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MEASUREMENT OF COOPERATIVE PRODUCTIVITY LEVEL: IN ACEH: THE MALMQUIST INDEX APPROACH

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ABSTRACT. Based on article 33 of the 1945 constitution, cooperatives are the backbone of Indonesia national economy. However, the hopes of cooperative to become the locomotive of the Indonesian economy are still far from expectation. the purpose of this research to measure the level of productivity and efficiency of cooperatives by using Data Envelopment Analysis and Malmquist Index analysis tools. Input variables used are own capital, external capital, labor, and members, while the output variable is turnover and the surplus (SHU) cooperatives from 23 districts/cities in Aceh from 2014 to 2016. Test results show that cooperatives that have an index value-efficient only in seven districts / cities, while in terms of productive cooperatives in Aceh as many as 14 districts/cities in Aceh. It is expected that policymakers in fostering and empowering cooperatives in Aceh, both from the government and cooperative management and other stakeholders, can improve cooperative performance through cooperative education and training for cooperative human resources, provide a conducive business climate and provide capital loans with easy schemes for cooperative. The limitation of this study is that the types of cooperatives used are cooperatives as a whole not classifying cooperative types. Testing the level of efficiency and productivity of cooperatives with various types of cooperatives that exist is a special attraction The objective is in the third line, the method is in the fourth line, the results and discussion are in the sixth line, the conclusions and suggestions are on the eighth line and so on.

Keywords: Cooperative; Data Envelopment Analysis; Malmquist Index

PENGUKURAN TINGKAT PRODUKTIVITAS KOPERASI DI ACEH: PENDEKATAN *MALMQUIST INDEX*

ABSTRAK. Berdasarkan pasal 33 undang-udang dasar 1945, koperasi merupakan merupakan sokuguru perekonomian nasional indonesia. namun demikian harapan kopeasi menjadi lokomotif perekonomian Indonesia masih jauh dari harapan. Tujuan penelitian ini untuk mengukur tingkat produktivitas dan efisiensi koperasi dengan menggunakan alat analisis *Data Envelopment Analysis* dan *Malmquist Index*. Variabel input yang digunakan adalah modal sendiri, modal luar, tenaga kerja dan anggota, sedangkan variabel outputnya omset dan selisih hasil usaha (SHU) koperasi dari 23 kab/kota yang ada di Aceh tahun 2014 sampai 2016. Hasil pengujian menunjukkan bahwa koperasi yang memiliki nilai indek efisien hanya pada tujuh kab/kota, sedangkan dari segi koperasi yang produktif di Aceh sebanyak 14 kab/kota yang ada di Aceh. Diharapkan para pengambil kebijakan dalam hal pembinaan dan pemberdayaan koperasi di Aceh, baik dari pemerintah dan pengurus koperasi maupun *stakeholder* lainnya untuk dapat meningkatkan kinerja koperasi melalui pendidikan dan pelatihan perkoperasian bagi sumber daya manusia koperasi, memberikan iklim usaha yang kondusif dan memberikan pinjaman modal dengan skema yang mudah bagi koperasi. Keterbatasan penelitian ini adalah jenis koperasi yang digunakan merupakan koperasi secara keseluruhan tidak mengklasifikasi tipe koperasi. Menguji tingkat efisiensi dan produktfitas koperasi dengan berbagai jenis koperasi yang ada merupakan sebuah daya tarik tersendiri. Tujuan ada pada baris ketiga, metode baris keempat, hasil dan pembahasan baris keenam, kesimpulan dan saran ada pada baris kedelapan dan seterusnya.

Kata kunci: Koperasi; *Data Envelopment Analysis*; *malmquist index*

INTRODUCTION

The number of cooperatives in Indonesia has increased every year, as has the growth of cooperatives in Aceh Province. In 2018 the number of cooperatives in Aceh reached 6,212 (Kementerian Koperasi dan Usaha Kecil dan Menengah Republik Indonesia., 2016). Of these 4,278 cooperative units are active, the rest are inactive, for various reasons including weak cooperative management resources, low member participation, lack of capital, and lack of mastery of information technology. From data from the ministry of cooperatives and small and medium enterprises in 2019, the number of cooperative members in Aceh reached 122,459 people, in other words, 2.26% of the total population of Aceh are members of cooperatives. Meanwhile, the poverty rate in Aceh is still around 15% (Badan Pusat Statistik, 2019). In terms of employment, cooperatives in Aceh are able to absorb a workforce of 5,736 people. This shows that cooperatives have also contributed to reducing the unemployment rate in Aceh which has reached 6.2% (Badan Pusat Statistik, 2019).

