Utilization of Agricultural Machinery to Support Rice Farming in Grobogan District

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Abstract: Government efforts to meet food needs through self-sufficiency done by facilitating farmers in the form of agricultural machinery with the aim that rice production increases. Management agricultural machinery agency in 2017 became a brigade institution. There are two types of facilitation for agricultural machinery: for a large amount of pre-harvest and harvest but the utilization is only piled up on certain types of agricultural machinery. Purpose: Analyze utilization and management agricultural machinery to farming rice. Method: The selected village is the rice production center that obtained agricultural machinery facilitation and managed farmer group combination, farmer, business management of agricultural machinery services randomly selected with Beginner, Developing and Professional classes. Informant: Chairperson, manager and operator. The research is qualitative descriptive evaluation. Method of collecting data: (i) in-depth interview; and (ii) forum group discussion. Data analysis with qualitative descriptive. Result: Pre-harvest of agricultural machinery utilization: two-wheel tractor, four-wheel tractor and water pump. Two-wheeled tractors are always used while the four-wheeled tractor is limited to land with wide plots with flat land conditions. For agricultural machinery harvest: Big Combine Harvester, power thresher, while agricultural machinery that has not been used optimally even has not been used trans planter, hand sprayer, medium combine harvester and small, multipurpose power charger and push thresher power. the best management of agricultural machinery is at the military district command with the lending process escorted since at the group level by the Village commissioner, then to the military rayon command, only to be delivered to the military district command. Loaning is done by filling in the blank, borrowing time as needed and can be extended. Borrowers bear the costs of transportation. Agricultural machinery must be clean and not damaged when borrowed and returned. Conclusion: Stack of agricultural machinery on two-wheeled tractors and Big combine harvester for rice farming. Other agricultural machinery has not been widely used because it cannot be operational is not in accordance with agroecological conditions.

Keywords: agricultural machinery; management; rice; utilization

1. Introduction

The government has targeted national food self-sufficiency, one of the commodities is rice Central Java has a contribution as a supporter of production. To achieve this goal the government has implemented a special effort program to increase rice, corn and soybean production through various programs to optimize the use of agricultural tools and machinery by facilitating the mechanization of agriculture. Agricultural mechanization support is expected to help increase yields through increased production and reduced yields, which have so far been high (Ministry of Agriculture, 2018).

Agricultural machinery is a means used for agricultural business, especially in the context of substituting labor in the agricultural sector. Agricultural machinery tools facilitated by the government three types, namely pre-harvest, post-harvest and yield processing. Agricultural machinery pre-harvest has a function to carry out the production process at the cultivation stage until near harvest, using agricultural machinery can be done by giving the results of suppressing input costs, agricultural machinery post-harvest has a function of harvesting and post-harvest production processes, agricultural machinery can reduce harvest and post-harvest costs and reduce yield loss, agricultural machinery processing results have a function of increasing added value so that it can increase revenue

Ownership status of agricutural machinery facilitated to farmers in 2013-2016, is a pure grant so that the management is carried out by farmer groups, a combination of farmer groups and agricultural machine tool

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service units but starting in 2017 machinery facilitated to farmers the status of ownership becomes provincial assets and district assets. In this regard, the management of agricultural machinery is carried out by the brigade.

Agricultural machinery management in Grobogan Regency depends on the institution that manages it. In Grobogan Regency agricultural machinery services management unit has formed an association so that the management of agricultural machinery has almost the same management, while the combined farmer groups and farmer groups each manage based on the results of group agreements. In the agreement there are those who have considered the sustainability and development of Agricultural machinery but some have not

Utilization of agricultural machinery tools in Grobogan Regency still relies on hand tractors for processing land while other tools such as 4-wheel tractors and combine havester rice harvesting equipment are still not optimal, because the agricultural machinery if used in the planting season one will cause combine to collapse in the ground, causing the tool to be unable to function and even increase the cost of lifting.

