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Clustering of Vegetables Commodities For Agricultural Development Planning in Pandeglang Region

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***Abstract* – Pandeglang is one development area of vegetables in Banten Province, but the development of commodity in this region has not been optimal. One of the support for the development of the commodity is a vegetables data base. Based on recent data showing the performance of the development of vegetable commodities declining trend. The continuing decline of vegetable development will affect the supply of vegetables in the hinterland, especially for the region Serang, Tangerang and Jakarta. This study aimed at determining candidateslocation of centers area of vegetables. The candidate region based on the type of commodity, social, economic and people's desire to develop. This study specifically aims to: 1) map the distribution of vegetables in Pandeglang, determining vegetable production centers and determine the candidate locations vegetable production centers, 2). Creating a regional development model of commodity vegetable based product competitiveness and comparative advantage and competitive advantage. The research method used descriptive analytic. This study uses cluster sampling. Basic commodity clustering area. Cluster sampling is based on the number of sub-district in Pandeglang, analytical tool used is a k-means cluster. Basic clustering is the similarity (similarity) or inequality distance (distance). Distance measurement method used is Euclidean distance. The results showed (1) the distribution of vegetables in Pandeglang Regency is a cosmopolitan, or spread in almost all of the districts, (2) In Pandeglang, found three vegetable clusters include: cluster one with a dominant commodity beans. Two clusters are dominated by commodities cayenne pepper. Three clusters are dominated by commodities kale**.

***Keywords* – Zoning, Cluster Vegetables, Center Area.**

I. Introduction

Based on the condition of the area, Pandeglang suitable for the development of vegetable commodities, especially for tropical vegetables. Opportunities are reinforced by the market access to the surrounding area, namely the district of Serang, Serang city, Tangerang City, district of Tangerang, even the capital city Jakarta. Currently these opportunities neglected, there is a tendency even Pandeglang, unable to supply vegetables to in the area of Banten province alone, the production of vegetables in Pandeglang tend to decline.

The decline in vegetable production is feared to threaten the sustainability of farming vegetables in Pandeglang direct implication to the scarcity of vegetable supply in Banten Province. To overcome these problems it is necessary to managing and structuring efforts to revitalize the agricultural area vegetable farming system in accordance with Bioecology and economic aspects.

Zoning or spatial planning based on the concept of separation and utilization of spatial control, zoning can be applied in many situations and can be adapted to different ecological environment, social, economic and politica (Darmasaputra et al,2006). Centers which can be defined as a small unit area that has certain characteristics, in which there are activities of a production process of product types featured has a great prospect to be developed into a cluster (Nuswantoro, 2011). Certain commodity clusters can be developed into a product development and the region's identity can be a competitive commodities.

Through the policy of the government can establish centers for the production of certain commodities that make the regions. Determination of these centers is based on agro-climatic suitability, community preferences, economic, social and local wisdom (Muslihat 2007). Through the construction of centers of commodities in the long term can boost rural development. The first step to determine the production center can be prefixed with clustering commodity.

II. Method

The method used is descriptive method. The sampling technique used is judgment sampling with sample criteria (1) Stakeholders mastering and understanding of issues related to research problems. (2) Sample restricted 4 samples each stakeholder group every region of the candidate region. (3) Available interviewed (Sceafer 2011)

The data used is secondary data obtained from the BPS and other relevant agencies. This study has differences with previous studies, both from the aspect of methodology, regions and commodities. The analysis tool used is a k-means cluster. Basic clustering is the similarity or inequality distance.

III. Result and Discussion

Topographical conditions Pandeglang have a height of between 0 to 1,778 m dpal. South region with an area of 85.07% of the total area is lowland, while the northern region of 14.93% is a plateau region. In the northern region there is Mount Karang (1778 m), Pulosari (1,346 m), and Mount Aseupan (1,174 m). Mount Reef is the highest mountain in Pandeglang and an active volcano is still active.