During the last five years the amount of residual income (SHU) from cooperatives in Aceh has increased (Ministry of Cooperatives and Small and Medium Enterprises, 2019). During this period the number of SHU in 2015 SHU for cooperatives

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reached Rp. 17.3 billion, Rp. 22.4 billion in 2016, Rp. 45.7 billion in 2017, Rp. 53.4 billion and 62.4 billion for 2018 and 2019. Likewise, cooperative capital, for the period 2015 to 2019, cooperative capital in Aceh has increased (Ministry of Cooperatives and Small and Medium Enterprises, 2019). In 2015, the cooperative capital in Aceh was IDR 95.3 billion, IDR 200.4 billion in 2016, IDR 340.7 billion in 2017, IDR 423.3 billion, and IDR 496.3 billion for 2018 and 2019. However, the performance of cooperatives in Aceh is still not satisfactory, this is indicated by the number of inactive cooperatives totaling 1,934 units.

Basically a cooperative is established for the welfare of its members with values, namely self-help, self-responsibility, democracy, equality, equality, and solidarity (International Cooperative Alliance, 2016; Hilson, 2018; Bhukuth, Roumane, & Terrany, 2018). Cooperatives in running their business are more concerned with their members than seeking the maximum profit that is commonly done by business entities other than cooperatives. However, far from the goal of seeking profit or profit, cooperatives have a basic objective, namely the welfare of members in particular and society in general. The cooperative runs its business according to the needs and economic efforts of its members. Laurinkari (2004), states that the purpose of cooperatives is empowerment not only for the economy but also for social and psychological activities. Cooperatives prioritize member strength rather than capital strength (Henzle, 1960). According to Michelsen (1994: 16) Cooperative is a membership organization that can determine its business. It can be understood that cooperative members are run by members as users of services/goods and as owners of the business.

Besides that, cooperatives also have a role in the national economy. According to the Ministry of Cooperatives and Small and Medium Enterprises (2016), cooperatives can contribute to a gross domestic gross of 1.7% of Indonesia's total GDP. This is in stark contrast to the number of cooperatives in Indonesia that reach hundreds of thousands. However, cooperatives are an important entity in the developing economy in Indonesia. It has a significant contribution to the welfare of the middle-lower income group, poverty reduction, and job creation (Azhari, Syechalad, & Majid, 2017; Bhukuth et al., 2018).

The establishment of cooperatives according to Riswan, Suyono, and Mafudi (2017) is to empower not only the economy but also the social and psychological community. This means that cooperatives do not only have the goal of seeking profit but also achieve mutual prosperity. The cooperative has a purpose for the welfare of members not for capital (Martini, Lasmi, Jaya and Sutrisni, 2017).

In running its business, the cooperative develops an economic business for the welfare of members. According to Hasan, Azhari, and Majid (2018), the cooperative will return the income earned or the number of customers to be allocated to members. It can also be saved as a future capital. In order to maintain business continuity, the cooperative needs to generate a profit known as the Rest of the Business (SHU - surplus cooperative). According to article 45 of Law no. 25 Republic of Indonesia (1992), Paragraph 1, "Cooperative surplus is the income earned in one-year fewer production costs, depreciation, and other liabilities, including taxes in the relevant year". The cooperative surplus is highly dependent on two aspects, namely financial and non-financial factors (the Republic of Indonesia, 1992).

The financial factor will increase if the cooperative has its own access to capital (savings, mandatory savings, reserves, and grants), external capital (debt) which can come from members, other cooperatives or their members, banks, and other financial institutions, issuing bonds and other securities. , another source of volume sales of legal and business goods and services to cooperatives. However, the growth of cooperatives is also influenced by non-financial factors, such as the number of employees, the number of members, and the business units. Thus, even though the cooperative has good financial performance, without being supported by good non-financial factors, the cooperative will certainly not be able to fulfill its purpose of maximizing SHU, and this, in turn, will result in the cooperative going bankrupt. (Syamni & Madjid, 2016).

