



# Evaluating Financial Performance of Public Cooperatives for Women in East Java, Indonesia

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Public cooperatives for women in East Java were first established in 2009 by the Governor, Soekarwo. Since the public cooperatives for women have been operating for more than five years, it is very important to evaluate their performance. This study is intended to investigate the issues of sustainability within the public cooperatives for women in East Java using Data Envelopment Analysis (DEA) and Dynamic Malmquist Productivity Index (MPI) method for the period of 2012–2014. The results revealed that most of the public cooperatives for women in East Java were still not efficient according to the output oriented VRS model. However, based on the MPI results, the cooperatives showed an increase in their productivity from 2012 to 2014 due to the influence of technological advancement rather than a change in efficiency.

**Keywords:** Public Cooperatives for Women, Data Envelopment Analysis (DEA), Difference Dynamic Malmquist Productivity Index (MPI), East Java.

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## 1. INTRODUCTION

The number of Indonesians living with per capita income below the poverty line is decreasing gradually, that is, around 16.58 in 2007 to 11.96 percent in 2012.<sup>1</sup> However, these percentages are quite small compared with the justification of the World Bank data which stated that 15.9 percent of the Indonesian population in 2010 was living with a per capita income below USD 1.9 per day.<sup>2</sup> In addition, 41.7 percent of the population in 2012 was living with a per capita income below USD 3.1 per day.

Jawa Timur, so called as East Java, the province that had highest rate of economic growth compared to the 2012 national average, still faced a paradox in handling its poverty rate. East Java's economic growth in 2012 was 7.27 percent, whereas, the national average was 6.19 percent. However, East Java's poverty rate was 13.4 percent, higher than the national average that 11.96 percent. In addition, the number of poor people in East Java was the the highest in Indonesia, i.e., 5.07 million.

Some studies have been done in analyzing the problem. Some crucial issues in East Java i.e., the tremendous economic growth in East Java did not reflect the welfare equality.<sup>3</sup> Therefore, in order to combat poverty, East Java must promote inclusive growth through establishing equality between rural and urban citizens, as well as among districts. East Java faced a serious issue in poverty due to low level of investment and entrepreneurship.<sup>4</sup> The study identified some possible causes of those problems, such as: low return to economic activity caused by low social

returns and low probabilities, and high cost of finance caused by low domestic saving and poor intermediation.

Since poverty has always prompted government concern, various programs have been introduced to combat poverty. In Indonesia, the most effective tools to cut the vicious circle of poverty is through empowering microcredit programs via microfinance institutions (MFIs).<sup>5–7</sup> The main reason is that MFIs are concentrating on microenterprises (MEs) which are handled by the poor.<sup>8–11</sup> By increasing the income of the poor, MFIs contribute to improve the poor's basic capabilities such as good health, education, social networks and command over economic resources.<sup>12</sup>

In East Java Province, the government has a program in order to reduce poverty through optimizing the role of MFIs so called "public cooperatives for women," i.e., women's cooperatives created by the government. Such cooperatives are famously known as "Koperasi Wanita (Kopwan)" in Indonesia. Women often represent the most disadvantaged category due to their lack of or limited access to assets such as land, literacy, credit or participation in decision-making processes, or so called "feminization of poverty."<sup>13</sup> Therefore, many programs are addressing women as the main actors in reducing poverty.<sup>14–18</sup>

Public cooperatives for women in East Java were first established in 2009 by the Governor, Soekarwo. The government succeeded to create 3,750 public cooperatives for women in 2009 and 4,756 in 2010 with the help of the initial grant of 25 million Rupiah (USD 1,889) per public cooperatives for women. Total amount distributed under this program was 212.65 billion rupiah (USD 16,067.25). Moreover, the government also gave an additional grant of 25 million rupiah to each of the 1,000 women's

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cooperatives in 2013 that had good performance. Since the public cooperatives for women have been operating for five years, it is very important to evaluate their performance.

The existence of the public cooperatives for women is intended to be an effective tool for combating poverty in East Java. This is because they have been concerned particularly about Micro Enterprises (MEs) which are handled by the poor. Increasing the income of the poor contributes towards escalating their basic capabilities such as good health, education, social networks and command over economic resources.

