Statistic Correlation Technique, MEMCDM Non-Numerical and Fuzzy System for Collaboration Determining of Dominant Factors of National Palm Oil Stock

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Abstract

Palm oil is the strategic commodities of the world and domestic of Indonesia. Indonesia is the biggest exporter of palm oil since 2006. As the biggest exporter, Indonesia can not be a price maker in international market. Besides Indonesia palm oil factory can not absorb all of crude palm oil production. This condition can disturbed to domestic crude palm oil stock and national foreign exchange or dollar when crude palm oil export decline. Therefor finding dominant factors of detect variable of stock problems are very important. The dominant factors is found by literature study then be equipped by historical data of annual periods. Statistical Pearson correlation and multi-pexpert multi-criteria decision making (MEMCDM) non-numerical are used to test and to verify correlation the dominant factors of national crude palm oil stock, and then fuzzy system is used to judge the dominant factors.

Keywords: Pearson correlation statistic, multi-criteria decision making non-numerical, fuzzy system

1. Introduction

Palm oil as a object of this research are combining of crude palm oil and palm kernel oil which produced by extract process of *fresh fruits bunches* (FFB). Processing technology of derivate palm oil can produce more than 169 end products which are use for daily need of human beings, for example palm cooking oil, margarine, cocoa butter substitute, fatty acid, fatty alcohol, surfactants, cosmetic, confectionaries, biodiesel, etc.

Palm oil is widely used to vegetable oil which has highest productivity. Palm oil productivity is among 4-5 ton/ha/year or equal 4800-6000 liter/ha/year, while coconut oil, brazil peanut oil and guava oil productivity among 2217 to 2689 liter/ha/year; as for jathropa, jojoba, peanut week, olive, canola, opium seed, and peanuts among 1163 to 1892 liter/ha/year, mean while sun flower seed, sesame, soybeans, straw, cotton seed, and corn just produce less then 1000 liter/ha/year. Cost production of palm oil is the most efficient. It cost production around 30-40 persen (Drajat 2012, GAPKI 2013).

Period of 2011-2015, palm oil world production and consumption are increase average 4.81 persen and 5.54 persen (USDA 2016). Increase of consumption more high then production is indicate that Palm oil is very important commodity. Increasingly of world Palm oil production is dominated by Indonesia and Malaysia production, which give contribution production *share* average 51.85 persen/year for Indonesia Production and 33.33 persen/year for Malaysia Production. Meanwhile, *share* of palm oil production of Indonesia to world production is increase average 1.28 persen/year, while *share* of palm oil production of Malaysia to world production is decrease average 1.45 persen/year (USDA 2016). Year 2013, total domestic CPO production is 29.317.968 million, with utilization are 59.6 persen export, 32.48 persen domestic consumtion and 8.13 persen stock (Ditjenbun 2013). Indonesia palm oil Export volume is approach twice then domestic consumption. It means domestic palm oil production concentrate to export utilities. So this commodity less value added to domestic production for its derivate product. Although palm oil industry was main driving force for new economics center in districts. It was saw that 4 billion farmers and 20 million workers was involved to the palm oil industry from upstream to downstream (Kemperin 2013).

In the other hand, the fact shown that even though Indonesia is being the bigest exporter in the world since 2006 year, but Indonesia do not have the power to be price setter for that commodity at international market. This situation give insecurity risk for domestic stock of palm oil.

Therefore, palm oil is being strategic commodity both at international and domestic level. This will be give the possibility to make stock problem in domestic Industry. This research objective is finding dominant factors of potential problem of domestic palm oil stock.

2. Method

Dominant factors which influence the movement of palm oil stock volume was identified by literature study to finding candidates factors. Then statistic technic was used to collect annual periodic data for that's candidates. Other than that person correlation technic was used to correlate the factors. Then expert voice was aggregated by multi-expert multi-criteria decision making (MCDM) non-numerical technique. Method to identify dominant

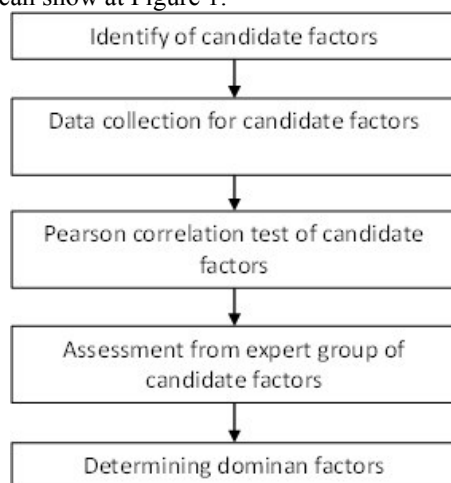factors of domestic palm oil stock can show at Figure 1.