Published research on the efficiency of cooperatives using DEA includes Akinsoyinu (2015), which conducted research on the efficiency of cooperatives in the financial sector of European countries (Germany, the Netherlands, Italy, Spain, England, France, Austria, Denmark, Philippines, and Portugal), Marwa & Aziakpono (2014) who examined the performance of savings and loan cooperatives in Tanzania. Tesfamariam et al (2013) conducted an efficiency study of savings and loan cooperatives in Ethiopia. Doumpos and Zopounidis (2012), conducted a performance evaluation of cooperative banks in Europe (Germany, France, Italy, Spain, and Austria). Candemir et al (2011) conducted a study on the efficiency of candlenut agricultural cooperatives in Turkey. Ludena (2010), examined the growth of agricultural productivity in

Latin America and the Caribbean. Khan et al (2010) analyzed the efficiency of cooperatives and small and medium enterprises in Pakistan, and Syamni & Madjid (2016) investigated the efficiency of savings and loan cooperatives in North Aceh.

As far as we know, research on measuring the efficiency of cooperatives in Indonesia using non-parametric methods using the DEA and the Malmquist index is still within the boundaries of one cooperative as well as at the sub-district and district levels. Such as research conducted by Syamni and Madjid (2016) which examined the efficiency level of savings and loan cooperatives in North Aceh. Nur Imamah (2019) tested the efficiency level of the Bina Utama savings and loan cooperative and sharia financing in Yogyakarta. Likewise, research conducted by Suendarti (2019) and Rahayu & Rusydiana (2018) which measures the efficiency level of savings and loan cooperatives and pesantren cooperatives. Meanwhile, this study examines the efficiency of cooperatives using the DEA with a Malmquist index which has a wider scope, with several districts/ cities in Aceh Province.

The problems raised in this article are how the level of productivity and efficiency of cooperatives in Aceh using a non-parametric approach. Thus this study aims to determine the efficiency of cooperatives by measuring the level of efficiency and productivity in 23 districts/cities in Aceh and to find out which cooperatives are more efficient in districts/cities in Aceh. The variables raised in this study consisted of input variables and output variables. Input variables include own capital, external capital, labor, and cooperative members. while the output variable includes the difference in business results (SHU) and the turnover of the cooperative. All variable data were obtained from the Ministry of Cooperatives and SMEs of the Republic of Indonesia and the Office of Cooperatives and Small and Medium Enterprises, Aceh Province.

METHOD

This study uses a non-parametric approach from Data Envelopment Analysis (DEA). Model data envelopment analysis (DEA) is a popular method for estimating efficiency / productivity, based on each input used and the output produced (Cooper at al, 2007). DEA is a non-parametric approach that has advantages. According to Coeli et al. (2005), the advantage of DEA is that the model approach does not specify certain conditions, such as the parameters of the population that is the parent of the research sample, its use is simpler, and it is easy to use because it does not require a lot of function specifications.

This research was built with research developed by Koopmans (1951) and Debreu (1951), Farrell (1957), which laid the foundation for the study of efficiency limits. Where he shows that a measure of the efficiency of the company can be calculated using many inputs. This study uses the Data Envelopment Analysis (DEA) approach developed by Bankers, Charnes and Cooper (1984), the resulting unit of output can show an increasing, constant or decreasing proportion of the input unit increase. The use of the VRS model is used because the assumption of this model is that the ratio between additional input and output is not the same (variable return to scale). This means that the addition of input x times does not or does not necessarily cause the output to increase by x times, it can be smaller or greater than n times. Increasing the proportion can be in the form of increasing returns to scale (IRS) or it can also be decreasing returns to scale (DRS). The results of this model add to the convexity condition for the weight values of λ, by entering in the following constraint model: the weight value λ, by entering in the following boundary model:

$$\sum_{j=1}^{n} \lambda j = 1$$

Furthermore, the BCC model can be written with the following equation: λ Max π (DMU efficiency VRS Model)