Nevertheless, the public cooperatives for women as microfinance institutions (MFI) may face a tradeoff between its objectives. MFIs have been constrained by dual operational purposes; those are to serve the poor (social commitment) and to reach sustainability (financial performance).<sup>19</sup> In addition, MFIs such as the cooperatives also perform multiple functions that support social and economic sustainability.<sup>20,21</sup> Thus, in order to pursue the success of the public cooperatives for women, those two goals must be reckoned up while evaluating their performance. This is because the ramifications of these two aims are mutually exclusive and causing a mission drift—that is, escalated profit motivation supports in procuring financial sustainability but at the cost of the exclusion of the poor.<sup>22</sup>

Researches on the performance of MFIs already have been prolific. Most of those studies however were concerned on MFIs in general such as common cooperatives or rural banks in such countries as: Bangladesh, Bolivia and Indonesia.<sup>23–29</sup> Investigations regarding women's cooperatives, especially public cooperatives for women in East Java have not been though roughly explored.

This study is intended to investigate the sustainability issue of the public cooperatives for women in East Java. In order to conduct a critical evaluation of sustainability regarding the public cooperatives for women model in terms of financial and economic viability the following objectives have been set:

- (1) to discuss an overview of the public cooperatives for women in East Java;
- (2) to examine the efficiency of the public cooperatives for women in East Java for the period 2012–2014; and
- (3) to find out the limitations, if any, of the public cooperatives for women in East Java in terms of their performance, and to suggest some measures for the problems encountered.

## 2. EXPERIMENTAL DETAILS

The East Java Province has 38 districts/cities. The current research was conducted in 19 districts/cities in East Java using the annual financial report for 2012–2014. In order to measure their financial efficiency, the study chose 82 units of public cooperatives for women that had good performance according to the measurements of the Department of Cooperatives and SMEs in East Java in 2013 and also had a complete series of their annual reports during the mentioned time periods. The distribution of the respondents was as figure out at Table I.

### 2.1. DEA Method

In this study, DEA method is used to assess financial efficiency of public cooperatives for women in East Java, Indonesia. Due to the fact that it is easier to control input rather than output variables in MFIs including the public cooperatives for women, DEA BCC

**Table I. The distribution of the respondents.**

No	Districts/ cities	Number of respondents	No	Districts/ cities	Number of respondents
1	Surabaya City	9	11	Banyuwangi	4
2	Kediri	8	12	Gresik	4
3	Situbondo	6	13	Mojokerto	3
4	Lumajang	6	14	Bangkalan	3
5	Magetan	6	15	Probolinggo	2
6	Madiun	6	16	Bojonegoro	2
7	Lamongan	5	17	Jember	1
8	Sumenep	5	18	Sampang	1
9	Pacitan	5	19	Nganjuk	1
10	Ponorogo	5		Total	82

input oriented model with variable return to scale (VRS) is used to compute financial efficiency in public cooperatives for women in East Java.

A study on piecewise-linear convex hull approach to frontier estimation had been proposed firstly by Farrell in 1957.<sup>30</sup> However, this method had not been receiving wide attention from many authors until the term data envelopment analysis (DEA) using constant return to scale (CRS) was promoted.<sup>31</sup> The next researchers who developed DEA are Banker, Charnes and Cooper in 1994 using variable return to scale (VRS).

The resulting DEA model that exhibits VRS is called BCC-model. The BCC-efficiency scores of DEA are also called “pure technical efficiency scores” since they are obtained from the model that allows VRS and eliminates the “scale part” of the efficiency from the analysis.<sup>32</sup> Generally, the CCR efficiency score for each DMU will not exceed the BCC efficiency score. It is because the BCC model analyzes each DMU “locally” rather than “globally.”

