IMPACT OF PROGRAM OF MECHANIZATION AGRICULTURE ASSISTANCE ON MAIZE COMMODITY PRODUCTION IN INDONESIA

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ABSTRACT

Agricultural tools and machines (Mechanization) have an important and strategic role in achieving agricultural development goals in order to accelerate the achievement of national food self-sufficiency and the main strategic commodities in meeting the needs of food and animal feed. The problem is, not all maize production is of good quality according to animal feed and industry standards. This is what deserves attention, the quality of maize production increases so that it is able to meet domestic demand and opens up opportunities for export. For this reason, a study is needed to analyze the effectiveness of the use and utilization with an evaluation approach of the mechanization assistance program provided by farmers. The results of the study showed that 60% of maize farmers thought that the assistance was able to increase the production and productivity of agricultural products. The results of interviews with maize farmers showed that the estimated increase in maize production ranged from 20 - 40% from the previous one. Maize Shiller assistance is still not evenly distributed, even though this machinery is very helpful for farmers in overcoming post-harvest maize problems. The limited number of reliable technical personnel at the village level is a problem in itself. For this reason, the budget for increasing the number of maize Shillers, mentoring and training in the use of agricultural machinery needs to be increased, so that the distribution of agricultural machinery is evenly distributed and farmers who receive direct training can easily use mechanization on their own agricultural land.

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1. INTRODUCTION
The importance of agriculture in national economic growth is one of the most potential sectors in contributing to economic growth and development both in terms of income and employment [24]. Therefore, the government in 2019/2020 has distributed agricultural machinery assistance to farmers both through farmer groups and farmer group associations (Gapoktan) with the aim of reducing the burden of farming costs and increasing production and productivity of agricultural products. Until now, maize is the second staple food commodity after rice, even in several regions in Indonesia, maize is used as an alternative food to replace rice (Ministry of Agriculture 2013). In addition, maize is the main raw material for the food and animal feed industries, especially chicken feed. The demand for maize production continues to increase every year in line with the increasing demand for the animal feed industry in Indonesia. The maize commodity has a multipurpose function (4F), namely for food, feed, fuel, and industrial raw materials (fiber) [39], [14], [35]. In animal feed rations, especially poultry, maize is the main component with a proportion of about 60%. It is estimated that more than 58% of domestic maize needs are used for feed, while for food only about 30%, and the rest for other industrial needs and seeds [18], [10], [46].

BPS data states that in 2018, national maize production reached 30 million tonnes with a growth of 3.91% compared to 2017 and productivity reached 5.24 tonnes / ha dry shelled. Meanwhile, the demand for animal and industrial feed reaches 11.1 million tons / year. The Ministry of Agriculture always increases maize production both by intensification (increasing productivity) and by extensification (expansion of the area). Intensification is carried out by modernizing agricultural tools and machinery, improving cultivation technology and integrated management of agricultural and resource management. Intensification as an effort to increase maize production is also carried out by applying innovative technology that is competitive (productive, efficient and quality) to produce maize seeds capable of producing 7-9 tons / ha of maize [6]. Therefore, in addition to modernizing agricultural tools and machinery, efforts to increase maize production can be made by investing in research and development (RND) [11], [12], [26].

This study intends to analyze the effectiveness of the use and utilization of browsers with an evaluation approach of the agricultural machinery assistance program provided by farmers. The results of the study are expected to be used as material for consideration for policy makers in planning and implementing agricultural machinery assistance programs that are more efficient, on time and on target.

2. MATERIALS AND METHODS

2.1 Location and Research Respondents
The research locations were in eight provinces, including: North Sumatra, Lampung, West Java, Central Java, East Java, West Nusa Tenggara, South Kalimantan, and South Sulawesi. The number of respondents as many as 34 respondents of maize farmers with sampling using a purposive sampling approach.

2.2 Sources and Types of Data
The data taken in this study include primary and secondary data. Primary data comes from the results of research in the field with a survey method in the form of structured interviews, while secondary data comes from documents (archives, reports, research results) belonging to the government, previous researchers or the community.
2.3 Method Analysis

The method of analysis uses a mix method approach that combines qualitative and quantitative approaches. Using a gradual qualitative and quantitative approach to understanding social reality. According to [9], the choice of this combination strategy is in the form of a sequential mixed method strategy, which is a procedure in which it seeks to combine the findings obtained from one method with the findings of another method. To answer goal one, using national macro secondary data. Meanwhile, to answer objectives two and three, using the data from the field survey.