Subject to:

$$\sum_{j=1}^{n} xij\ \lambda ij \geq \pi io \qquad i = 1,2,\dots m \tag{1}$$

$$\sum_{j=1}^{n} yrj\ \lambda j \geq yio \qquad i = 1,2,\dots s \tag{2}$$

$$\sum_{j=1}^{n} \lambda j \geq 1 \qquad (VRS) \tag{3}$$

$$\sum_{j=1}^{n} \lambda j \geq \theta \qquad j = 1,2,\dots n \tag{4}$$

Where θ is the efficiency of the DMU, n the number of DMUs, m the number of inputs, s the number of outputs, xij the number of the ith input DMU j, yrj the number of the rth output of the DMU j λj the weight of the DMU j for the calculated DMU. Meanwhile, to calculate the level of cooperative productivity, researchers used the Malmquist Index, with the following formula:

$$M_o\left(x^t, y^t, x^{t+1}, y^{t+1}\right) = \frac{D_o^{t+1}\left(x^{t+1}, y^{t+1}\right)}{D_o^t\left(x^t, y^t\right)} \times \left[\left(\frac{D_o^t\left(x^{t+1}, y^{t+1}\right)}{D_o^{t+1}\left(x^{t+1}, y^{t+1}\right)}\right)\left(\frac{D_o^t\left(x^t, y^t\right)}{D_o^{t+1}\left(x^t, y^t\right)}\right)\right]^{\frac{1}{2}} \tag{5}$$

where $D_o^t\left(x^{t+1}, y^{t+1}\right)$, the distance from period t + 1 observation to technology t period. The first ratio on the right side of Equation (5) measures

the change in relative efficiency between years t and t + 1. Next, the total factor productivity will be estimated by the following formula:

$$M_O\left(x^t, y^t, x^{t+1}, y^{t+1}\right) = \left[\left(\frac{D_o^{t+1}\left(x^t, y^t\right)}{D_o^t\left(x^t, y^t\right)}\right)\left(\frac{D_o^{t+1}\left(x^{t+1}, y^{t+1}\right)}{D_o^t\left(x^{t+1}, y^{t+1}\right)}\right)\right]^{\frac{1}{2}} \times$$

$$\left(\frac{D_0^t\left(x^t, y^t\right)}{D_0^{t+1}\left(x^{t+1}, y^{t+1}\right)}\right) \times \left(\frac{D_0^{t+1}\left(x^t, y^t\right)}{D_0^{t+1}\left(x^t, y^t\right)} \frac{D_0^{t+1}\left(x^{t+1}, y^{t+1}\right)}{D_0^{t+1}\left(x^{t+1}, y^{t+1}\right)} \frac{D_0^t\left(x^t, y^t\right)}{D_0^t\left(x^t, y^t\right)} \frac{D_0^t\left(x^{t+1}, y^{t+1}\right)}{D_0^t\left(x^{t+1}, y^{t+1}\right)}\right)^{\frac{1}{2}} \quad (6)$$

Where: $\left[\left(\frac{D_o^{t+1}\left(x^t, y^t\right)}{D_o^t\left(x^t, y^t\right)}\right)\left(\frac{D_o^{t+1}\left(x^{t+1}, y^{t+1}\right)}{D_o^t\left(x^{t+1}, y^{t+1}\right)}\right)\right]^{\frac{1}{2}}$ = Technical Change (7)

$\left(\frac{D_o^t\left(x^t, y^t\right)}{D_o^{t+1}\left(x^{t+1}, y^{t+1}\right)}\right)$ = Pure Efficiency Chang e (8)

$\left(\frac{D_o^{t+1}\left(x^t, y^t\right)}{D_o^{t+1}\left(x^t, y^t\right)} \frac{D_o^{t+1}\left(x^{t+1}, y^{t+1}\right)}{D_o^{t+1}\left(x^{t+1}, y^{t+1}\right)} \frac{D_o^t\left(x^t, y^t\right)}{D_o^t\left(x^t, y^t\right)} \frac{D_o^t\left(x^{t+1}, y^{t+1}\right)}{D_o^t\left(x^{t+1}, y^{t+1}\right)}\right)^{\frac{1}{2}}$ = Scale Efficiency Change (9)

The increase in efficiency according to the value of the Malmquist index is of greater than one value. Meanwhile, the decrease in the value of efficiency is if it is less than 1. Likewise with technical efficiency and efficiency change. If the TECHch value is> 1, it means that there is an increase in technology in the production process, or technical components are the main reason for increasing efficiency (TFP). Meanwhile, if EFFch> 1, it means that the process of managing input into output is efficient (frontier). With this formula, it is expected that the productivity of cooperatives in 23 districts/cities in Aceh province can be measured non-parametric.

Variable Input and Output

In this study, the input variables used were the cooperative's own capital, external capital, labor and the number of cooperative members, while the output variables were the total turnover and SHU of the cooperative show on Table 1.