By defining efficiency as the weighted sum of outputs over the weighted sum of inputs, the following equation is developed.

$$h_0(u, v) = \frac{\sum_r u_r y_r}{\sum_j v_j x_{j0}} \quad (1)$$

According to most studies in microfinance institutions, this study adopted the production approach.<sup>33–37</sup> Therefore, there were two output and two input variables chosen. The output vectors selected were Gross Loan Portfolio ( $Y_1$ ) and Number of Active Borrowers ( $Y_2$ ), while Total Assets ( $X_1$ ) and Operating Expenses ( $X_2$ ) were the input vectors. Using the inputs and outputs of this research. The equation can be written as follows:

$$h_0(u, v) = \frac{u_1(Y_{1i}, Y_{2i})}{v_1(X_{1i}, X_{2i})} \quad (2)$$

Where:  $h_0$ : Relative efficiency of the public cooperatives for women,  $Y_{1i}$ : Gross Loan Portfolio,  $Y_{2i}$ : Number of Active Borrowers,  $X_{1i}$ : Total Assets,  $X_{2i}$ : Operating Expenses,  $u_r$ : Weight given to output  $r = 1, 2$ ,  $v_j$ : Weight given to inputs  $j = 1, 2$ .

$$\min \in \theta - \in \left( \sum_{j=1}^4 s_j^- + \sum_{r=1}^3 s_r^+ \right)$$

$$\text{Subject to: } \sum_{j=1}^9 x_{ij} \lambda_j + s_i^- \geq \theta x_{i0} \quad i = 1, 2, 3 \quad (3)$$

$$\sum_{j=1}^9 y_{rj} \lambda_j - s_r^+ \geq \theta y_{r0} \quad i = 1$$

$$\lambda_j \geq 0 \quad \text{and} \quad j = 1, 2, 3, \dots, 9$$

For the BCC model, the following constraint is added:

$$\sum_{j=1}^9 \lambda_j = 1$$

Where:  $\lambda_j$ : is a matrix of intensity factors that defines the hypothetical DMU to which DMU<sub>*j*0</sub> is compared,  $\Theta$ : is a radial input reducing measure of technical efficiency,  $S_i^-$  and  $S_i^+$ : are slack variables used to convert the inequalities to equalities,  $\epsilon > 0$ : An Archimedian element defined to be smaller than say a positive real number.

DEAP was utilized in this study to measure the technical efficiency of the women cooperatives based on BCC input oriented model. It is also used to find the needed improvements of the inefficient women cooperatives in order to make them 100 percent efficient.

### 2.2. Malmquist Productivity Index (MPI)

The MPI is defined using distance functions.<sup>38</sup> The model allows one to analyze a multi-input, multi-output production technology without the need to specify a behavioral objective (i.e., cost minimisation or profit maximisation). The input distances can be seen by looking at a minimal proportional contraction of the input vector, given an output vector. Meanwhile, the output distances deal with a maximal proportional expansion of the output vector, given an input vector.

This paper focused on output distance function. The production technology can be defined by the output set,  $P(x)$ , representing the set of all output vectors,  $y$ , that can be produced by the input vector,  $x$ . Therefore,

$$P(x) = \{y: x \text{ can produce } y\} \quad (4)$$

The output distance function is as follows:

$$d_0(x, y) = \min\{\delta: (y/\delta) \in P(x)\} \quad (5)$$

The value of the distance function,  $d_0(x, y)$ , will be less than or equal to one if the output vector,  $y$ , is an element of the feasible production set  $P(x)$ .

The MPI measures the TFP change between two data sets by calculating the ratio of the distances of each data point relative to a common technology. According to Farrell et al. (1994), the output oriented MPI index between period  $s$  (the base period) and period  $t$  is as follows:

$$m_0(y_s, x_s, y_t, x_t) = \left[ \frac{d_0^s(y_t, x_t)}{d_0^s(y_s, x_s)} \times \frac{d_0^t(y_t, x_t)}{d_0^t(y_s, x_s)} \right]^{1/2} \quad (6)$$

where  $d_0^s(x_t, y_t)$  shows the distance from the period  $t$  observation to the period  $s$  technology. The TFP growth will be positive if,  $m_0 > 1$ , vice versa. If the Eq. (6) is evaluated by period  $s$  technology and the period  $t$  technology, the productivity index will be:

$$m_0(y_s, x_s, y_t, x_t) = \frac{d_0^t(y_t, x_t)}{d_0^s(y_s, x_s)} \left[ \frac{d_0^s(y_t, x_t)}{d_0^s(y_s, x_s)} \times \frac{d_0^t(y_t, x_t)}{d_0^t(y_s, x_s)} \right]^{1/2} \quad (7)$$