Rice commodities are a priority and political commodity because rice is a staple food for the Indonesian people so it must be fulfilled on time, amount, place, quality and price so that the food is easily accessible to the people in Indonesia. Rice production in Grobogan Regency on average every year is 753,965 tons, the achievement of production is influenced by the extent of agricultural land and input factors, one of which is labor that is replaced by agricultural machinery that can improve the performance of rice farming. he performance of agricultural machinery to support rice production depends on the institution that manages it, therefore an evaluation is needed to determine the utilization of agricultural machine. Purpuse: Analyze utilization and manajement agricultural machinery to farming rice.

2. Methods

The research is descriptive qualitative evaluation, namely research with evaluation design to collect and analyze data. The approach used is fenomological, namely to allow expressing reality and describing the situation comprehensively in the real context. The study was conducted from April to October 2018.

The study was conducted in Grobogan Regency with the consideration that Grobogan Regency is the largest rice production center in Central Java and has the facilitation of large quantities of agricultural machinery. Selection of location samples is the village of rice production centers that obtain facilitation of agricultural machinery tools which are managed by a combination of farmer groups, farmer groups, agricultural machinery service unit management. The institution was chosen randomly except the agriculture machinery service unit which was chosen based on classes namely Beginners, Developers and Professionals. Informants are Chairperson, manager, administrator, joint operator of farmer groups / farmer groups / alsintan service management units and District Brigade managers and military District Command

Method of collecting data: (i) Independent interview: in-depth interviews were conducted at the field, district and military District Command brigades. Data: Implementation, management, benefits, maintenance, sustainability of agricultural machinery; (ii) Forum Group Discution (FGD), carried out to strengthen the results of the inter-agency study. The FGD was conducted with key figures such as Field Agricultural Extension, private agricultural services management units, related agencies.

The data sources used are primary and secondary data. Data obtained is processed by grouping based on the use of agricultural machinery (types, quantities, distribution, suitability to geographical conditions); Management. Then the data was analyzed using qualitative descriptive analysis.

3. Result and Discussion

3.1 Utilization of agricultural machinery in the management institution

Agricultural machinery has a strategic position in rice production, because by using agricultural machinery it is expected that there will be an increase and quality of crop production resulting in a decrease in costs per unit of production. Utilization of labor-saving technology in agricultural machinery, shifting the use of human and livestock power, it is expected that conditions at the farm level will increase in income which contributes to the decline in production costs, increased yields and reduced yield losses.

Agricultural machinery has a mutual relationship (substitution) with humans and has a very strategic role and potential because of its contribution in increasing productivity, resource efficiency, improving quality through product processing and diversification that results in high added value in supporting agribusiness development programs. If applied correctly and appropriately, the use of agricultural machinery will contribute positively to the development of agribusiness systems and businesses that are competitive and sustainable.

Facilitation of agricultural machinery by the government is given to the district brigades and field brigades. To utilize agricultural machinery, the method of using agricultural machinery utilization services was carried out. Therefore, the agency managing the agricultural machinery makes a rule for the use of agricultural machinery tools that each institution has its own rules with the principal components containing the costs of transportation, fuel, operator services, maintenance and savings for cash. Utilization of types of agricultural machinery in management institutions is usually associated with ease of use, in accordance with agroecological conditions, availability of labor, low costs, cropping patterns that exist in the region. The utilization of Pre-Harvest agricultural machinery can be seen in Table 1.

Table 1: Utilization of Alsintan

Institution for receiving agricultural machinery	Types of agricultural machine											
	R2		R4		TRP		WP		HSPR		EV S	
	Total	UT/U/UP	Total	UT/U/UP	Total	UT/U/UP	Total	UT/U/UP	Total	UT/U/UP	Total	UT/U/UP
Brigade Districk	105	UT	5	UT	17	U	127	UT	137	UP	1	UT
CFG Grobogan	366*	UT	13	UT	62	U	279	UT	58	UT		
FG Ngudi Mulyo	1	UT	1	UT	1	U						
FG Karyatani	1	UT	1	UT	1	U						
AMSUM Karanganyar	10	UT	1	UT	1	U						
AMSUM Margomulyo	2	UT	1	UT	1	U	1	UT				
AMSUM Mintratani Modern	1	UT	1	UT	1	U						
AMSUM Ngudi Mulyo	4	UT			1	U						

