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Different Tests for the Existence of Agricultural Cooperatives in Indonesia: Before and After COVID-19

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Abstract— The COVID-19 pandemic has damaged the Indonesian economic system from various sectors. The sustainability of economic sectors, such as agriculture, becomes risky if not handled seriously by the Government. Cooperatives in Indonesia have become the heart of their members (especially farmers) who are highly dependent on agricultural productivity activities (production, distribution, marketing, and capital or equipment assistance). With these considerations, the purpose of this study is to discuss the extent to which the existence of Agricultural Cooperatives based on 4 variables (Number of Cooperatives, Members, Assets, and Business Volume) before and after COVID-19 takes place. Our study object focuses on 34 provinces in Indonesia during the 2019-2020 period. With this panel data, the study used a Difference Test analysis model through 2 presentations (Levene's Test for Equality of Variances and T-test for Equality of Means). From this study, it can be concluded that Assets and Business Volume are simultaneously significantly affected by COVID-19. As additional information, the results also explain that assets are an important component for the existence of agricultural cooperatives because partially they have a systematic impact compared to other variables. The value of the originality of this study has been proven in the novelty of objects, analysis models, data, and test results that have never been done by other researchers, so it is very interesting to be a reference in the future.

Keywords—Cooperative, Farmer, Assets, Business Volume, COVID-19, Agricultural Sector.

1. Introduction

Cooperatives play a role in boosting the welfare of members and society. In achieving this goal, the cooperative tries to carry out activities according to the type of cooperative, such as in the fields of crafts, agriculture, and shopping. The opening of cooperative business fields means providing opportunities for workers. The objectives of development through agricultural co-operatives explained the organizational logic of family farming and economic viability. In general, small farmers face systematic disadvantages in developing countries, from the adoption of agricultural technology, the efficiency and effectiveness of input use, modern-based supply chain access, and several other uncertainties. These barriers make it difficult for smallholders to benefit from agricultural production and marketing and tend to widen the income gap between rural and urban residents [67], [40]. Agricultural cooperatives are categorized as appropriate institutions and allow farmers to participate in competitive market inputs and outputs, so as to increase quality, food security, adopt technological advances, improve agricultural economic performance, and the welfare of rural households [1], [37], [38], [44], [39], [41], [70]. Corona Virus Disease (COVID-19) has had economic, social, educational, and political impacts globally. So far, not a single country has not been

affected by the pandemic. Indonesia is a country that is particularly affected on the economic side because it is dominated by cooperatives that need special attention to this sector. The contribution of cooperatives to the national economy is quite large. The government has made various efforts to save cooperatives (especially those engaged in the agricultural sector) by determining the short term, for example from the aspect of empowering cooperative members, loan assistance, and strategic steps to shorten the supply chain. For this reason, a survival strategy is needed for agricultural cooperatives, so that business existence can run during COVID-19 [27], [16], [63], [53].

Table 1. Development of agricultural cooperatives in Indonesia, 2019-2020

	2019*	2020**	Difference	%
Cooperative (Unit)	45,489	35,761	-9,728	-21.39
Member (Person)	22,463,738	17,525,886	-4,937,852	-21.98
Asset (IDR Million)	152,113,137.04	70,923,072.69	-81,190,064.35	-53.37
Business Volume (IDR Million)	154,718,530.14	81,190,046.35	-73,528,483.79	-47.52

Source: Ministry of Cooperatives and SMEs of the Republic of Indonesia (2020)