The ratio outside the square brackets measures the change in the output-oriented measure of Farrell technical efficiency between periods  $s$  and  $t$ , so called as Efficiency Change (EFFCH). Meanwhile, the ratio inside the brackets measures the Technological

Change (TEHCH), that is the geometric mean of the shift in technology between the two periods, evaluated at  $x_t$  and also at  $x_t$ . Therefore  $m_0(y_s, x_s, y_t, x_t)$  is a Total Factor Productivity Change (TFPCH) between the two periods.

After computing the MPI based on CRS technology, this paper also measured pure technical efficiency change (PECH). The PECH model is as follows:

$$PECH = \frac{d_{0v}^t(y_t, x_t)}{d_{0v}^s(y_s, x_s)} \quad (8)$$

Therefore, the scale efficiency change (SECH) capturing the change in the deviation between VRS and CRS technologies could be measured by disaggregating the EFFCH into a component of PECH calculated relative to the VRS technology. The equation of SECH is as follows:

$$SECH = \left[ \frac{d_{0v}^t(y_t, x_t)/d_{0c}^t(y_t, x_t)}{d_{0v}^s(y_s, x_s)/d_{0c}^s(y_s, x_s)} \times \frac{d_{0c}^s(y_t, x_t)/d_{0c}^s(y_t, x_t)}{d_{0c}^s(y_s, x_s)/d_{0c}^s(y_s, x_s)} \right]^{1/2} \quad (9)$$

where the subscripts ‘*v*’ and ‘*c*’ denote VRS and CRS technologies, respectively.

## 3. RESULTS AND DISCUSSION

### 3.1. Profile of Public Cooperatives for Womens in East Java

There are two kinds of women’s cooperatives in East Java, i.e., women’s cooperatives created by the community (private women’s cooperatives) and women’s cooperatives created by the provincial government (public cooperatives for womens). In this study, we focus on the second type, i.e., public cooperatives for women.

In the administrative data of the Department of Cooperatives and SMEs in East Java province, there were 8,506 public cooperatives for women spread over 38 districts/cities in 2010. The distribution of public cooperatives for women among districts/cities depended on the number of villages because the government gave one women cooperative in one village as Table II.<sup>39</sup> Department of Cooperatives and SMEs in East Java province has been monitoring the existing public cooperatives for women. Of these there were 2,990 public cooperatives for women or only 38.25 percent from the total that performs well under the performance assessment conducted by the Department in 2013. Those cooperatives, therefore, got additional grants from the government i.e., 25 million Rupiah. There were four cities where 50 percent more of their public cooperatives for women obtained the grant: Madiun City, Mojokerto City, Probolinggo City, and Kediri City. Meanwhile, there were 8 areas where less than 30 percent of their public cooperatives for women obtained the grant: Probolinggo District, Pasuruan City, Malang District, Bondowoso District, Pamekasan District, Pasuruan District, Tuban District, and Bangkalan District. The performance of those good public cooperatives for women are as Table III.

### 3.2. Human Resources

The organizational structure of public cooperatives for women is similar with cooperatives in Indonesia in general. The highest power in an organization is held by the members associated in the General Assembly. In order to operate the organization, the cooperatives have a Board of Directors and an Audit Committee.

**Table II. The number of public cooperatives for womens in East Java established in 2009–2010.**

No	Districts/ cities	Number of cooperatives	No	Districts/ cities	Number of cooperatives
1	Lamongan	474	20	Bondowoso	219
2	Bojonegoro	430	21	Ngawi	217
3	Malang	390	22	Banyuwangi	217
4	Pasuruan	365	23	Madiun	206
5	Gresik	356	24	Lumajang	205
6	Sidoarjo	353	25	Pamekasan	189
7	Kediri	344	26	Sampang	186
8	Sumenep	332	27	Pacitan	171
9	Probolinggo	330	28	Surabaya city	163
10	Tuban	328	29	Trenggalek	157
11	Jombang	306	30	Situbondo	136
12	Ponorogo	305	31	Malang city	57
13	Mojokerto	304	32	Kediri city	46
14	Nganjuk	284	33	Pasuruan city	34
15	Bangkalan	281	34	Probolinggo city	29
16	Tulungagung	271	35	Madiun city	27
17	Blitar	248	36	Batu city	24
18	Jember	248	37	Blitar city	21
19	Magetan	235	38	Mojokerto city	18
				Total	8,506