Figure 1. Research Method to identify dominant factors of domestic palm oil stock.

3. Discussion

3.1 Identification of Dominant Candidates Factors of Domestic Palm Oil Stock

In Theory, stock is resultant between supply and demand. So that palm oil stock can define as a resultant of domestic supply volume and palm oil demand. Therefore when stock factors was founded it means that supply factors and demand factors was identified. Domestic palm oil distribution mechanism can describe in Figure 2.
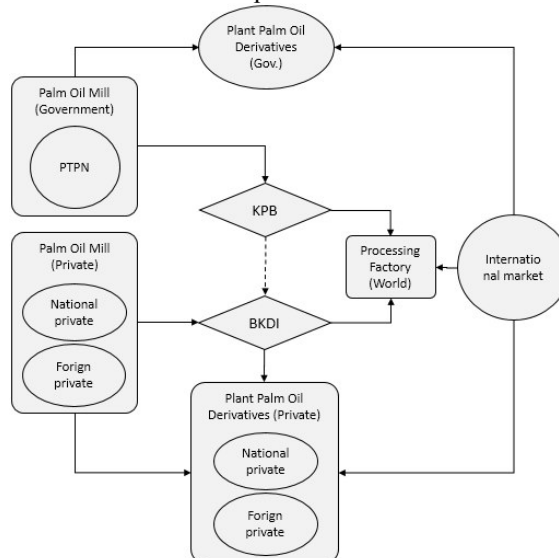

Figure 2. Domestic Palam Oil Distribution Mechanism

Base on survey research study, that was defined that the overview of domestic palm oil stock as below :

- Domestic palm oil producer. There are two type of domestic palm oil producers. First National factory (BUMN) and second private factory from national and foreign investment.
- Domestic palm oil consumers. There are two type of domestic palm oil consumers. First national palm oil derivate factory (BUMN) and second private palm oil derivate factory from national and foreign investment. Beside the palm oil derivate factory was both collaboration between national and private invenstment.
- Stock and Demand Mechanism. palm oil was produced by national and private factory partially distribute periodically to national palm oil derivate producer like cooking pal oil and margarine and the rest will be sell to BKDI market (bursa komoditi derivatif indonesia) or KPB (Kantor Pemasaran Bersama). Domestic palm oil derivate factory always got raw material (palm oil) to produce be cooking palm oil or margarine periodically. The national palm oil derivate factory not have a problem about raw material. Meanwhile if the private ones have a lack of raw material they can apply to BKDI. Stock palm oil in BKDI was contributed by KPB.
  So that the palm oil distribution mechanism describe that domestic palm oil stock was involeved by aspects: production, consumption, impor and export. And then dominant factors of domestic palm oil stock as below:
- Domestic Production (VP) be affected by candidate factors :
  a. National palm oil land area (VP_a), (Purba 2011).

   b. Domestic palm oil price (VP_b), (Purba 2011).
   c. Domestic palm oil consumption (VP_c), (Prahastuti 2000).
   d. Domestic petroleum price (VP_d), (SIP 2013).
   e. International palm oil price (VP_e), (Muslih 2013)
   f. Average palm oil productivity (VP_f), (Purba 2011).

- Import (VI) be affected by candidate factors:
   a. US Dollar rate (VI_a), (Hamdani 2012).
   b. Domestic palm oil price (VI_b), (Salya 2006).
   c. Domestic palm oil consumption (VI_c), (Salya 2006).
   d. Gross Domestic Product (VI_d), (Yulismi 2006, Hamdani 2012).
   e. International palm oil price (VI_e), (Purba 2011).

- Domestic Consumption (VK) be affected by candidate factors:
   a. Palm oil export (VK_a), (Prahastuti 2000, Kusumawar dhana 2008, Hasbullah 2009, Purba 20011).
   b. US Dollar rate (VK_b), (Salya 2006).
   c. Domestic palm oil price (VK_c), (Aruan 2009).
   d. Domestic palm oil production (VK_d), (Aruan 2009).