Note: *) as of July 31, 2019 **) as of July 31, 2020

The impact of COVID-19 has had a devastating effect on the existence of agricultural cooperatives in Indonesia. Table 1 explains that there is a significant change in the number of cooperative factors, members, assets, and business volume of agricultural cooperatives. The biggest change was from assets, in 2019 (before COVID-19), the value reached IDR 152,113,137.04 million and decreased to IDR 70,923,072.69 million in 2020 or decreased to IDR -73,528,483.79 million (-53.37%). Meanwhile, a shift was also experienced in the number of cooperatives up to -21.39%. This clearly affects the sustainability of agricultural cooperatives in Indonesia, because agriculture is the sector that provides the second-largest contribution to Gross Domestic Product (GDP) second (after the services sector). The decline in agricultural commodities will certainly have a negative impact on the welfare of farmers. When agricultural production continues and demand in the market falls, there will be an oversupply, so that commodity prices will drop. The drop in prices has made farmers (such as those who are members of cooperatives) reduce their production due to losses. If this is not resolved immediately, then in the future when the pandemic reaches an end and food shortages occur (because farmers continue to reduce their production). By looking at the phenomena that have been described around the existence of agricultural cooperatives in Indonesia, we are interested in discussing the extent of differences in terms of the number of cooperatives, members, assets, and business volume before and after COVID-19. From the purpose of this study, it can produce real contributions and comparisons to various parties. The value of originality of the study is highly respected because there has never been any other study that has analyzed the same so that the novelty is likely to be of interest to be analyzed more deeply.

2. Theoretical framework

Generally, agricultural cooperatives can be classified into sections based on their main activities, namely marketing cooperatives, agricultural supply cooperatives, and service cooperatives. Marketing cooperatives are aimed at the process of bargaining for better prices, handling, processing, producing, and selling agricultural products. Agricultural supply cooperatives act as volume buyers, producing, processing, formulating, and distributing agricultural supplies and inputs (eg seeds, fertilizers, agricultural equipment, and other support). Meanwhile, service cooperatives can provide services such as warehouse storage, milling, drying, artificial insemination, irrigation, credit, and insurance (Cropp & Ingalsbe, 1989; Royer, 1995; Ortmann & King, 2007). Cooperatives from an economic point of view, obviously depend very much

on success in running the organization. Not only in terms of finance and human resources in it but social relations for the process of diffusion and mutualism as the main conditions for considering how the sustainability of agricultural cooperatives through cooperative movements and impact on the food system. This diffusion refers to the spread of practices within the social system (including behavior, strategy, technology, organizational processes, values, and structures) that are applied. Various previous studies, illustrate the history of the factors that shape the introduction and adoption of innovation in agricultural cooperatives (Birchall & Simmons, 2004; Gray, 2014; Roy et al., 2019; Schneiberg, 2013; Strang & Soule, 1998; Ajates, 2020; Jermier & Forbes, 2016). Agricultural cooperatives are a type of business that is democratically owned and controlled by its members who utilize services with the aim of taking advantage of the profits in the agricultural sector. Broadly speaking, all types of businesses can be organized as cooperatives. Cooperatives in various countries have operated in almost every sector of the economy (including finance, housing, retail, services, forestry, fisheries, and agriculture, all of which can be controlled by people who take advantage of special services provided by the cooperative (Harris et al., 1996; Cook, 1994). The capital that is large enough to support commercial farmers (in this case including subsidies, additional prices, tax breaks, and mismanagement of cooperative resources) is more due to distorted prices. With the onset of political dynamics, a series of reforms initiated in the 1980s, eliminating tax concessions, removing subsidies, marketing, and deregulating agricultural finance, reduced the role of agricultural cooperatives and the dependence on government support. At that time, the dominant agricultural cooperatives experienced instability in the global economy, so their sustainability should be a major concern (Richards et al., 1993; Ortmann & King, 2006; Darma et al., 2020). Several empirical studies explain that agricultural cooperatives can provide credit services to members who experience production constraints. Increasing agricultural productivity deserves to be evaluated, in order to increase the welfare of farmers, reduce poverty in rural areas, and increase food security. Cooperative membership in the agricultural sector can add value to the commercialization behavior of small farmers. Commercialization is needed to break agricultural productivity, farm income, and the existence of micro and macro food security. In addition, cooperatives can also reduce transaction costs and information asymmetry by strengthening farmers' negotiating abilities. In turn, members of agricultural cooperatives get added value through their bargaining power, so that the price of agricultural products is high and they are able to produce and reach production costs (Ahmed & Mesfin, 2017; Shiferaw et al., 2014; Zeng et al., 2015; Asfaw et al., 2015; Asfaw et al. al., 2012; Kassie et al., 2011; Becerril & Abdulai, 2010; Alene & Hassan, 2006; Minten & Barrett, 2008; Evenson & Gollin, 2003; Tefera et al., 2016; Bernard & Spielman 2009; Markelova & Mwangi 2010; Hellin et al., 2009; Trebbin 2014; Timmer, 1997). In this study, the concept is applied to analyze how the existence of agricultural cooperatives (both before and after COVID-19). The sustainability of agricultural cooperatives in Indonesia is focused on the number of agricultural cooperatives, cooperative members, assets, and business volume development.