Almost all of the public cooperatives for women have three members on the Board of Directors consisting of a leader, secretary and treasurer. Meanwhile, according to the Law No. 25 of 1992, it is not a must for cooperatives to have Audit Committee since all members are actually auditors for the cooperatives. However, in the case of public cooperatives for women in East Java, there are 92 percent of the cooperatives that have at least one member in the Audit Committee. The district with public cooperatives for women that have no Audit Committee is Tuban district.

The level of education among women's cooperative members is still low. Most of the members have graduated from senior high school (31.15 percent). There are only a few members who have

**Table III. The public cooperatives for womens in East Java performing well under assessment conducted by the department of cooperatives and SMEs in East Java in 2013.**

No	Districts/cities	Number of cooperatives		No	Districts/cities	Number of cooperatives	
		Unit	Percent			Unit	Percent
1	Mojokerto city	10	55.56	20	Pacitan	65	38.01
2	Madiun city	15	55.55	21	Nganjuk	107	37.68
3	Probolinggo city	16	55.17	22	Batu city	9	37.50
4	Kediri city	25	54.35	23	Sidoarjo	119	33.71
5	Blitar city	10	47.62	24	Lamongan	157	33.12
6	Lumajang	97	47.32	25	Ponorogo	100	32.79
7	Situbondo	64	47.06	26	Jember	78	31.45
8	Surabaya city	76	46.63	27	Sumenep	102	30.72
9	Malang city	25	43.86	28	Bojonegoro	131	30.47
10	Tulungagung	118	43.54	29	Banyuwangi	66	30.47
11	Trenggalek	68	43.31	30	Gresik	107	30.41
12	Ngawi	92	42.40	31	Probolinggo	98	30.06
13	Kediri	145	42.15	32	Pasuruan city	10	29.70
14	Mojokerto	124	40.79	33	Malang	114	29.41
15	Blitar	101	40.73	34	Bondowoso	62	29.23
16	Madiun	82	39.81	35	Pamekasan	53	28.04
17	Magetan	93	39.57	36	Pasuruan	101	27.67
18	Sampang	73	39.25	37	Tuban	87	26.52
19	Jombang	119	38.89	38	Bangkalan	71	25.27
					Total	2,980	

graduated from higher institutions of education (9.83 percent). Moreover, there are still many members that did not graduate from elementary school (13.44 percent), and those who could only finish until elementary school (21.64 percent) and junior high school (23.93 percent). However, most members are within productive ages, i.e., 41 to 50 years old. There are only 12.97 percent who are in retirement age.

### 3.3. Financial Component

Sources of capital at public cooperatives for women in East Java consist of internal and external equities. The internal equities include initial deposit members (principal and mandatory), grants from the provincial government, reserves, and undistributed profits. Whereas, external equities consist of additional member deposits and capital from third parties. As public cooperatives, the primary capital of public women's cooperatives comes from the grants. The number of initial deposit members as well as reserves and undistributed profits were quite small, i.e., around one to ten million Rupiah (equal with USD 75.56 to USD 755.57<sup>a</sup>).

The public cooperatives for women made a good achievement in terms of their assets and profits. The grants that had been distributed by the government in 2013 were Rp.51,586,350,000.00 and this number helped the cooperatives to grow their total assets to Rp.86,380,669,000.00. The top five public cooperatives for women that had the highest amount of assets were Kopwan Sri Rejeki in Mojokerto District (350.3 million Rupiah), Kopwan Aster in Malang City (348.6 million Rupiah), Kopwan Lestari in Madiun City (318.3 million Rupiah), Kopwan Sumber Rejeki in Mojokerto District (317.3 million Rupiah), and Kopwan Anugerah in Madiun District (285.7 million Rupiah).