The type of soil found in Pandeglang, including fertility of soils with low to moderate, which include soil type alluvial, grumusol, regosol, latosol and podsolic. The soil type latosol relative spread in sub-districts, while the soil type and grumusolregusol contained in several districts in the western part near Ujung Kulon. The type of soil is

alluvial sediment contained in the lowlands of the South and West. Podzolic soil type are common in central and northern part is a plateau region.

Rainfall ranged from 107.75 mm to 324.83 mm per year. The rainy season is between November to March, and the dry season from June to August. Temperatures 18o to 29 o C. The population in 2014 was 1,188,405peoples, with a population of 607 304 peoples male and female population of 581 101 peoples.

Market is a critical infrastructure in the framework of agricultural development in rural areas in Pandeglang Region, almost every district there is a district market, which includes not only sell industrial products to meet the daily needs of the community, but also for the functioning of agricultural commodities. Number of district market is 20 markets, only sub-districts adjacent distance that does not have a market.

There are 15 types of commodity vegetables cultivated by the people in Pandeglang, with a harvested area of 2,998 ha, ielong beans, cucumbers, peppers large, lettuce, tomatoes, eggplant, chili, mushrooms, leeks, kale, spinach, carrots, green beans, squash, onion. Long beans is the dominant commodity in planting by the farmers, followed by commodity cucumber, chili is great. Commodity onion harvested area is a commodity with the lowest total of 8 ha, contributing factor is the conformity of climate and the interest of farmers. Long beans production is highest of vegetables, the total production of 59 719 ku.

Selection of vegetable commodities to transform farmers cultivated in Pandeglang is strongly influenced by the preferences of farmers. Preferences farmer is an indicator in the selection of vegetables to be produced. These factors should be taken into consideration for the farmer as the producer in determining what kind of vegetables to be produced. Preferences farmers consists of 2 types of economic and non-economic factors. One important factor is the price factor, if the relatively good price farmers will be more interested to decide. Despite the high price of the product but if the risk of failure is high and requires substantial capital farmers are reluctant to choose these commodities.

Non-economic factors that effect farmers producing vegetables in Pandeglang is easy cultivation technical factors, such as long beans are a vegetable that does not necessarily require the mastery of technology / technical cultivation complex is a good choice for producing vegetables. Both water shortage in the dry season, so that the water provided is not sufficient as an alternative when planting rice, vegetables became a priority compared to other crops. Third time crop rotation to break the cycle of pests or diseases from the previous crop, and the fourth hereditary habits associated with local knowledge or mastery of cultivation technology usually applied by local farmers.Based on these factors drawn from a relatively equal distribution of the commodity in some of the districts. Farming patterns thereby facilitating decision-makers to develop the area of agricultural development.

Table 1. Distribution of Commodity Vegetables cluster one in Pandeglang 2015

No	Commodity	Sub District	Number of sub District
1	Long Beans	Sumur, Cimanggu,Cibaliung,Cibitung, Cikeusik, Cigeulis, Panimbang, Sobang, Munjul, Angsana, Sindangresmi,Picung, Bojong, Saketi, Cisata, Pagelaran, Patia, Sukaresmi, Labuan, Carita, Jiput,Cikedal, Menes, Pulosari, Cimanuk, Cipeucang, Banjar, Kaduhejo,Mekarjaya, Cadasari	30
2	Cucumbers	Sumur, Cimanggu, Cikeusik, Ciheulis, Panimbang, Sobang, Munjul, Angsana, Sindangresmi, Bojong, Saketi, Carita, Jiput, Mandalawangi, Cimanuk, Cipeucang, Banjar, Kaduhejo, Pandeglang, Majasari, Cadasari, Koroncong.	22
3	Great chili	Angsana, Sindangsari, Carita, Jiput, Menes, Mandalawangi, Banjar, Kaduhejo, Pandeglang, Majasari, Koroncong	11
4	Cayenne pepper	Cieusik, Cigeulis, Saketi, Sukaresmi, Carita, Banjar, Pandeglang, Cadasari, Koroncong.	9
5	Eggplant	Panimbang, Sindangresmi, Jiput, Banjar, Cadasari, Koroncong	6

Source: Pandeglang, 2015 figures (data processing)

Based on Table 1 shows that the commodity cosmopolitan in Pandeglang is beans. The commodity spread almost throughout the District in Pandeglang. Commodity distribution locations that most of the commodity cucumber, chilli and cayenne great each commodity utuk cucumber spread in 22 sub-districts in 11 districts of large chilli and cayenne pepper 9 districts. Commodity distribution can be seen in Table 2.