Notes:

R2	: Two Wheel Tractor;	R4	: Four Wheel Tractor
TRP	: Transplanter	WP	: Water Pump
HP	: Hand Sprayer	EV	: Ekvakator Small
CFG	: Combination of Farmer Group	UT	: Utilized,
FG	: Farmer Group	U	: Untapped,
AMSUM: Agricultural Machinery Service Unit Management		UP	: used optimally

In table 1, it is known that the pre-harvest agricultural machinery used are two-wheeled and four-wheeled tractors and water pumps. Rice farming for tillage always uses two-wheeled tractors so that time is faster. The use of a four-wheeled tractor can be done on flat land with a wide plot of ¼ shoulder to ½ shoulder. According to Firdaus & Jon Hendri (2015) that the use of tractors has now become the main necessity of farmers to cultivate land, considering the cultivation of land with labor is considered to be increasingly expensive along with the lack of availability of labor because they have switched professions to non-agriculture and increased labor costs in addition to processing soil.

The placement brigade agricultural machinery is divided into two warehouses, namely Godong District and Wirosari District. In 2019 one warehouse is added to the BPP Gubug, which is currently being prepared. This was stated by the Head of the Infrastructure Division of the Grobogan District Agriculture Office, Mrs. Lativa

> *"That with the help of agricultural machinery from the government with a large number and variety of types, it is necessary to approach the tool with the location, therefore in 2019 there are three warehouses for brigades, namely in Godong, Wirosari and Gubug which are currently preparing"*

Types of agricultural machine tools belonging to the district brigade that are utilized by a combination of farmer groups, farmer groups and agricultural machinery equipment service units are two-wheeled, four-wheel tractors. Agricultural machinery is borrowed for 1-3 months with the location of all sub-districts of Grobogan Regency except Kedung Jati Subdistrict because the largest land is tegal land so it is more often planted with palawijo plants

Types of agricultural machinery that have not been utilized are hand sprayers and transplants. Borrowed water pumps of size 2 inc, 3 inc and 4 inc for pumping surface water are planted and used in the dry season, actually the water pump needed is more than 6 inc in size so that it can be used to extract water from the river over long distances.

Agricultural machinery in the district military command Brigade that is utilized are two-wheel tractors, four-wheel tractors, hand sprayers, water pumps and excavators. Agricultural machinery utilization is still not optimal because the 4-wheel tractor is only used in the second planting season while in the planting season I cannot be used because the soil is too deep. The untapped agricultural machinery is a transplant because the tool cannot be used. Institutions that manage agricultural machinery often borrow from Godong and Gubug sub-districts.

Agricultural machinery in the field Brigade utilized are two-wheeled and four-wheeled tractors. Agricultural machinery is lent to all people who need it, but prioritized members of farmer groups in one village, one sub-district if it is fulfilled, all are loaned out of the sub-district even outside the district. 4-wheel tractor agricultural machinery is widely used outside the district such as in Sragen Regency, considering the condition of the land allows using the tool. In addition to using pre-harvest agricultural machinery, farmers also use post-harvest agricultural machinery. The benefits can be seen in Table 2.

Table 2: Utilization of Post-Harvest Systems

Institution for receiving agricultural machinery	Types of agricultural machine									
	CHSB		**CHSS**		**CHSK**		**PWTM**		**PWT**	
	Total	**UT/U/UP**	**Total**	**UT/U/UP**	**Total**	**UT/U/UP**	**Total**	**UT/U/UP**	**Total**	**UT/U/UP**
Brigade Districk	1	UT								
CFG/FG/AMSUM			14	U	27	UP	30	BO	59	UP
CFG Ngudi Mulyo	1	UT								
FG Karyatani	1	UT								
AMSUM Karanganyar									1	UT
AMSUM Margomulyo	1	UT							1	UP
AMSUM Ngudi Mulyo					1	UT				

Information:

LCH	: large combine havester	MCH	: Medium Combine Havester
SCH	: small Combine Havester	PWT	: Power Threser
PWTM	: Power Threser Multifungs	U	: Untapped,
UT	: Utilized,	UP	: used optimally