The average return on assets (ROA) of public cooperatives for women in East Java also was good, i.e., 8.88 percent per annum and there were also some cooperatives that had double digits of ROA. This percentage was higher than the standard of the Indonesian Central Bank, i.e., 1.2 to 5 percent a year. The top five public cooperatives for women that had the highest ROA were Kopwan Karang Bunga in Sumenep District (90.3 percent), Kopwan Bina Mandiri in Lamongan District (57.0 percent), Kopwan Sejahtera in Lamongan District (40.2 percent), Kopwan Maju Kencana in Lamongan District (34.9 percent), and Kopwan Gema Mulya in Jember District (32.6 percent).

The achievement of public cooperatives for women in East Java also can be seen from their return on equity (ROE) especially the equity from the grants. The average of ROE was 14.86 percent per year which was higher than the best rate of ROE according to the Indonesian Central Bank i.e., 12 percent a year. Moreover, there were also many Kopwans in 18 districts that had ROE more than 20 percent, i.e., Malang City (33.90 percent), Pasuruan City (26.85 percent), Bangkalan District (25.19 percent), Sidoarjo District (24.91 percent), Kediri City (22.95 percent), Madiun District (22.22 percent), Gresik District (21.83 percent), Malang City (21.82 percent), Surabaya City (21.12 percent), Malang District (20.80 percent), and Sumenep District (20.11 percent).

<sup>a</sup>USD 1 = 13,235 Rupiah per April 10, 2016.

### 3.4. The Number of Members

The cooperative can mobilize its members, organize involvement, and sometimes count on the voluntary capacity of its members.<sup>40</sup> During the three years since their establishment, public cooperatives for women in East Java have succeeded to multiply their membership more than three times. From 997 public cooperatives for women that had good performance in 2013, there were 67,539 women joining the cooperatives. Roughly, each public cooperatives for women had 68 members in 2013. The top five public cooperatives for women that had the largest number of members were Kopwan Dana Mulia in Nganjuk District (271 members), Kopwan Syariah Bina Sejahtera in Malang District (211 members), Kopwan Maju Kencana in Lamongan District (210 members), Kopwan Bangau in Madiun City (208 members), and Kopwan Sumber Rejeki in Mojokerto District (184 members).

### 3.5. Results

All inputs and outputs of the respondents tended to increase from 2012 to 2014. Since the outputs, i.e., Gross Loan Portfolio ( $Y_1$ ) and Number of Active Borrowers ( $Y_2$ ) increased, the inputs i.e., Total Assets ( $X_1$ ) and Operating Expenses ( $X_2$ ) also increased. Table IV presents the descriptive statistics of outputs and inputs employed in this study.

DEA model were solved by using DEA-Program (DEAP) software. The public cooperatives for womens in Table IV are ranked based on their average Technical Efficiency (TE). According to the results, the number of public cooperatives for women that were efficient in 2012 to 2014 (scale efficient = 1) based on output-oriented variable return to scale (VRS) model were declining. In addition, most of public cooperatives for women in East Java were not efficient in the period from 2012 to 2014. There were only 10 cooperatives (12.2%) that were efficient in 2012, 7 cooperatives (8.5%) in 2013, and 6 cooperatives (7.3%) in 2014.

The average of overall technical efficiency from 2012 to 2014 has a U-shape trend when the lowest scale was in 2013, i.e., 67%. The decline of efficiency score in 2013 was occurred because of the rising of total assets and operating expenses, which was higher than the marginal gross loan portfolio and number of active borrowers. However, the Provincial Government of East Java seemed to be successful in improving the performance of

the women's cooperatives in 2014 since the efficiency score was rising as well. This was because the government conducted more training programmes to increase the managerial skills of woman cooperative boards in 2014 through education in areas such as financial planning, human resource management, risk management, and promotion strategy.