Table 2. Results of Initial Cluster Centers

Commodity	Cluster		
	1	2	3
Long beans	30	20	7
Large Chilli	9	10	0
Cayenne pepper	7	17	1
eggplant	9	22	2
cucumbers	22	18	11
Kale	5	7	2
Spinach	11	12	1
Tomato	0	16	0

Table 3. Iteration History

Iteration	Change in Cluster Centers		
	1	2	3
1	12.544	9.843	11.572
2	2.794	4.317	.830
3	1.304	.000	.812
4	.000	.000	.000

A Convergence Achieved due to no or small change in cluster centers. The maximum absolute coordinate change for any center is zerro. The current iteration is four. The minimum distance between initial centers is 25,436.Based on the clustering process takes four stages of iterations to get the proper cluster. Based on the table above the minimum distance between the center of the cluster that occurred from the results of iteration is 25.44.

Table 4. Final Cluster Centers

Commodities	Cluster		
	1	2	3
Long beans	16.82	20.00	10.91
Large Chilli	12.09	11.50	6.55
Cayenne pepper	8.45	13.00	6.32
Eggplant	7.73	18.50	4.45
Cucumbers	17.27	19.00	9.45
Kale	6.00	6.00	3.91
Spinach	7.18	8.50	4.23
Tomato	5.27	15.00	1.91

Pursuant to the results of the above analysis to commodity beans, Great chili, cayenne pepper, eggplant, cucumber, kale, spinach, and tomato is positive for the third cluster shows the data it is above average. One cluster consists of the districts in the possession of commodity vegetable planting area of more than the average district in the scope of Pandeglang. This is evident from the results in the final cluster centers in the whole variable. A cluster is a grouping of sub-districts that have a planting beans, Great chili, cayenne pepper, eggplant, cucumber, kale, spinach, and tomatoes included in a large group. Because all is positive. Cluster two shows characteristics of the districts that have an average acreage of beans, Great chili, cayenne pepper, eggplant, cucumber, kale, spinach, and tomatoes exceeding the average districts studied. This was evident from the positive values contained in Cluster Centers in the overall final variables do not have another variable whose value is negative. Thus it can be estimated that the second cluster is a grouping of the districts that have a planting beans, Great chili, cayenne pepper, eggplant, cucumber, kale, spinach, and tomatoes, including a large group. Likewise, the cluster of three, based on those results analysis cluster 3 is characteristic subdistricts that have an average acreage of beans, Great chili, cayenne pepper, eggplant, cucumber, kale, spinach, and tomatoes exceeding the average districts studied. This was evident from the positive (+) contained in the final table cluster centers in the whole variable. Another variable is positive. And so can be presumed that the cluster is a grouping of three subdistricts that have a planting beans, Great chili, cayenne pepper, eggplant, cucumber, kale, spinach, and tomatoes are included in the small groups.

Table 5. Results of Analysis of Variance

	Cluster		Error		F	Sig.
	Mean Square	df	Mean Square	df		
Long beans	175.844	2	12.420	32	14.158	.000
Large Chilli	121.854	2	20.464	32	5.954	.006
Cayenne pepper	50.336	2	5.109	32	9.852	.000
eggplant	197.503	2	5.504	32	35.882	.000
cucumbers	269.525	2	11.051	32	24.389	.000
Kale	17.862	2	3.119	32	5.726	.007
Spinach	42.200	2	6.688	32	6.310	.005
Tomato	176.571	2	7.500	32	23.543	.000

The F tests should be used only for descriptive purposes Because The clusters have been chosen to maximize the differences Among cases in different clusters. The observed significance levels are not corrected for this and thus can not be interpreted as tests of the hypothesis that the cluster means are equal.