3. Methods

To answer the objectives of the study, we used panel data and processed it with the Difference Test analysis tool. Panel data is focused on the object of study, which is based on 34 provinces in Indonesia. Meanwhile, the Difference Test refers to a comparison of 2 different times during 1 year, to be precise before COVID-19 (as of 31 July 2019) and after the presence of COVID-19 (as of 31 July 2020). The study data is based on secondary data and collected through Indonesian Government Agencies. The estimation technique using panel data will result in explicit diversity in calculations by involving specific individual variables, providing more information, better variability, reducing the relationship between independent variables, providing more degrees of freedom, and being more efficient. Panel data is more suitable if you are going to study dynamic change. Panel data can detect and measure effects that time- series and cross-section data

cannot, thus enabling researchers to study more complex behavioral models and minimize bias (Gujarati, 2004; Fok et al., 2005; Hahn & Kuersteiner, 2002).

Table 2. Explanation of variable design

Variables	Code	Measurements	Scale
Cooperative	C	The cooperative in question is a cooperative that operates as a supplier in the agricultural sector, marketing and serving its members, namely farmers. This cooperative is in the form of a formal farmer collective action for the production, marketing and processing of agricultural products (Buccola, 2014; Kyriakarakos et al., 2020).	Ordinal
Member	M	The members in question are those who aim to increase the production and income of members by helping to better link financial, agricultural input, information, and output markets with the understanding that these services are in line with common interests (Thompson & Valentinov, 2017; Iliopoulos & Valentinov, 2018; Valentinov, 2017).	Ordinal
Asset	A	The assets in question are transaction costs and their limitations in increasing production and achieving sufficient market power in agricultural cooperatives to be sustainable (Tortia et al., 2013; Fulton, 1995).	Nominal
Business Volume	BV	The business volume in question is agricultural cooperatives driven by business users and has contributed significantly to developing the productivity of the agricultural sector, agricultural systems, and the welfare of farmers or their members (Aref, 2011; Gray et al., 2001; Gray, 2014).	Nominal

Quantitative analysis for the Difference Test is measured by the Independent Sample Test, which is a parametric test used to test for similarities or different hypotheses (Salkind, 2010). The variables used are based on 4 variables (number of cooperatives, members, assets, and business volume). The data comes from 4 different measurements and 2 observation periods because they are taken from paired subjects. To make data processing easier, we used the Statistical Package for the Social Sciences (SPSS) version 25 assistance. A detailed explanation of each variable needs to be explained so that the scope and boundaries of the study focus on the objectives (see Table 2).

4. Results

The study results need to answer the relationship between the number of agricultural cooperatives, members, assets, and business volume in Indonesia with a Difference Test through descriptive statistics and the Independent Sample Test. In the first step, we need to present the results based on descriptive statistics. Measurement as a provider of means to measure an important phenomenon of interest. Descriptive statistics are answers to indexes that can be used to summarize data. Researchers are interested in drawing generalizations from data, not in the context of descriptive statistics that aim to draw conclusions to large-scale populations (Gelman & Nolan, 2002; Kaliyadan & Kulkarni, 2019; Kranzler & Moursund, 1999). From the total sample size for each variable as many as 34 regions in Indonesia, the mean has experienced drastic changes after COVID-19. The highest mean value was Cooperative Members (before COVID-19) of 660698.1765. Meanwhile, the largest standard deviation reached 907094.8708 from the Farmer Cooperative Capital and the highest standard error mean achievement was in Business Volume, which is 716188.0636

(see Table 3).