In 2012, there were 20 cooperatives (24.39%) that had an efficiency score below average. The highest efficiency score (100%) was reached by 10 cooperatives i.e., Kopwan Baratajaya in Surabaya, Kopwan Annisa Mandiri in Surabaya, Kopwan Sakinah in Lumajang, Kopwan Bunga Mawar in Lumajang, Kopwan Barokah Sejahtera in Magetan, Kopwan Anugerah in Sumenep, Kopwan Arta Makmur in Pacitan, Kopwan Karya Lestari in Pacitan, Kopwan Seruni in Sampang, and Kopwan Wijaya Kusuma in Madiun. Meanwhile, Kopwan Melati in Bangkalan was the most unefficient cooperative in 2012, it only had 58.2% efficiency score.

The number of public cooperatives for womens that had an efficiency score below average was increasing in 2013 compared to 2012, i.e., 45 cooperatives (54.87%). There were only 7 cooperatives that got 100% efficiency scale: Kopwan Sakinah in Lumajang, Kopwan Ceria in Surabaya, Kopwan Sukun in Bangkalan, Kopwan Jambu Manis in Sumenep, Kopwan Al Khatijah in Sumenep, Kopwan Sri Gading in Surabaya, and Kopwan Sahabat Kita in Mojokerto. Moreover, the lowest efficiency score had also relatively declined, i.e., 22.9% which was attained by Kopwan Abadi in Lamongan.

Overall, the performance of public cooperatives for womens in East Java was better in 2014 since the standard deviancy score declined, the skewness showed the positively skewed, and the median was increasing. However, the number of cooperatives that were 100% efficient was decreasing, i.e., 6 cooperatives. Those were Kopwan Sakinah in Lumajang, Kopwan Muslimah in Lumajang, Kopwan Seruni in Sampang, Kopwan Airlangga in Surabaya, Kopwan Bina Mandiri in Lamongan, and Kopwan Karya Lestari in Pacitan. In this period, Kopwan Melati in Bangkalan became the most unefficient cooperative again like in 2012 which only had 57.1% efficiency score.

The productivity change of public cooperatives for women in East Java were measured by Malmquist Productivity Index (MPI) and decomposed the changes in the Total Factor Productivity

Table IV. Descriptive statistics for outputs and inputs used, 2012–2014.

Outputs (Y) and inputs (X)	Average	Std dev	Min	Max
2012				
Gross loan portfolio ( $Y_1$ )	51,925,596.89	37,097,049.52	10,650,000.00	243,265,700.00
Number of active borrowed ( $Y_2$ )	67.85	28.09	24.00	208.00
Total assets ( $X_1$ )	61,609,690.75	39,353,462.69	27,277,775.00	249,714,975.00
Operating expenses ( $X_2$ )	5,526,319.38	7,821,130.02	405,000.00	63,884,240.00
2013				
Gross loan portfolio ( $Y_1$ )	77,356,540.85	49,936,655.77	8,500,000.00	272,366,600.00
Number of active borrowed ( $Y_2$ )	75.32	30.82	20.00	205.00
Total assets ( $X_1$ )	92,815,784.18	55,523,060.27	20,688,700.00	273,953,525.00
Operating expenses ( $X_2$ )	7,231,323.85	5,821,241.84	300,000.00	33,137,100.00
2014				
Gross loan portfolio ( $Y_1$ )	97,866,668.66	62,193,949.47	19,350,000.00	323,046,000.00
Number of active borrowed ( $Y_2$ )	80.15	34.61	24.00	206.00
Total assets ( $X_1$ )	115,787,772.58	66,513,883.38	34,726,000.00	383,768,250.00
Operating expenses ( $X_2$ )	8,848,480.33	9,305,132.50	315,000.00	57,634,850.00

Note: All vectors were in Rupiah except Number of Active Borrowed were in persons.

(TFPCH) Change to Efficiency Change (EFFCH) and Technological Change (TECHC). In addition, the changes in efficiency into Pure Efficiency (PECH) and Scale Efficiency Change (SECH) were also decomposed. Dynamic MPI was also employed to take into account changes of productivity for every two subsequent years. All indices were relative to the previous year and therefore the outputs began with the year 2013. The MPI and its components between 2012 and 2013, therefore, took the initial score of 1,000 in 2012. Hence, any score greater than 1,000 indicated an improvement (progress) and lower than 1,000 indicated wosening (regression). A similar process was utilized for 2012–2013 and 2013–2014 productivity change analysis.