RESULT AND DISCUSSION

Descriptive of input and output variables

This study calculates the level of efficiency and productivity of existing cooperatives in 23 districts / cities plus existing cooperatives at the provincial level in Aceh. Data sourced from the office of the Ministry of Cooperatives and Small and Medium Enterprises of the Republic of Indonesia and the Office of Cooperatives and Small and Medium Enterprises of Aceh. The variables used are the variables of own capital, outside capital and number of members as input variables, while the input variables are turnover and SHU of the cooperative from 2014 to 2016,

Table 2 shows that the highest SHU output value was obtained by cooperatives in Aceh Tengah district of IDR78.9 billion, and the lowest was cooperatives in Aceh Jaya district of IDR77.5 million. Meanwhile, the highest output value of cooperative turnover of IDR.448.5 billion is in Aceh Selatan district, and the lowest is in Aceh Jaya district, valued at IDR600 million.

The highest value of capital input itself was obtained by the city of Banda Aceh amounting to IDR387.5 billion and the lowest was Simeulue district of IDR1,075 billion. Furthermore, the lowest value of external capital input was in Simeulue district with a value of IDR1,395 billion and the highest was Central Aceh district with a value of IDR345.4 billion. The highest number of cooperative

Tabel 1. Input and Output of Variable

Variable	Definition	Input/Ouput
Capital owned	The amount of capital owned by the cooperative which comes from internal cooperatives in the form of principal savings, mandatory savings, reserves and grants in each district/city	Input
Outside capital	The amount of capital that comes from outside the cooperative in the form of loans from members, other cooperatives, banks, financial institutions, issuance of bonds/other securities	Input
Labor	The number of workers absorbed in the cooperative sector	Input
Member	Owners and users of cooperative services and are recorded in the book of cooperative members	Input
Turnover	Cooperative sales volume/income for one financial year	Output
SHU	The difference between the income and costs of the cooperative in a period of one year	Ouput

Tabel 2. Variable Descriptive Statistics

	Output		Input			
	SHU (IDR)	Turnover (IDR)	Capital owned (IDR)	Outside capital (IDR)	Member (People)	Labor (People)
Mean	5.561.515.000	37.248.218.000	27.248.572.000	32.335.994.000	20.283	281
Std Deviasi	13.057.730	67.899.775.000	53.643.218.000	52.386.318.000	14.787	282
Minimum	77.570.000	600.000.000	1.075.890.000	1.395.474.000	1.510	40
Maximum	78.901.267.000	448.534.729.000	387.557.150.000	345.486.050.000	57.361	1.264

Source: own calculation based on cooperatives annual report

members is in North Aceh district, namely 57,361 members and the lowest is a cooperative located at the provincial level with 1,510 members. In terms of manpower, the largest number of workers is Aceh Utara district with 1,264 people, and Singkil district is a district with a small workforce of 40 people.

Table 2 also shows that the average (mean) of SHU output and turnover is IDR5,561 billion andIDR 37,248 billion. Meanwhile, the average input variable for capital is IDR27.248 billion, external capital isIDR 32.335 billion, the number of cooperative members is 20,283 people and a workforce of 281 people.

Efficiency Levels of Cooperatives in Aceh

Based on the results of data processing (see Table 3), it shows that cooperatives in Aceh are not efficient, this is indicated by the overall average value of below one, namely 0.711. However, there are several cooperatives in Aceh that obtained a consistent index score of 1,000 or 100% during the study period including Langsa City, Aceh Jaya, South Aceh, Central Aceh, Singkil, Sabang, Subulussalam and Province. In other words, for the 2014 to 2016 period of cooperatives, only seven districts / cities and provincial level cooperatives had an index value of 1,000 or 100% (efficient).

From Table 3 it is also illustrated that Bireuen district is the district with the lowest efficiency value with an index value of 0.109 or 10.9%, followed by Aceh Barat (13.7%), Aceh Utara (28.4%), Nagan Raya (29, 5%), East Aceh (37.2%), Aceh Tamiang (48.4%), Lhoksemawe City (49.2%), and Pidie Jaya (49.6%). In addition, the test results also show the level of efficiency of each district / city that has a moderate index value, including Southeast Aceh (52.7%), Gayo Lues (62.9%), Aceh Besar (60.6%) and Bener Meriah. (77.4%). Furthermore, three districts / cities that have index values that are close to efficient are Banda Aceh (96.9%), Pidie (94.8%) and Aceh Barat Daya (94.3%).