- Export(VE) be affected by candidate factors:
   a. Domestic palm oil price (VE_a), (Muslih 2013).
   b. Domestic palm oil production (VE_b), (Wardani 2008).
   c. US Dollar rate (VE_c), (Salya 2006, Wardani 2008, hasbullah 2009, Purba 2011).
   d. palm oil export price (VE_d), (Wardani 2008).
   e. Export tax (VE_e), (Yulismi 2006, Wardani 2008, Kusumawardhana 2008, Hasbullah 2009, Purba 2011, Muslih 2013).
   f. International palm oil consumption (VE_f), (Purba 2011).

3.2 Correlation candidate factors of Domestic palm oil stock by Pearson statistic Technique

Pearson correlation was testing to historical time data of candidate factors (VP_i, VI_i, VK_i, VE_i), where $i=a, b, c…$ (data = interval) the factors are production, import, consumption, and export of domestic CPO. Correlation technique produce correlation value (r), where r value are between -1 to 1. That value indicates the strong or weak of correlation between the factors. If r value was positive showed that the correlation was in the same directly, and If r value was negative that showed that the correlation was in the inversely direction. The value of r atau $|r|$ indicated strong value was produced. $|r| = 0$ was indicated not had correlation, $0 > |r| \geq 0.25$ is the correlation very weak, $0.25 > |r| \geq 0.5$ is the correlation average, $0.5 > |r| \geq 0.75$ is the correlation strong, dan $0.75 > |r| \geq 0.99$ is the correlation very strong, serta $|r| = 1$ is perfect correlation (Sarwono 2006).

Tabel 1. Test of Correlation Pearson

No		Aspect & Candidate Factors	Correlation		
			r	indicated	level
A		Production			
		1. Land use	0.99	directly	VH
		2. Domestic price	0.96	directly	VH
		3. Domestic consumption	0.93	directly	VH
		4. Domestic price of petroleum	0.95	directly	VH
		5. World price	0.71	directly	VH
		6. Productivity	0.52	directly	M
B		Import			
		1. US dollar rate	-0.46	inversely	M
		2. Domestic price	-0.36	inversely	M
		3. Domestic consumption	-0.25	inversely	M
		4. Gross domestic product	-0.38	inversely	M
		5. Domestic production	-0.39	inversely	M
C		Consumption			
		1. Export	0.72	directly	H
		2. US dollar rate	0.81	directly	VH
		3. Domestic price	0.91	directly	VH
		4. Domestic production	0.93	directly	VH
D		Export			
		1. Domestic price	0.86	directly	VH
		2. Domestic production	0.91	directly	VH
		3. US dollar rate	0.72	directly	H
		4. Export price	0.81	directly	VH
		5. Export Tax	-0.21	inversely	VL
		6. Domestic consumption	0.78	directly	VH

VH : Verry High, H : High, M : Moderate, L : Low, VL : Verry Low

Expert was assess and gave score to candidate factors. As for the criteria's should be used for expert judgment are below (Yager, 1993) :

- Affectivity of variable influence. This used to describe about influence level of candidate factors. the higher of expert jugment mean higher the influence of candidate factors.
- Operational Variable. this is criteria to describe difficulties level of how to operate the candidate factors. the lower of expert judgment to the criteria means the higher of difficulties level of the candidate factors operation
- Availability of data. The availability of data is important to be consider. If the data was not available or not complete then the operationalization of candidate factors will have troble. The higher of accessibility to the data means the higher operationally of the candidate factors.
- Accurate of data. The accurate of data is very important to guarantee that the candidate factors are good to operation. Otherwise, if the data was not accurate so the result of the operation of candidate factors is not valid. The higher of validation of data shows the higher candidate factors operation.
- Simplicity of time and cost to finding the data. Simplicity of finding the data was important to be consider of candidate factors operation. The simplicity are about ways to find the data, time needed to collect the data, and cost to find and operate the data. For example if one condition the data was complete and accurate, but the ways to find it is very difficult or needed the high cost even needed long time to collect the data so this condition can influence the benefit of candidate factors operation. Therefore, that's criteria was used to show feasibility of preparing the data of candidate factors operation which are simple, cheap, fast and accurate. Then the higher of criteria assessment means the higher of feasibility collecting and operation the candidate factors.
- Score linguistic Level. Score linguistic level was used to give the linguistic level scale. There are "very high", "high", "moderate", "low" and "very low".