The TECHC analysis showed the technology change of public cooperatives for women in East Java according to the comparison between inputs and outputs from the year of 2012 to 2014. For three years there were 34 cooperatives (41.46%) reaching technological progress condition since their TECHC scores were more than 1,000. Meanwhile, the rest (58.54%) still were in technological regression. Most public cooperatives for women that had technological progress were located in Surabaya city (15%) and Ponorogo District (12%). Whereas the others were in Situbondo District (9%), Lumajang District (9%), Kediri District (9%), Pacitan District (9%), Bangkalan District (9%), Lamongan District (6%), Banyuwangi District (3%), Magetan District (3%), Probolinggo District (3%) and Bojonegoro District (3%) respectively.

Table IV shows the MPI results for the public cooperatives for women in East Java for the period 2012–2013 and 2013–2014. The MPI results during 2012–2013 indicated that the public cooperatives for women in East Java increased progress in productivity by 18.6% in 2013. The advancement in the productivity of the public cooperatives for women in East Java in 2013 was mainly attributed by the increase in technological change of 32.4% despite the decrease of efficiency change of 10.3%. Further decomposition of productivity revealed that the increase of the scale of efficiency had been caused by technological change. In 2014 the productivity of the public cooperatives for women in East Java also increased although only 17.0%. While the technological change and pure efficiency improved in 2014, the efficiency change reduced by 1.1% and there was a regression of scale efficiency by 6.7%.

#### 4. CONCLUSIONS

This study investigated the efficiency and productivity change of public cooperatives for women in East Java, Indonesia for the period of 2012 to 2014. The technical, pure technical and scale efficiencies were analyzed by the Data Envelopment Analysis (DEA) method. Meanwhile, this study also utilized Malmquist Productivity Index in order to find the total factor productivity change and the sources of change.

The findings showed that there were around 90% of public cooperatives for women in East Java that were not efficient for period of 2012 to 2014 according to the output oriented VRS model. The overall technical efficiency also had a U-shape trend when the lowest scale was in 2013, i.e., 67%. In addition, the public cooperatives for women public cooperatives for women which were efficient in each year were not consistent. For example, Kopwan Baratajaya in Surabaya was efficient in 2012 but it was not efficient in following periods. Only Kopwan Sakinah in Lumajang was efficient consistently during the periods examined.

According to the MPI results, it can be asserted that technological advancement had the biggest influence on the productivity changes during the study period compared to efficiency change. Further decomposition of productivity sources suggested that the decreasing of pure technical efficiency and scale efficiency reduced the effect of scale advancements in 2013. In addition, the declining of the efficiency change and the scale efficiency also reduced the effect of scale advancement in 2014.

In order to increase the efficiency scale, the public cooperatives for women public cooperatives for women in East Java must improve their gross loan portfolio and the number of active borrowers through raising capital outside of grants. This can be achieved by increasing the initial deposit from members, therefore, the cooperative boards must be more active in order to reach higher numbers of active members. The cooperatives can make a manuver in differentiating the kinds of funding products such as Idul Fitri, Idul Adha, education and traveling savings. The cooperatives also can do cooperation with the village chiefs or the neighborhood leaders to save their funds with the cooperatives. Since the educational background of the cooperative boards is still low, the government of East Java Province must accompany the cooperatives through any training programmes to build a new funding product and learn about the strategy to get new members.

There are some limitations on this study that must be highlighted. First, the study only analyzed the efficiency of the public cooperatives for women public cooperatives for women as a product of the government initiative and did not compare with the private women's cooperatives. It will be more interesting if both types of cooperatives are compared since the results indicate that most of the public cooperatives for women public cooperatives for women in East Java were not efficient. Second, after investigating productivity, it will be more comprehensive if future researchers also analyze factors influencing the productivity of the cooperatives. Third, knowing the impact of the cooperatives to improve the welfare of its members in specific and the rural society in general is important in order to show the outreach of the cooperatives. Therefore, if the public cooperatives for women public cooperatives for women in East Java are effective in increasing the quality of life of their members, the program will be a benchmark for other provinces as a good strategy to alleviate poverty in their area.

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