Table 3. Statistical descriptive highlights

Variables	N	Mean	Std. Deviation	Std. Error Mean
C1	34	1337.9118	2323.99933	398.56260
C2		1051.7941	2111.11195	362.05271
M1		660698.1765	1156322.403	198307.6560
M2		507437.8235	907094.8708	155565.4869
A1		4473915.531	6841894.314	1173375.195
A2		2085384.491	2870821.096	492341.7562
BV1		4550521.686	7094550.895	1216705.441
BV2		2387941.654	4176058.147	716188.0636

Source: Own tabulations

Note: 1) Before COVID-19; 2) After COVID-19

The second step is to measure the study model with the Independent Sample Test consisting of Levene's Test for Equality of Variances, and t-test for Equality of Means. The Levene's Test for Equivalence of Variance is reviewed based on the first two statistical boxes. The null hypothesis in Levene's test refers to the same variance. If the probability value in this test is greater than the provisions of 0.05 or 5%, then the null hypothesis can be accepted, assuming that the variance is the same. Conversely, both simultaneously and partially, if not eligible, then the null hypothesis is rejected (Conover et al., 1981; Davis, 2018; Brown & Forsythe, 1974; Nordstokke & Zumbo, 2007). These statistical assumptions are summarized in Tables 4 and 5.

Table 4. Levene's test for equality of variances

Variables		F	Sig.
C	Equal variances assumed	.087	.769
	Equal variances not assumed		
M	Equal variances assumed	.701	.406
	Equal variances not assumed		
A	Equal variances assumed	8.169	.006
	Equal variances not assumed		
BV	Equal variances assumed	4.265	.043
	Equal variances not assumed		

Source: Own tabulations

The existence of a striking shift between before and after the occurrence of COVID-19 was explained by the F test and the 5% probability limit. General acquisition, of the four variables in the study, 2 of them (Asset and Business Volume) simultaneously have a systematic effect. This is evidenced by a significance value of 0.006 for Agricultural Cooperative Assets and from Business Volume reaching 0.043. On the other hand, with the presence of COVID-19, there is no significant effect of the simultaneous number of cooperatives and agricultural cooperative capital.

Table 5. T-test for equality of means

Variables	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
						Lower	Upper
C1	.531	66	.597	286.11765	538.45549	-788.94342	1361.17871

C2		65.400	.597			-789.12753	1361.36283
M1	.608	66	.545	153260.3529	252044.7325	-349963.192	656483.8978
M2		62.459	.545			-350496.207	657016.9127
A1	1.877	66	.065	2388531.040	1272481.730	-152060.705	4929122.785
A2		44.271	.067			-175544.749	4952606.829
BV1	1.532	66	.130	2162580.031	1411841.872	-656253.216	4981413.279
BV2		53.417	.131			-668700.343	4993860.406

Source: Own tabulations

Note: 1) Before COVID-19; 2) After COVID-19

From the 2-way probability test, we draw the conclusion that there is 1 variable that has a partially significant effect, i.e. Assets. This is indicated by the acquisition of significance of 0.065 (before COVID-19) and 0.067 (after COVID-19). The rest, there are 3 variables in this study (Number of Cooperatives, Members, and Business Volume of Agricultural Cooperatives shows that there is no systematic impact, both before and after COVID-19. The probability results of the variables obtain a significant value that is above the provisions so that the proposed hypothesis is rejected.