Table 2. Score Linguistic Level

No	Code	Value	Levef of Interest
1	VH	Verry High	5
2	H	High	4
3	M	Moderate	3
4	L	Low	2
5	VL	Verry Low	1

Score level "very high" means the best value, otherwise score level very low means the worst value.

- Determine the importance level of criteria and its negation. The criterias was determined by expert then be given weigh value of Very High, High, Medium, Low and Very Low (VH, H, M, L, VL) to show the importance of the criteria factors of domestic palm oil stock. The higher of criteria level shows the higher of importance of the criteria which will be used.

Table 3. Determine the importance level of criteria and its negation.

No	Criteria	Value	
		Weight (Wk)	Neg. of Weight (nWk)
1	Effective of Influence	VH	VL
2	Operationalisation	M	M
3	Availability of Data	VH	VL
4	Accurate of Data	H	L
5	Simplicity, cost, & time to data operation	VL	VH

The negation of assessment of importance criteria was fouded by the matematic formulation below :

$$nWk = Wq-k+1$$

- Instrumentation and assessment. After determine the importance level criteria, then do the instrumentation for assessment by experts. Experts member whose gave score to the candidate factors were 4 (four) persons. The background of them are postdoctoral and had been work experience about 10 years. They are the academic and public executive whose responsible to make public policy about palm oil productions from upstream to downstream.

  The result of each expert will be aggregated. Assessment of each factor by each expert for each criteria is Vij(ak), with the result as shown at table 4.

- Aggregation of experts assessment for each criteria. It was doing with two levels. First, aggregation of all criteria factors and second agregration of all experts judgment. The formulation of this aggregation as below (Yager 1993):

$$V_{ij} = \min [nW_k \vee V_{ij}(a_k)]$$

The formulations result is the expert judgment based on criteria aggregation. (Yager 1993), shown at table 5.

Tabel 4. Score of four experts

No		Aspect & Candidate Factors	Assessment of Criteria				
			1	2	3	4	5
Expert 1							
A		Production					
		1. Land use	VH	VH	VH	VH	VH
		2. Domestic price	M	M	L	M	L
		3. Domestic consumption	VH	VH	H	VH	H
		4. Domestic price of mineral oil	L	M	M	L	M
		5. World price	VH	VH	VH	VH	VH
		6. Productivity	VH	VH	VH	VH	H
B		Import					
		1. US dollar rate	VH	H	VH	H	H
		2. Domestic price	M	R	M	M	L
		3. Domestic consumption	M	M	M	L	M
		4. Gross domestic product	VH	VH	H	H	H
		5. World price	VH	VH	VH	VH	VH
C		Consumption					
		1. Export	VH	VH	VH	VH	VH
		2. US dollar rate	VH	H	VH	H	H
		3. Domestic price	VH	VH	VH	VH	H
		4. Domestic production	VH	VH	VH	VH	VH
D		Export					
		l. Domestic price	VH	VH	VH	VH	VH
		2. Domestic production	VH	VH	VH	VH	VH
		3. US dollar rate	VH	VH	VH	VH	VH
		4. Export price	VH	VH	VH	VH	VH
		5. Export Tax	VH	H	H	H	H
		6. Domestic consumption	H	H	H	H	M
Expert 2							
A		Production					
		1. Land use	VH	VH	VH	VH	VH
		2. Domestic price	L	M	M	L	L
		3. Domestic consumption	H	VH	VH	H	VH
		4. Domestic price of mineral oil	M	H	H	M	VH
		5. World price	VH	VH	VH	VH	VH
		6. Productivity	VH	VH	H	H	H
B		Import					
		1. US dollar rate	H	M	M	H	M
		2. Domestic price	H	H	H	H	M
		3. Domestic consumption	L	L	VL	VL	L
		4. Gross domestic product	VH	VH	VH	VH	H
		5. World price	VH	H	VH	H	M
C		Consumption					
		1. Export	VH	VH	VH	VH	VH
		2. US dollar rate	VH	VH	VH	H	H
		3. Domestic price	VH	VH	VH	VH	VH
		4. Domestic production	VH	VH	VH	VH	T
D		Export					
		l. Domestic price	VH	VH	VH	VH	H
		2. Domestic production	VH	VH	VH	VH	H
		3. US dollar rate	VH	H	H	H	M
		4. Export price	VH	VH	VH	VH	H
		5. Export Tax	H	M	M	M	M
		6. Domestic consumption	VH	H	H	H	M
Expert 3							