The results of the cluster obtained in this study, for the instrument beans, cayenne pepper, eggplant, cucumbers, and tomatoes, so in showed difference between the districts on the 3 (three clusters) were formed. This can be demonstrated F count for long beans 14 158 and sig = 000. Then consecutive highly significant: a cayenne pepper to demonstrate the value of F count 9852 and sig = 0:00, (b) to show the value of F count eggplant 35 882 and sig = 000. (c) shows the F count cucumber and sig = 24 389 000 and 23 543 F count tomato and sig = 000. While instrument Cabebesar F count showed no significant difference among the districts in the 3 (three) clusters formed .. This can be demonstrated F count 5954 and sig = 0.006. Then successive showed no significant difference as follows: (a) Instrument kale F count = 5,726 and sig = 0.007. (B) the instrument spinach F count = 6,310 and sig = 0.005. (C) shows the F count tomato instrument 23 543 and sig = 0.000.

Table 6. Number of Cases in each Cluster

Cluster	1	11.000
	2	2.000
	3	22.000
Valid		35.000
Missing		.000

Based number of cases in each cluster indicates that cluster 1 amount 11 districts, clusters 2 consists of two sub-districts and clusters 3 consists of 22 sub-districts.

Table 7. Final clustering 1

No.	Commodity	Subdistrict	Number of districts
1.	Long Beans	Sumur, cimanggu,cigeulis, panimbang, sobang, munjul, angsana, sindangresmi, bojong, saketi, cisata, labuan, carita, jiput, menes, mandalawangi, cimanuk, banjar, kaduhejo, pandeglang, majasari, cadasari, koroncong.	23
2.	Cucumbers	Sumur, cimanggu, cikeusik, ciheulis, panimbang, sobang, munjul, angsana, sindangresmi, bojong, saketi, carita, jiput, mandalawangi, cimanuk, cipeucang, banjar, kaduhejo, pandeglang, majasari, cadasari, koroncong.	22
3.	Large chili	Angsana, sindangsari, carita, jiput, menes, mandalawangi, banjar, kaduhejo, pandeglang, majasari, koroncong.	11
4.	Cayenne pepper	Cieusik, cigeulis, saketi, sukaresmi, carita, banjar, pandeglang, cadasari, koroncong.	9
5.	Eggplant	Panimbang, sindangresmi, jiput, banjar, cadasari, koroncong.	6
6.	Spinach	Saketi, sukaresmi, jiput, banjar, cadasari, koroncong	6
7.	Kale	Saketi, jiput, banjar.	3
8.	Tomato	Sindangresmi, banjar, cadasari.	3

Kale and tomatoes is a commodity with a distribution that is at least. This commodity spread each in 3 regions. Kale scattered in the District Saketi, Jiput, and Banjar. Tomato spread in the District at the District Sindang Official, Banjar and Cadasari.

Table 14. Results of Final clustering 2
No. Commodity Sub-District Number Sub-District

No.	Comodity	Sub District	Number Sub District
1	Cayenne pepper	Sumur, cimanggu, cibaliung, cibitung, panimbang, sobang, munjul, cisata, pagelaran, jiput, menes, mandalawangi, kaduhejo, mekarjaya, karangtanjung	15
2	Eggplant	Sumur, cimanggu, cibaliung, sobang, angsana, bojong, pagelaran, carita, cimanuk, mekarjaya, pandeglang, karangtanjung	12
3	Kale	Sumur, cimanggu, panimbang, sobang, pagelaran, carita, menes, cimanuk, pandeglang, cadasari, karangtanjung, koroncong	12
4	Large Chili	Simanggu, cibitung, panimbang, sobang, munjul, cisata, pagelaran, pulosari, cimanuk, cadasari, karangtanjung	11
5	Cucumbers	Cibaliung, cibitung, picung, cisata, pagelaran, sukaresmi, labuan, pulosari, karangtanjung	9
6	Tomato	Sobang, carita, jiput, pulosari, mandalawangi, cimanuk, pandeglang, karangtanjung, koroncong	9
7	Long Beans	Cibaliung, cibitung, cikeusik, pagelaran, sukaresmi, pulosari, mekarjaya, karangtanjung	8
8	Spinach	Panimbang, sobang, labuan, carita, menes, cimanuk, pandeglang, karangtanjung	8