5. Discussions

The empirical findings state that the Asset variable has a systematic effect, both before and after COVID-19. This proves that the existence of Agricultural Cooperatives is very dependent on their assets. The ability of assets for the continuity of agricultural cooperatives in Indonesia indicates that those engaged in the agricultural sector cannot carry out activities (production, distribution, marketing, and sales) to the market if they are not supported by assets. An asset becomes the main capital because it also involves transaction costs incurred by the farmers who are members of the organization. Sometimes, the assets of the Petanian Cooperative are donations from farmers in an area (usually they are engaged in 1 agricultural commodity). It should be noted that assets are different from the capital in this respect. The asset in agricultural cooperatives in Indonesia is defined as a form of wealth and economic resources (including capital) of its members. Short-term assets are needed by Agricultural Cooperatives to finance operational activities such as salaries, purchasing raw materials, paying taxes, insurance, and etc. In the cooperative, it can be in the form of a working capital savings and loan cooperative which is needed to provide loans to members, because it is called circulating capital. In this case, the establishment of a capital-based cooperative is aimed at the process of establishing a cooperative (establishment permit, business license, article of association, and work plan). In long-term capital, it is necessary to provide facilities, for example, to purchase land, buildings, machinery, and vehicles required by Agricultural Cooperatives (Batubara, 2012; Ketaren, 2007). From other discussions, the number of cooperatives, members, and business volume are variables that are not affected by the COVID-19 pandemic. This evidence is characterized by empirical findings which state that the acquisition of a significance level of the three variables is above the Asset value. The number of cooperatives, members, and business volume of agricultural cooperatives in Indonesia has no significant effect (before and after COVID-19). In 2013, agriculture currently still plays an important role in developing countries (especially ASEAN), because it is an economic sector that contributes to the income of workers around 60% to 70%. Food security is the most important thing, especially for a country with a large population like Indonesia. Various problems experienced by farmers, those who generally live in rural areas, have the desire that an Agricultural Cooperative can be formed to distribute credit to members who need capital in their business activities. So far, the position of Indonesian farmers is not as prosperous as a whole. This presumably explains the level of participation or consumption of modern traders which has no effect on the welfare of traditional farmers. Agricultural cooperatives that are not able to compete in the market, ultimately try their best to find alternative opportunities and opportunities, so that they can also continue to

exist. The final goal is to improve the income and welfare of members in the cooperative (farmers) who are still in the poor category, so that government attention is needed through the issuance of subsidies (Nguyen et al., 2015; Rianse et al., 2013; Mannan & Nordin, 2014; Minot. , 2015; Nyamekye et al., 2016; Staatz, 1987).

6. Conclusion

Based on the Difference Test analysis model, in general, the presence of COVID-19 simultaneously has a systematic impact on the Asset and Business Volume of Agricultural Cooperatives in Indonesia. Other results also conclude that assets have a systematic impact on the existence of Agricultural Cooperatives in Indonesia, both before and after COVID-19. The number of cooperatives and members actually suffered losses from this pandemic, but the impact did not significantly affect the existence of agricultural cooperatives. It takes strategic steps from the government for the continuity of agricultural cooperatives through business licensing that is savings and loans. In addition, efforts need to be made through subsidies (fertilizers, technology in agricultural production, seeds, and other cooperative equipment) which can determine the distribution, production, and marketing systems of farmers who are members of agricultural cooperatives.

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8. Appendix

Table A-1. The existence of Indonesian Agricultural Cooperatives (before COVID-19)

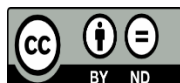
Provinces	Cooperative (Unit)	Member (Person)	Asset (IDR Million)	Business Volume (IDR Million)
<i>Sumatera Islands</i>				
Aceh	671	122,459	741,191.95	858,341.07
North Sumatera	1,524	929,962	7,958,317.86	5,658,111.70
West Sumatera	1,646	313,950	4,278,835.52	4,147,748.59
Riau	1,306	354,314	3,211,437.50	2,961,365.85
Jambi	523	102,262	766,346.23	896,054.82
South Sumatera	766	283,238	2,474,049.64	1,934,588.12
Bengkulu	659	79,182	700,504.68	468,544.91
Lampung	970	909,361	3,265,911.84	2,804,702.47
Bangka Belitung	405	68,069	500,300.59	504,961.62
Riau Island	357	63,523	662,658.92	593,464.97
<i>Java Islands</i>				
DKI Jakarta	769	1,264,944	13,350,612.75	16,564,902.94
West Java	3,855	2,040,509	16,072,554.05	17,670,557.18
Central Java	4,549	5,742,018	25,967,911.02	24,287,935.21
DI Yogyakarta	1,307	857,104	4,061,898.99	4,491,040.78
East Java	13,174	3,620,213	26,275,314.66	28,116,735.18
Banten	1,171	875,844	4,427,885.30	4,338,462.17
Bali	3,137	1,108,238	14,294,454.95	13,444,457.16
West Nusa Tenggara	1,187	317,182	1,548,605.07	1,276,627.33
East Nusa Tenggara	596	703,337	3,022,143.15	2,590,375.49
<i>Kalimantan Islands</i>				
West Kalimantan	959	1,203,533	5,968,757.18	8,529,436.10
Central Kalimantan	438	235,002	2,296,638.38	2,577,494.19
South Kalimantan	790	198,855	1,562,382.65	1,015,792.74
East Kalimantan	1,038	211,495	2,792,577.07	2,019,612.39
North Kalimantan	113	26,981	350,418.26	176,301.91
<i>Sulawesi Islands</i>				
North Sulawesi	374	65,765	335,192.12	337,208.98
Southeast Sulawesi	447	132,214	805,554.66	1,022,220.56
South Sulawesi	1,147	374,806	2,923,259.25	3,326,599.39
Central Sulawesi	476	65,999	436,738.30	917,726.06
Gorontalo	274	46,193	243,249.39	198,286.68
West Sulawesi	83	18,788	109,905.85	273,968.89
<i>Maluku Islands</i>				
Maluku	199	33,786	168,238.68	186,116.15
North Maluku	137	24,434	137,712.98	182,116.15
<i>Papua Islands</i>				
Papua	375	59,836	347,064.57	297,558.55
West Papua	67	10,342	54,504.03	48,321.01
<i>Total</i>	<i>45,489</i>	<i>22,463,738</i>	<i>152,113,137.04</i>	<i>154,718,530.14</i>