A	Production					
	1. Land use	VH	VH	VH	VH	VH
	2. Domestic price	M	L	M	L	M
	3. Domestic consumption	H	VH	H	H	M
	4. Domestic price of mineral oil	H	VH	M	H	H
	5. World price	VH	VH	VH	VH	VH
	6. Productivity	H	H	M	M	M
B	Import					
	1. US dollar rate	H	H	M	H	M
	2. Domestic price	M	H	M	H	M
	3. Domestic consumption	L	L	M	L	L
	4. Gross domestic product	VH	VH	VH	VH	M
	5. World price	VH	VH	H	VH	VH
C	Consumption					
	1. Export	VH	VH	VH	VH	H
	2. US dollar rate	VH	H	H	VH	H
	3. Domestic price	VH	VH	VH	VH	VH
	4. Domestic production	VH	VH	VH	VH	H
D	Export					
	1. Domestic price	VH	VH	VH	VH	VH
	2. Domestic production	VH	VH	VH	VH	VH
	3. US dollar rate	H	VH	H	H	M
	4. Export price	VH	VH	VH	VH	VH
	5. Export Tax	H	M	M	M	H
	6. Domestic consumption	VH	H	H	H	M
Expert 4						
A	Production					
	1. Land use	VH	VH	VH	VH	VH
	2. Domestic price	M	L	M	L	M
	3. Domestic consumption	VH	H	VH	H	H
	4. Domestic price of mineral oil	VH	VH	VH	VH	H
	5. World price	H	VH	VH	H	H
	6. Productivity	VH	H	VH	H	H
B	Import					
	1. US dollar rate	H	VH	H	H	H
	2. Domestic price	M	H	H	M	M
	3. Domestic consumption	VL	VL	L	M	M
	4. Gross domestic product	VL	L	L	VL	VL
	5. World price	S	T	R	T	R
C	Consumption					
	1. Export	VH	VH	VH	VH	H
	2. US dollar rate	VH	H	M	H	H
	3. Domestic price	VH	VH	VH	VH	H
	4. Domestic production	VH	VH	VH	VH	VH
D	Export					
	1. Domestic price	VH	VH	VH	VH	H
	2. Domestic production	VH	VH	VH	VH	VH
	3. US dollar rate	L	L	L	L	L
	4. Export price	VH	VH	VH	VH	VH
	5. Export Tax	H	H	H	M	M
	6. Domestic consumption	H	H	H	M	M

Tabel 5. Criteria Aggregation value

No		Aspect & Candidate Factors	Agregat of Criteria			
			1	2	3	4
A		Production				
		1. Land use	VH	VH	VH	VH
		2. Domestic price	VL	VL	VL	VL
		3. Domestic consumption	H	H	H	H
		4. Domestic price of petroleum	L	M	M	VH
		5. World price	VH	VH	VH	VH
		6. Productivity	VH	H	M	H
B		Import				
		1. US dollar rate	H	M	H	H
		2. Domestic price	M	H	M	M
		3. Domestic consumption	L	VL	L	VL
		4. Gross domestic product	H	VH	VH	VL
		5. World price	VH	H	H	L
C		Consumption				
		1. Export	VH	VH	H	VH
		2. US dollar rate	H	H	H	M
		3. Domestic price	VH	VH	VH	VH
		4. Domestic production	VH	VH	VH	VH
D		Export				
		1. Domestic price	VH	VH	VH	VH
		2. Domestic production	VH	VH	VH	VH
		3. US dollar rate	VH	H	H	L
		4. Export price	VH	VH	VH	VH
		5. Export Tax	H	M	H	M
		6. Domestic consumption	H	H	H	M

While aggregation of experts judgment (second level) was doing by the formulation below (Yager 1993):

$$V_i = f(V_i) = \max [Q_i \wedge b_j]$$

Where Q determine with the mathematic formula below :

$$Qj = int \left[1 + \left(j * \frac{q-1}{r} \right) \right]$$

Then the result of expert's aggregation and criteria's aggregation value is shown at table 6.