In Table 2, it is known that the post-harvest agricultural machinery used is Big Combine Harvester and Power Threser. For moderate and small Combine Harvester the utilization is still not optimal because it can only be used in the second planting season, the utilization in planting season I causes tires to enter the ground. This is consistent with the statement of the manager of the Karanganyar service unit manager

Combine to work with a record of dry land if the wetlands will sink. The condition of the combine harvester, the RPM is fast, so the threshing section will twist the threshing section of the grain. If the normal RPM is in good condition, this is because it is not balanced between threshing and RPM"

The use of large combine harvester according to farmers is more practical, the yield produced is higher because the loss rate is smaller than using a power thresher. While for the medium and small Combine Harvester the utilization is not optimal because According to Amirrullah (2016) that the presence of agricultural technology such as combine harvester does not shift the existing workforce to work as wage laborers or as laborers. Using this tool is only to avoid if the labor season is short of harvest. From the cost and time efficiency of using the combine harvester tool faster and the costs incurred are also more efficient and time efficient. The large Combine Harvester is utilized continuously, considering that the number is still small so that to fulfill it, we still use the services of private machinery from Jepara Regency.

Multipurpose power thresher has not been utilized because the ability of the tool is not optimal, that is, it is not able to separate between rice and hollow rice and dirt while the small power wheel of the two wheels works also cannot be maximized because the results cannot be clean at once and must be repeated so that more time and effort are needed. This condition causes farmers to prefer to use mobile power thresher services.

In the development of agricultural mechanization there are still some obstacles, namely the condition of land is very influential on the application of appropriate agricultural machinery, low skilled labor so that the use of agricultural machinery is still limited, workshop facilities and spare parts are still limited, access to finance for the development of agricultural machinery is still low, relatively expensive prices, lack of institutional development and other supporting facilities, damaged agricultural machinery.

Therefore, the right strategy for developing agricultural machinery tools is needed. Efforts to develop agricultural machine tools should begin with identifying their needs, namely: (1) determine the number and types of agricultural machine tools in accordance with the conditions of the region and the business being developed; (2) testing the feasibility of using agricultural machinery from a technical and socio-economic perspective; and (3) development design of tools to fit the needs of farmers. In the development phase it needs cooperation between users (farmers, service entrepreneurs, farmer groups, cooperatives) with distributors / manufacturers, as well as workshops or the procurement of spare parts.

The level of adequacy of agricultural machinery shows that the level of adequacy of hand tractors and threshing machines varies between regions or districts. According to Satriyo (2011), it was stated that the level of adequacy of hand tractors and threshing machines nationally was only around 34%.

Meanwhile the level of adequacy of hand tractors and threshing machines in Grobogan Regency is still much higher than the national average (Alihamsyah, 2016).

This was all agedly due to the increase in agricultural machinery tool rental business due to the profitable business of leasing agricultural machinery, and the increasing assistance from the government.

This was allegedly due to the increase in agricultural machinery tool rental business due to the profitable business of leasing agricultural machinery, and the increasing assistance from the government. The results of Trip Alihamsyah's study (Alihamsyah, 2016) stated that the Subdistrict level of hand tractor sufficiency was very poor in 6 districts namely Kedungjati, Wirosari, Toroh, Tawangharjo, Purwodadi, Tanggungharjo, and very less in 6 districts namely Brati, Karangayung, Klambu, Godong, Tegowanu, Toroh, while rice threshing machines are very poor in 9 districts namely Penawangan, Brati, Wirosari, Klambu, Godong, Grobogan, Purwodadi, Gubung, Tanggungharjo and very less in 4 districts namely Kedungjati, Tegowanu, Ngaringan, Randublatung

Therefore, the increase in the population of hand tractors and rice thresher machines in the future will be focused on the sub-district through various schemes, including: direct assistance and advance cash advance

purchases of agricultural machinery and mobilization of agricultural machinery between sub-districts with different planting schedules and reallocation from the sub-district more agricultural machinery to the sub-district is still lacking.