3. RESULTS AND DISCUSSION

3.1 Analysis of the Need for Mechanization and Maiza Production

The mechanization requirement analysis is calculated from the plant area multiplied by the mechanization use index divided by the mechanization break event point then subtracted by the number of existing mechanization [5], [7]. Furthermore, the calculation of the mechanization adequacy status is carried out, namely the status of a certain number of mechanization available compared to the amount of mechanization needed to work on the area of rice fields in an area [4]. The value of the presence of this mechanization is expressed as a percentage and formulated as follows: % adequacy status of machinery = (Number of machinery available/Number of machinery needed) x100%

3.2 Amount and Distribution of Mechanization Aid on Maize Commodities

The Ministry of Agriculture, through the Directorate General of Agricultural Infrastructure and Facilities, has budgeted the procurement of pre-harvest mechanization from 2015-2018 of IDR 12,832,989,909.88, - with the realization of as many as 398,000 units of machinery (PSP of the 2018 Ministry of Agriculture). The total budget from 2015 to 2017 has always been increasing, only in 2018 it has decreased compared to 2017. The increase in the number of mechanization is mostly provided in one Special Effort program package (UPSU). Apart from giving mechanization, the UPSUS program was also given a package of assistance in the form of seeds and fertilizers.

The most dominant requests for pre-harvest almonds are automatic hand sprayers, maize planters, water pumps, 2-wheeled tractors, and trays with a total assistance of around 10 thousand-80 thousand units. 2-wheeled tractors are needed by farmers, especially for tillage before planting. Meanwhile, the water pump is needed by farmers to overcome water shortages in the dry season or to overcome water shortages in agricultural land that is far from access to water resources (dry land agro-ecosystem). Especially for maize plants, starting in 2017 a large amount of maize planter assistance was rolled out in the hope of helping maize farmers at the start of the planting season. With this machine, it is hoped that it will increase the efficiency and productivity of maize farmers [3], [18], [32].

Apart from providing pre-harvest assistance, the Ministry of Agriculture also provides post-harvest assistance for maize. The results showed that post-harvest handling and practices were very important, because they determined the quality of the maize kernels produced. Determining when to harvest is the initial stage of a series of post-harvest handling of maize which aims to determine and determine the harvest of maize by taking into account the age of harvest and method of harvest [1], [35], [14].

In post-harvest handling of maize, the biggest operational cost is when releasing the maize kernels from the cobs. Therefore, the use of maize sheller in production centers is a very valuable asset, because it can reduce costs and increase farmers' income. One of the assistance provided for post-harvest agricultural machinery is aimed at planning activities. The aid from the Ministry of Agriculture includes several tools,
namely: maize Sheller (maize sheller), maize Combine Harvester (maize harvesting machine), VD maize + buildings, Multipurpose Power Thresher, and Moisture Tester reaching more than 23 thousand units in all provinces in Indonesia. Assistance of agricultural machinery in the form of maize Shellers and Power Thresher shows that post-harvest handling of maize is the Ministry of Agriculture's main concern with a total aid of around 21 thousand units and this policy is in line with the research results.

3.3 Conditions and Utilization of Mechanization Aid for Maize Commodities
There are at least ten types of government aid distributed to maize farmers through their respective farmer groups. Of the various types of mechanic, maize seed assistance was the aid most received by farmer groups and was utilized entirely by farmers (Figure 1). These results indicate that the maize seeds distributed by the government are in great demand by farmers. Therefore, this maize assistance needs to be continuously provided to increase agricultural production. Apart from maize seeds, subsidized fertilizer assistance is one of the assistance that farmers always expect because it can reduce production costs. However, this subsidized fertilizer policy needs to be studied more seriously because at the technical level of distribution, the quantity and quality are often problematic.

Source: Survey data processed, 2020.

Figure 1. Types of Agricultural Equipment and Machinery Assistance and Its Utilization
Based on the results of the study, no maize farmer respondents received maize Shiller assistance which is very helpful for farmers in overcoming post-harvest maize problems. There are only Power Therasers that were received by farmer groups at the survey location. Referring to the results of this study, the Ministry of Agriculture needs to increase the amount of maize Shiller assistance to maize farmer groups in the coming fiscal year. The results of the analysis of the use of a semi-automatic maize sheller machine equipped with a propulsion in the form of a 1.5 HP dynamo type electric motor with a rotation speed of 2800 rpm and has 2 inlets for maize blowers show that this machine can be maize sheller of 350 kg / hour [37], [13]. Based on the results of the interview, the existence of an agricultural machinery workshop and the availability of spare parts are very much needed to solve the damage to the machinery. Both have an effect on optimizing the use of mechanization and avoiding unused machineries assistance by farmers (stalled).