Table 6. the result of expert's aggregation and criteria's aggregation value

No	Aspect & Candidate Factors	Aggregat of Criteria & Expert
A	Production	
	1. Land use	VH
	2. Domestic price	L
	3. Domestic consumption	H
	4. Domestic price of petroleum	M
	5. World price	VH
	6. Productivity	H
B	Import	
	1. US dollar rate	H
	2. Domestic price	M
	3. Domestic consumption	L
	4. Gross domestic product	H
	5. World price	H
C	Consumption	
	1. Export	H
	2. US dollar rate	H
	3. Domestic price	VH
	4. Domestic production	VH
D	Export	
	1. Domestic price	VH
	2. Domestic production	VH
	3. US dollar rate	H
	4. Export price	VH
	5. Export Tax	M
	6. Domestic consumption	H

3.3 Determine of Candidate Factors of Domestic Palm Oil Stock with Mamdani Inference Fuzzy System
Base on pearson correlation statistic testing and experts judgment which are aggregate by MCDM Non Numerical technique, so next operation is determine dominants candidate factors of domestic palm oil stock. Fuzzy inference Mamdani was used to this operation. The Mamdani fuzzy inference system is shown at Figure 2 (Kusumadewi & Purnomo 2004).
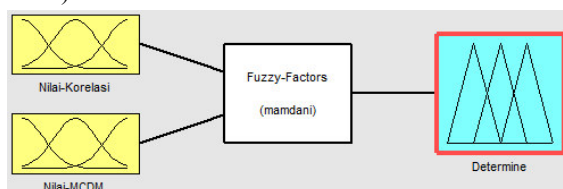

Figure 2. The Mamdani Fuzzy Inference System

As for, the method was used to determine the dominant factors of domestic palm oil stock were Mamdani Fuzzy Inference System, with the input member and output system then the rule of it (Kusumadewi & Purnomo 2004) are use the below role:

a. Member of input and output function :
- Correlation value (r), (Sarwono 2006)

    r = 0   : not (no correlation)
    $0 > r \geq 0.25$: verry low (vl)
    $0.25 > r \geq 0.50$: moderate (m)
    $0.50 > r \geq 0.75$: high (h)
    $0.75 > r > 1$: verry high (vh)
    r = 1   : perfect (p)

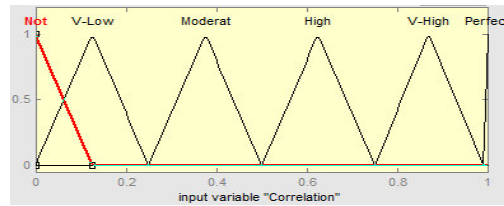**Figure 3.** Member function of "correlation"

- Result of MCDM Non-Numerical aggregations

MCDM = 1   : verry low (vl)
MCDM = 2   : low (l)
MCDM = 3   : moderate (m)
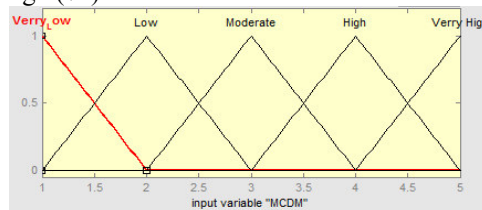MCDM = 4   : high (h)
MCDM = 5   : verry high (vh)

Figure 4. Member function of "MCDM"

- Inference Value of Determine the dominant factors of Domestic palm oil stock

value < 0.5   : not-elected ("ne")
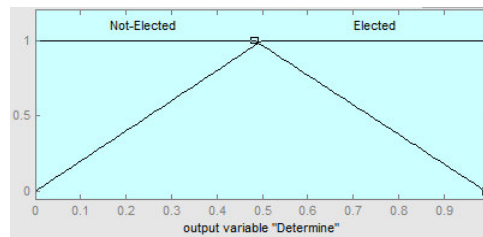value $\geq$ 0.5   : elected ("e")