The addition of hand tractors needs to be considered carefully by considering local land conditions, technical aspects (community skills) and social, so that the use of agricultural machinery can increase crop production, be efficient in rice cultivation and improve the quality of crop yields. The suitability of each type of tractor and its tillage equipment is specific to the condition of the land, mainly related to the mechanical properties of the local soil (Hendriadi & Salokhe, 2002).

2. Management of Agricultural Machine Tools

Agricultural machine tools facilitated to farmers through the brigade, district and field institutions must be managed properly so that they can serve farmers to do farming. Stages of management carried out by institutions managing agricultural machine tools vary depending on the ability of the institution. Management carried out by the managing agency can be seen in Table 3.

Table 3: Management of Alsintan

No	Institusion	Planing	Implementation	Supervision
		Brigade Districk		
1	Depertement of Agricultur	Make rules for how to borrow tools	- Borrowers fill in blanks - There are no rates - Alsin transportation costs	Brigade
2	Komandi Districk Military	Make rules for how to borrow tools	- The Borrower fills in blanks through the Village Development Board and Military Rayon Command - There are no rates - Alsin transportation costs	Fasiter
		Field Brigade		
1	Combined farmer groups	Make a tariff	- Operator determinant - Bookkeeping still not perfect - Hand tools operator answered - Less focus	Supervision by the chairman has not been maximized
2	Farmer group	Make a tariff	- Operator determinant - Bookkeeping is still not perfect - Operator responsibility - Less focus	Supervision by the chairman has not been maximized
3	AMSUM	-Make articles of association and by-laws -Make a tariff - join association AMSUM - Borrow tool	- -Operator determinant - Bookkeeping is rather perfect - Competing with each other - Involved social activities - Operator responsibility - Focus on alsintan services	Meeting each month

Source: Primary data processed, 2018

In Table 3, it can be seen that the management of agricultural machinery in Grobogan District, the best management is in military district command, because it is managed by parts or territorial staff who are used to managing military heavy equipment. The borrowing process is started from the level of the group by the non-commissioned village supervisor so that the need for agricultural machinery is properly identified at the location, the loan is then escorted by the military rayon command, then submitted to the military district command.

Tool borrowing is done by filling in the blank provided, the loan time is in accordance with the requirements and can be extended by filling in the return form. The equipment borrowed is clean and undamaged, the repayment time must also be clean and undamaged, if there is damage at the time of borrowing, the borrower is responsible for repairing it in accordance with the original conditions.

Borrowers are charged a transportation fee at the time of delivery and return. Military district command does not have costs for treatment, care is carried out on machinery that still has a warranty. With no allocation of costs for treatment and Alsin is no guarantee, the sustainability of Alsin so that conditions remain good should be further thought given that machines are not subject to tariffs.

Management of agricultural machine tools by farmer groups, farmer groups in Grobogan Regency is still not professional because management is left to the operators. Farmers who will use services for land processing and

harvesting directly contact operators and operators who regulate the implementation schedule, thus the group never knows the use of agricultural machinery owned, so the nature of the business is mutual trust

Tariffs charged to farmers are used for fuel components, operators, cash, damage and equipment losses. Bookkeeping is carried out by operators not transactions but is accumulated for example once a month and special meetings to discuss and carry out activities of supervision of agricultural machine tools have not been done by the group.

The management of agricultural machine tools by the Agricultural Machine Service Management Unit is carried out with economic objectives so that the target achieved is to gain profits so that the managed equipment can increase. Agriculture in Grobogan Regency is the same because it is in accordance with the standards of the association of Nit Agriculture Machine Tool Manager, Grobogan Regency. Agricultural machine tools that are borrowed besides own property also borrow in the District Brigade. The borrowing time for a brigade farm machine can be up to one year by means of a discussion of the loan. Borrowed agricultural machinery are generally two-wheeled and four-wheeled tractors, and combine large harvesters. The rates paid by the borrower are used for Solar, Operator, Cash, Maintenance purchases.