The test results also showed that there were several districts / cities that obtained unstable index values, such as Pidie district and Aceh Barat Daya district in the 2014 and 2015 periods that had an index value of 1,000 or 100%, but in 2016 the two districts had index values at below 100%. Likewise, Bener Meriah district in 2014 and 2016 obtained an index value of 100% but in 2015 it had an index value below 100%. (looks on tabel 3)

Productivity of Cooperatives in Aceh

The results of research on cooperative productivity in each district / city, from 2014 to 2016, are described through the change in the value of the Total Productivity Index change (TFPch) and its two sub-components, namely technical change (technical change / TECHch) and efficiency change (efficiency change). EFFch). If the value of the TFP-Malmquist Index and the two components above is worth less than one, it implies a decrease in the productivity of the cooperative. However, if the value is greater than one, then this indicates an increase in the productivity of the cooperative, of course in the relevant aspects. And if the value is equal to one, then there is no change in efficiency in the TFPch calculation.

Tabel 3. Efficiency Levels of Cooperatives in Aceh

No	Kab/kota	2014	2015	2016	Rata-rata
1.	Banda Aceh	1.000	0.922	0.985	0.969
2.	Aceh Besar	1.000	0.577	0.240	0.606
3.	Pidie	1.000	1.000	0.843	0.948
4.	Pidie Jaya	0.387	0.259	0.841	0.496
5.	Aceh Utara	0.324	0.216	0.312	0.284
6.	Lhoksemawe	0.331	0.364	0.781	0.492
7.	Bireuen	0.195	0.089	0.043	0.109
8.	Aceh Timur	0.366	0.516	0.233	0.372
9.	Langsa	1.000	1.000	1.000	1.000
10.	Aceh Tamiang	0.121	0.330	1.000	0.484
11.	Aceh Barat	0.098	0.108	0.206	0.137
12.	Simeulue	1.000	1.000	1.000	1.000
13.	Nagan Raya	0.202	0.252	0.431	0.295
14.	Aceh Jaya	1.000	1.000	1.000	1.000
15.	Aceh Selatan	1.000	1.000	1.000	1.000
16.	Aceh Barat Daya	1.000	1.000	0.828	0.943
17.	Aceh Singkil	1.000	1.000	1.000	1.000
18.	Aceh Tengah	1.000	1.000	1.000	1.000
19.	Aceh Tenggara	0.561	0.615	0.404	0.527
20.	Gayo Lues	0.301	0.586	1.000	0.629
21.	Sabang	1.000	1.000	1.000	1.000
22.	Bener Meriah	1.000	0.322	1.000	0.774
23.	Subulussalam	1.000	1.000	1.000	1.000
24.	Propinsi	1.000	1.000	1.000	1.000
	Mean	**0.704**	**0.673**	**0.756**	**0.711**

Source: own calculation based on cooperatives annual report

From the results of Table 4 there are 14 districts / cities and one provincial level cooperative that has an index value above one or that has a positive index value, namely Pidie, Pidie Jaya, North Aceh, Lhoksemawe City, East Aceh, Langsa City, Tamiang, West Aceh, Nagan Raya, Aceh Jaya, Aceh Selatan, Singkil, Gayo Lues, Sabang and the Province. The rest get the index value below one. The lowest or negative malmquist index value was in Aceh Besar district, namely - 49.4%, while the highest was in Lhoksemawe City with a positive index value of 47.8%.

During the period 2014 to 2016, there were several districts / cities that experienced productivity

levels that never even obtained an index value above one, namely Banda Aceh, Aceh Besar, Bireuen, Southeast Aceh and Subulussalam. This is because in the four districts / cities many cooperatives are inactive (Cooperatives and UKM Office, 2016). As a whole, cooperatives in Aceh are already productive. This can be proven by the tfpch average index value above one (1,050).

The results of this study are in line with several previous studies including Syamni & Madjid (2016) investigating the efficiency of savings and loan cooperatives in North Aceh. Doumpos and Zopounidis (2012), conducted a performance evaluation of cooperative banks in Europe (Germany, France, Italy, Spain, and Austria). Candemir et al (2011) conducted a study on the efficiency of candlenut agricultural cooperatives in Turkey. Ludena (2010), examined the growth of agricultural productivity in Latin America and the Caribbean. Akinsoyinu (2015) who conducted research on the efficiency of cooperatives in the financial sector of European countries (Germany, Netherlands, Italy, Spain, England, France, Austria, Denmark, Philippines and Portugal), Marwa & Aziakpono (2014) who examined the performance of cooperatives savings and loans in Tanzania. Tesfamariam et al (2013) conducted an efficiency study of savings and loan cooperatives in Ethiopia.