Figure 5. Member function of "Determine"

b. list of rule

- If (r is not) and (MCDM is vl) then "NE"   If (r is not) and (MCDM is l) then "NE"
- If (r is not) and (MCDM is m) then "NE"   If (r is not) and (MCDM is h) then "NE"
- If (r is not) and (MCDM is vh) then "NE"   If (r is vl) and (MCDM is vl) then "NE"
- If (r is vl) and (MCDM is l) then "NE"   If (r is vl) and (MCDM is m) then "NE"
- If (r is vl) and (MCDM is h) then "NE"   If (r is vl) and (MCDM is vh) then "NE"
- If (r is m) and (MCDM is vl) then "NE"   If (r is m) and (MCDM is l) then "NE"
- If (r is m) and (MCDM is m) then "NE"   If (r is m) and (MCDM is h) then "E"
- If (r is m) and (MCDM is vh) then "e"   If (r is h) and (MCDM is vl) then "NE"
- If (r is h) and (MCDM is l) then "NE"   If (r is h) and (MCDM is m) then "E"
- If (r is h) and (MCDM is h) then "E"   If (r is h) and (MCDM is vh) then "E"
- If (r is vh) and (MCDM is vl) then "NE"   If (r is vh) and (MCDM is l) then "NE"
- If (r is vh) and (MCDM is m) then "E"   If (r is vh) and (MCDM is h) then "E"
- If (r is vh) and (MCDM is vh) then "E"   If (r is p) and (MCDM is vl) then "NE"
- If (r is p) and (MCDM is l) then "NE"   If (r is p) and (MCDM is m) then "E"
- If (r is p) and (MCDM is h) then "E"   If (r is p) and (MCDM is vh) then "E"

As for the result of determine of dominant factors of domestic palm oil stock is shown at table 7.

Fuzzy Mamdani inference process in pearson correlation test of candidate dominant factors which aggregate with MEMCDM non-numerical shown that from 21 factors palm oil stock 5 of it got lower then 0,5 value. So five factors of it is not verified and deleted from the candidates factors, because base on member fuction "determine" is rejected ("NE"). Meanwhile 16 factors of domestic palm oil stock got value upper 0,5 were selected because base on member fuction "determine" is selected ("E"). therefore the dominant factors of domestic palm oil stock are 16 factors, below:

- Production
    1. Land use
    2. Domestic consumption
    3. World price
    4. Productivity
- Import
    1. US dollar rate
    2. Gross domestic product
    3. World proce
- Consumptiom
    1. Export
    2. US dollar rate
    3. Domestic price
    4. Domestic production
- Export
    1. Domestic price
    2. Domestic production
    3. US dollar rate
    4. Export price
    5. Domestic consumption

Table 7. Determine of dominant factors of domestic palm oil stock value

No	Aspect & Candidate Factors	Value of			Determine
		r	MCDM NN	Fuzzy Sstem	
A	Production				
	1. Land use	0.99	5	0.50	E
	2. Domestic price	0.96	2	0.47	NE
	3. Domestic consumption	0.93	4	0.56	E
	4. Domestic price of petroleum	0.95	3	0.46	NE
	5. World price	0.71	5	0.54	E
	6. Productivity	0.52	4	0.52	E
B	Import				
	1. US dollar rate	-0.46	4	0.54	E
	2. Domestic price	-0.36	3	0.39	NE
	3. Domestic consumption	-0.25	2	0.25	NE
	4. Gross domestic product	-0.38	4	0.61	E
	5. World price	-0.39	4	0.60	E
C	Consumption				
	1. Export	0.72	4	0.53	E
	2. US dollar rate	0.81	4	0.56	E
	3. Domestic price	0.91	5	0.58	E
	4. Domestic production	0.93	5	0.56	E
D	ExportVH				
	1. Domestic price	0.86	5	0.61	E
	2. Domestic production	0.91	5	0.58	E
	3. US dollar rate	0.72	4	0.53	E
	4. Export price	0.81	5	0.56	E
	5. Export Tax	-0.21	3	0.45	NE
	6. Domestic consumption	0.78	4	0.53	E

4. Conclusion

Base on literature study and pearson correlation statistic testing by Sarwono (2006) scale got that the candidates dominant factors of domestic palm oil stock are 21 factors, where 15 factors are have linear correlation and the other of six factors are not have linear. As for the correlation level, 12 factors have very strong correlation, 2 factors have strong correlation, 6 factors have moderate correlation and 1 factors have very weak correlation. While the result of experts which aggregated by MEMCDM non-numerical technic determine the candidate factors which have influence to domestic palm oils stock are: 7 factors are very high, 9 factors are high, 3 factors are moderate and 2 factors are low. Next base on mamdany fazzy inference system to test the candidate factors

by experts judgment MEMCDM non-numerical shown that from 21 candidate factors as research objects 16 factors was dominant to determine the Domestic palm oil stock.

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