The duties and responsibilities of the operator are responsible for the cleanliness, maintenance and security of the Tool. In general, the tool is carried by the home operator, this is to make it easier as long as the tool is used, but the tools that are not used will be stored in the warehouse. In general, warehouses become one with the office of the farmer group/Alsintan Services Management Unit with limited land. Land ownership status is owned by the village, and some even belongs to the private sector. The garage as a shelter and maintenance is not inside the building, but mostly outside the building without a roof.

Bookkeeping services in the Unit Management of Agricultural Machine Tools Services performed well, bookkeeping carried out include: Inventory books that contain records of the number, types and years of tools obtained, financial books, membership books, books of each type of alsintan. The manager supervises the operation of the equipment carried out by the operator and the records carried out by the administration section.
Maintenance and minor repair of the tool is carried out by the operator or mechanic. Its technical capability is obtained from the experience and training of tool agent technicians as a post-sale service. In the event of severe damage, the Agricultural Machinery Equipment Management Unit coordinates with the agent. However, this requires time and communication with the dealer.

“According to Mr. Margono, the Karangrayung Agricultural Machinery Service Management Unit can use young people who can depend on the operator because the area is wide, can reach one sub-district, because the service is quite good and there is promotion from the mouth”

3.2 Problems of Utilization of agricultural machinery at the Rice Farming Level

1. Climate and Time
   a. The period of tillage for rice plants is limited by cropping patterns, because it is strongly influenced by seasons. Therefore, a definite schedule is needed with the capacity and number of tillage tools.
   b. Planting time / harvest is often not the same, so the road to the location of the tool is constrained, therefore the pattern of land area management is needed in accordance with the capacity and the number of tools.

2. Land Types and Conditions*:*
   a. Utilization of agricultural machine tools is influenced by the type of soil. In the first planting season, the rainy season, on the type of clay that is loose, the tool is relatively heavy (above the carrying capacity of the soil), with small wheels that will collapse and cannot operate.
   b. Map the narrow land with relatively high contours, affecting the operation of moving the tool to another plot...

3. Institutional and Human Resources Managers*:*
   a. Military District Command Brigade, has management human resources and experience in managing military heavy equipment, but does not directly communicate with farmer users. Farmer groups and Agricultural Machine Tool Service Management Units communicate directly with farmer users, but the number and types of equipment managed are limited and their human resources, often have no experience in managing and operating the equipment.
   b. Human Resources, especially Mechanics as well as Tool operators in several locations have difficulty in availability.

4. Types and brands of agricultural machinery tools*:*
   a. Reasons for agricultural machinery are not yet utilized: i) Excavators, not much needed; ii) Four-Wheel Tractor, not in accordance with the terrain and extent of the plot; iii) Transplanter, often jammed / idle on loose soil in Planting Season I and wasteful use of rice seeds; iv) Water pump, too heavy to mobilize and short hose; v) Hand sprayer hand, not practical, because with heavy hand movers; vi) Combain Harvester, often damaged on axles and ambles in the first growing season, especially for medium and small types and certain brands..
   b. The brands of agricultural machine tools affect the productivity and the level of damage to the tool, especially in the Transplanter and Combain Harvester

c. Training facilities and workshop are not yet available to deal with heavy damage and replace damaged spart parts.
d. Post-sale services from agricultural machine tool agents, there is no periodic communication and monitoring for maintenance and damage to the equipment as well as training for maintenance and operationalization of the field.
e. Depreciation costs for managed equipment have not been sufficient for tool rejuvenation, because not all types of equipment are not optimal working hours.

4. Conclusion

1. The use of agricultural machinery which is most often used for rice farming is a type of Wheel Tractor 2 and Power threser, while the other types are still not optimal, some are not even used (Heavy Water Pump, Transplanter, Hand pump Hand Sprayer, Combine Havester Medium and Small, Power Multipurpose / push Threser).
2. Problems with the use of agricultural machinery at the farm level are relatively many aspects that affect, both in terms of specifications, brand (quality), type and condition of land, operators and technicians and other management.
3. Agricultural Machinery Services Management Unit that is directly related to farmers users are still too few managing tools, because the level of ability is different and constrained by the availability of operators;

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