Source: Ministry of Cooperatives and SMEs of the Republic of Indonesia (2020)

Table A-2. The existence of Indonesian Agricultural Cooperatives (after COVID-19)

Provinces	Cooperative (Unit)	Member (Person)	Asset (IDR Million)	Business Volume (IDR Million)
<i>Sumatera Islands</i>				
Aceh	447	100,847	496,324.18	244,867.77
North Sumatera	1,150	753,149	5,608,586.41	2,349,731.45
West Sumatera	1,380	186,624	2,737,510.08	1,541,325.44
Riau	700	260,530	1,593,208.70	1,618,228.80
Jambi	414	97,051	522,686.57	243,659.66
South Sumatera	583	136,902	1,334,036.99	1,140,012.65
Bengkulu	521	82,424	357,666.81	342,837.88
Lampung	621	657,220	1,997,506.29	1,268,405.54
Bangka Belitung	317	20,837	241,931.13	258,369.46
Riau Island	249	41,697	457,972.16	204,686.76
<i>Java Islands</i>				
DKI Jakarta	657	787,085	6,638,891.36	6,711,721.39
West Java	3,328	1,639,466	7,598,517.89	8,474,036.16
Central Java	3,403	4,536,146	8,644,754.45	17,323,156.57
DI Yogyakarta	1,253	594,830	1,369,103.64	2,692,795.34
East Java	12,089	2,819,400	12,422,585.82	13,832,728.84
Banten	811	840,671	2,580,801.04	1,847,036.16
Bali	2,284	756,989	3,290,110.92	11,004,344.03
West Nusa Tenggara	807	260,853	897,534.69	651,070.38
East Nusa Tenggara	493	512,747	1,902,612.20	1,119,530.94
<i>Kalimantan Islands</i>				
West Kalimantan	493	837,056	2,947,494.18	3,021,262.99
Central Kalimantan	320	212,397	1,200,645.71	1,095,992.67
South Kalimantan	463	198,166	884,023.58	678,359.08
East Kalimantan	544	188,429	1,490,982.81	1,301,594.26
North Kalimantan	96	24,111	115,520.07	234,898.20
<i>Sulawesi Islands</i>				
North Sulawesi	308	17,645	208,431.19	126,760.93
Southeast Sulawesi	336	131,519	531,308.28	274,246.38
South Sulawesi	791	336,408	1,827,006.51	1,096,252.74
Central Sulawesi	298	59,224	267,430.90	169,307.40
Gorontalo	202	41,855	165,711.68	77,537.71
West Sulawesi	48	15,837	54,336.22	55,569.63
<i>Maluku Islands</i>				
Maluku	114	28,644	95,326.88	72,911.80
North Maluku	147	18,052	104,288.47	33,433.51
<i>Papua Islands</i>				
Papua	58	50,381	273,232.25	73,832.32
West Papua	36	7,694	44,992.62	9,511.40
Total	35,761	17,525,886	70,923,072.69	81,190,046.35

Source: Ministry of Cooperatives and SMEs of the Republic of Indonesia (2020)



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