The implication of this research is that stakeholders can take concrete steps to increase the level of efficiency and productivity of cooperatives in Aceh. In particular, policy holders for fostering and empowering cooperatives such as increasing the human resources of cooperatives through cooperative education and training, providing loans with easy schemes, providing a business climate that is conducive to the development of cooperatives as a whole, because cooperatives are the locomotive of the national economy in accordance with the mandate of the law. Basic 1945 article 33. In addition, cooperatives are one of the strategic instruments for community empowerment, especially in rural areas (Syahza, 2010).

Furthermore, the cooperative can carry out several programs that can improve its performance. One way is to collaborate with third parties, including State-Owned Enterprises like BUMN (Badan Usaha mIlik Negara). Because empowerment of Small and Medium Enterprises and cooperatives needs to involve BUMN in partnership programs (Relawan, 2014). Of course, this cooperation is mutually beneficial for both parties.

CONCLUSION

This study measures and analyzes the level of productivity of cooperatives in Aceh, using the non-parametric Data Envelopment Analysis method. The input variables used are own capital, external capital,

Tabel 4. Total Factor Productivity Malmquist Index of Cooperatives in Aceh

No	Kab/Kota	Tfpch	Effch	Techch	Pech	Sech
1.	Banda Aceh	0.829	0.894	0.927	0.993	0.901
2.	Aceh Besar	0.494	0.438	1.126	0.490	0.896
3.	Pidie	1.048	0.860	1.219	0.918	0.937
4.	Pidie Jaya	1.028	1.201	0.856	1.474	0.815
5.	Aceh Utara	1.001	0.887	1.128	0.980	0.904
6.	Lhoksemawe	1.478	1.492	0.990	1.536	0.972
7.	Bireuen	0.686	0.519	1.322	0.471	1.102
8.	Aceh Timur	1.085	0.838	1.295	0.797	1.051
9.	Langsa	1.028	1.188	0.865	1.000	1.188
10.	Aceh Tamiang	2.866	2.956	0.969	2.869	1.030
11.	Aceh Barat	1.381	1.430	0.965	1.447	0.988
12.	Simeulue	0.873	1.000	0.873	1.000	1.000
13.	Nagan Raya	1.332	1.407	0.946	1.460	0.964
14.	Aceh Jaya	1.358	1.617	0.840	1.000	1.617
15.	Aceh Selatan	2.080	1.000	2.080	1.000	1.000
16.	Aceh Barat Daya	0.750	0.707	1.060	0.910	0.777
17.	Aceh Singkil	1.200	0.829	1.448	1.000	0.829
18.	Aceh Tengah	0.658	1.000	0.658	1.000	1.000
19.	Aceh Tenggara	0.952	0.901	1.056	0.849	1.062
20.	Gayo Lues	1.444	1.058	1.365	1.822	0.581
21.	Sabang	1.128	1.018	1.108	1.000	1.018
22.	Bener Meriah	0.877	1.000	0.877	1.000	1.000
23.	Subulussalam	0.612	0.553	1.108	1.000	0.553
24.	Propinsi	1.014	1.000	1.014	1.000	1.000
	Mean	**1.050**	**0.993**	**1.058**	**1.049**	**0.946**

Source: own calculation based on cooperatives annual report

labor and members, while the output variables are turnover and the difference in operating results (SHU). The test results found that cooperatives in Aceh were not fully productive and efficient. Of the 23 districts in Aceh, the efficiency level is only seven districts / cities, while the number of cooperatives that have a productive level is 14 districts / cities. Therefore, policy makers should formulate and implement a number of policies that can increase the productivity level of cooperatives in Aceh. Several policies that can be taken include increasing the human resource capacity of cooperatives through education and training. Furthermore, it provides a conducive business climate for the cooperative movement. lastly provides easy requirements for obtaining financing for productive schemes.

The limitation of this research is that the cooperative data used are all cooperatives in Aceh, regardless of the type of cooperative. Suggestions for further researchers to look at the level of efficiency and productivity of cooperatives in Aceh using more specific types of cooperatives such as savings and loan cooperatives, agriculture, fisheries and so on.

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