasih Subdistrict, Sentolo Subdistrict, and Temon Subdistrict. This cluster has similarity in paddy wetland, non-agriculture land, agriculture shop, bank, coop, high school, higher school, and farmers group. Subdistricts whci are grouped in cluster 2 are Girimulyo Subdistrict, Kalibawang Subdistrict, Kokap Subdistrict and Samigaluh Subdistrict. Similarity in this cluster is uneducated people and non-farmers occupation. While cluster 3 only one member which is Wates Subdistrict, it has uniqueness in paddy dryland, market, farmers’ occupation and basic school.

Table 3 Cluster result

| Cluster | Member         | Similarity              |
|---------|----------------|-------------------------|
| 1       | 1. Galur       | 1. Paddy wetland        |
|         | 2. Lendah      | 2. Non agriculture land |
|         | 3. Nanggulan   | 3. Agriculture shop     |
|         | 4. Panjatan    | 4. Bank                 |
|         | 5. Pengasih    | 5. Coop                 |
|         | 6. Sentolo     | 6. High school          |
|         | 7. Temon       | 7. Higher school        |
|         | 8. Farmers group|                        |
| 2       | 1. Girimulyo   | 1. Uneducated people    |
|         | 2. Kalibawang  | 2. Non farmers occupation|
|         | 3. Kokap       |                         |
|         | 4. Samigaluh   |                         |
| 3       | 1. Wates       | 1. Paddy dryland        |
|         | 2. Market      | 2. Market               |
|         | 3. Farmers occupation|                   |
|         | 4. Basic school|                         |

3.3. Discussion
Increasing financial institution such as bank or cooperation has meaning to provide enough financial support like loan for operating their agriculture to develop the potential commodity. Agriculture shop plays important role to provide agriculture materials such as seed, fertilizer, pesticides etc. The availability of agriculture shop can support the effort the potential commodity. Educated farmers will have higher chance to adapt new technology and can develop their farming. The availability of education institution can support the process to make educated farmers. The active farmers’ group makes farmers can share knowledge and work together in developing their farming. Downstream of agriculture is market, the availability of market can stimulate farmers to produce potential commodity.
Paddy wetland is potential commodity in some subdistricts. In Galur Subdistrict, Nanggula Subdistrict, Panjatan Subdistrict, and Temon Subdistrict, paddy wetland has poteny to be more developed because it has large paddy wetland, means the production can be increased with both extensification and intensification. These areas also have quite enough agricultre shop who provide materials for planting paddy. Bank and coop support the development because through financial supports. Farmers group are available enough for sharing knowledge and work together for developing paddy. With high and higher education are available enough mean farmers have good education that can be used to develop their paddy farming. While Samigaluh Subdistrict for developing paddy wetland need to increase the agriculture shop, coop, farmers’ group and good education. Wates Subdistrict need similar increase with Samigaluh Subdistrict, but this subdistrict has advantage in having market and many people who work as farmer.

Paddy dryland that has potential to be developed in Galur Subdistrict, Girumulyo Subdistrict, and Samigaluh Subdistrict. In order to can develop this commodity in Galur Subdistrict need to increase the number of market. While to develop this commodity in Girumulyo Subdistrict and Samigaluh Subdistrict need to increase the financial institution, education institution and agriculture material support.

Maize has potential to be developed in Lendah Subdistrict, Pengasih Subdistrict and Sentolo Subdistrict. To be developed in this area, based on cluster analysis, their area is lack in number of market, so need to increase the number of market or increase the market capacity. Meanwhile cassava has potential to be developed in 5 subdistricts. Girumulyo Subdistrict, Kalibawang Subdistrict and Kokap Subdistrict need to increase the financial institution, education institution and market capacity. Meanwhile Lendah Subdistrict and Pengasih Subdistrict need to increase the market number or capacity.

Peanut become potential commodity to be developed in 4 subdistricts. In Girumulyo Subdistrict and Kokap Subdistrict, to develop this commodity in Girumulyo Subdistrict and Kokap Subdistrict need to increase the financial institution, education institution, number of market. Meanwhile Pengasih Subdistrict and Temon Subdistrict need to increase the number of market. Soybean become potential commodity to be developed in Galur Subdistrict and Nanggula Subdistrict, for the development in these subdistricts need to increase the number of market. This commodity also potential to be developed in Kalibawang Subdistrict, to be developed here need to increase the financial institution, education institution, number of market.
4. Conclusion
Commodity in agriculture has special condition in every area. One commodity has potency to be developed in one region, but not in other region. This kind of condition drive people to see each region potency. Forgetting region potency can make the development program only partial program. Today’s program need to be a holistic program that can cover all region and show their potencies. Based on the LQ and cluster, the programs for developing agriculture are increasing human resource quality, organization and facilities. All efforts in developing agriculture become the responsibility for every related party.

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