Farmers are very satisfied with the reliability of PPL in serving farmers such as the ability to provide solutions to agricultural problems, easy to contact by farmers and open to constructive criticism. These results indicate that PPL is truly the spearhead in the success of the agricultural programs of the Ministry of Agriculture. PPL should get more attention from the Ministry, for example by increasing the extension budget, funding assistance for conducting Farming Demonstrations (Denfarm) and also facilitating the provision of transportation assistance. If we pay attention, rural terrain, especially dry land, is very difficult to explore. With the assistance of transportation vehicle facilities, it is hoped that it will make it easier for PPLs to carry out extension tasks.

### 3.4 Impact of the Alsintan Assistance Program on Maize Farming

The distribution of mechanization aid to maize farmers certainly has the main objective of increasing agricultural production [43], [45]. The results of a survey of maize farmers showed that the assistance of mechanization was able to increase production and of course the productivity of agricultural products (60%). The provision of pre-harvest and post-harvest mechanization assistance as well as other assistance such as maize seeds and subsidized fertilizer is a package that can be said to be complete in supporting farming [25], [27-29].

Mechanization assistance also increases the application of technology by farmers, such as in the application of spacing, accelerated planting and better irrigation systems [33], [41], [42]. Agricultural modernization through increasing the capacity of agricultural machinery and agricultural technology indirectly encourages farmers to be able to master various new technologies applied in agricultural land [44], [36]. These results also indicate the adoption of agricultural technology in maize farmers is going well [34].

Another positive impact of providing alsin assistance to maize farmers is that machinery significantly reduces production costs and provides added value to production from related matters such as: increased planting area, good quality of irrigation, regular spacing, planting acceleration, improving land quality and productivity. Production costs become easier because farmers no longer rent to the private sector but to their groups. [17], [38], [31].

Assistance received by farmer groups is managed in such a way as a rental system or a group cash system whose value is much cheaper than the rental of mechanization to the private sector [21], [23]. For some advanced farmer groups or farmer group associations (Gapoktan), it is advisable to form a Tool and Machine Service Business (UPJA) so that the management of agricultural machinery is more professional and provides more value to businesses in agriculture [19], [16], [20].

The impact of the use of asintan on maize farming surveyed by farmer respondents in terms of the emphasis
on production costs, added value to crop production, and the rental price of members being cheaper than non-poktan members expressed satisfaction with an average score of 67%. This indicates that the existence of UPJA agriculture is towards independence. Farmer independence is significantly influenced by farmer characteristics, availability of innovation, support for the socio-cultural environment, farmer capacity and farming dynamics. [40]. In addition, [15], [2] state that farmer independence is influenced by factors of support from outside the farmers, level of education and farming experience. Furthermore, according to [30] that the characteristics of farmers and extension performance have a significant effect on the level of farmer independence in farming in Cimerang Village, Bogor, West Java.

4. CONCLUSION
The mechanization assistance provided to farmers is able to increase the production and productivity of maize farmers' agricultural products by 20-40%. This increase in production is expected to be directly proportional to the increase in income and welfare of farmers. Another positive impact of providing machinery assistance to maize farmers is that it has significantly reduced production costs and provides added value to production.

The results of the study showed that 60% of maize farmers thought that the assistance was able to increase production and of course the productivity of agricultural products. The provision of pre-harvest and post-harvest mechanization assistance as well as other assistance such as maize seeds and subsidized fertilizer is a package that can be said to be complete in supporting farming. The results of interviews with maize farmers showed that the estimated increase in maize production ranged from 20 - 40% from the previous one.

Maize Shiller assistance is still not evenly distributed, even though this machinery is very helpful for farmers in overcoming post-harvest maize problems. There are only Power Therasers that were received by farmer groups at the survey location. Referring to the results of this study, the Ministry of Agriculture needs to increase the amount of maize Shiller assistance to maize farmer groups in the coming fiscal year. The limited number of technical personnel who can be relied on at the village level is a problem in itself. Therefore, the budget for assistance and training in the use of agricultural machinery needs to be increased. It is hoped that farmers who receive direct training, so that they will easily use mechanization on their own agricultural land.

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