Based on the results of clustering are 15 districts that belong to the clustering 2 to commodity cayenne pepper. Cayenne pepper is a clustering with the highest number of districts. Chickpea and spinach for the category clustering second lowest number of districts as many as eight districts. Based on the above data cape coral districts to category 2 is a district with vegetable commodities with many different types.

Table 16. Final Clustering 3

No	Commodity	Sub District	Number Sub District
1	Spinach	Sumur, cimanggu, cibaliung, cibitung, cikeusik, cigeulis, munjul, angsana, sindangresmi, picung, bojong, pagelaran, patia, cikedal, pulosari, mandalawangi, cipeucang, kaduhejo, mekarjaya, majasari.	20
2	Kale	Cibaliung, cibitung, cikeusik, cigeulis, munjul, angsana, sindangresmi, picung, bojong, cisata, patia, sukaresmi, Labuan, cikedal, pulosari, mandalawangi, cipeucang, kaduhejo, majasari.	19
3	Eggplant	Cibitung, cikeusik, cigeulis, munjul, picung, saketi, cisata, patia, sukaresmi, Labuan, cikedal, menes, pulosari, mandalawangi, cipeucang, kaduhejo, majasari	17
4	Tomato	Cimanggu, cikeusik, cigeulis, panimbang, munjul, angsana, saketi, cisata, sukaresmi, menes, kaduhejo, mekarjaya, majasari	13
5	Large Chili	Sumur, cibaliung, cikeusik, cigeulis, bojong, saketi, patia, sukaresmi, Labuan, cikedal, cipeucang, mekarjaya	12
6	Cayanne Pepper	Munjul, picung, patia, Labuan, cikedal, pulosari, cimanuk, cipeucang, majasari	9
7	Long Beans	Picung, patia, cikedal, cipeucang	4
8	Cucumber	Patia, cikedal, menes, mekarjaya	4

Based on the final clustering spinach are clustering with the highest distribution of districts which amounted to 20 districts. While below, namely commodity kale, spread in 19 sub-districts. This indicates that the long beans, spinach and eggplant, and tomato spreading characteristics due to clustering 3 more evenly spread in the sub-district level area greater than the average of 12.25. As for the great chili, cayenne pepper, string beans, and cucumbers numbers distribution at the district level below the average of 12.25. Commodity groups with the spread above the average, assuming the existence of these commodities is empirically proven means those commodities are agroekositem, economically and socially is already profitable and commodities-commodities can be referred commodity clustering in groups of three districts of the cluster.

IV. Conclusion

The results showed that the overall distribution of vegetables in Pandeglang are cosmopolitan, or spread in almost all regions sub district.After do clustering, found three clusters of vegetables in Pandeglang. Cluster one is commodity beans, cucumbers, peppers large, cayenne pepper, eggplant, spinach and tomatoes. The commodities are not everything is spread evenly throughout the district, which is predominantly spread is the long beans and cucumbers, while other commodities in some districts there are only included in a single cluster. Two clusters are dominated by commodities chili spread covering 21 districts, then commodity large chilli found in 20 districts, while commodity eggplant, cucumber, kale and spinach are in 10 to 13 districts. Three clusters are dominated by commodities kale spread in 25 districts followed by commodity spinach and tomatoes, respectively in 22 and 20 districts, while other commodity spread less than 20 districts.

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