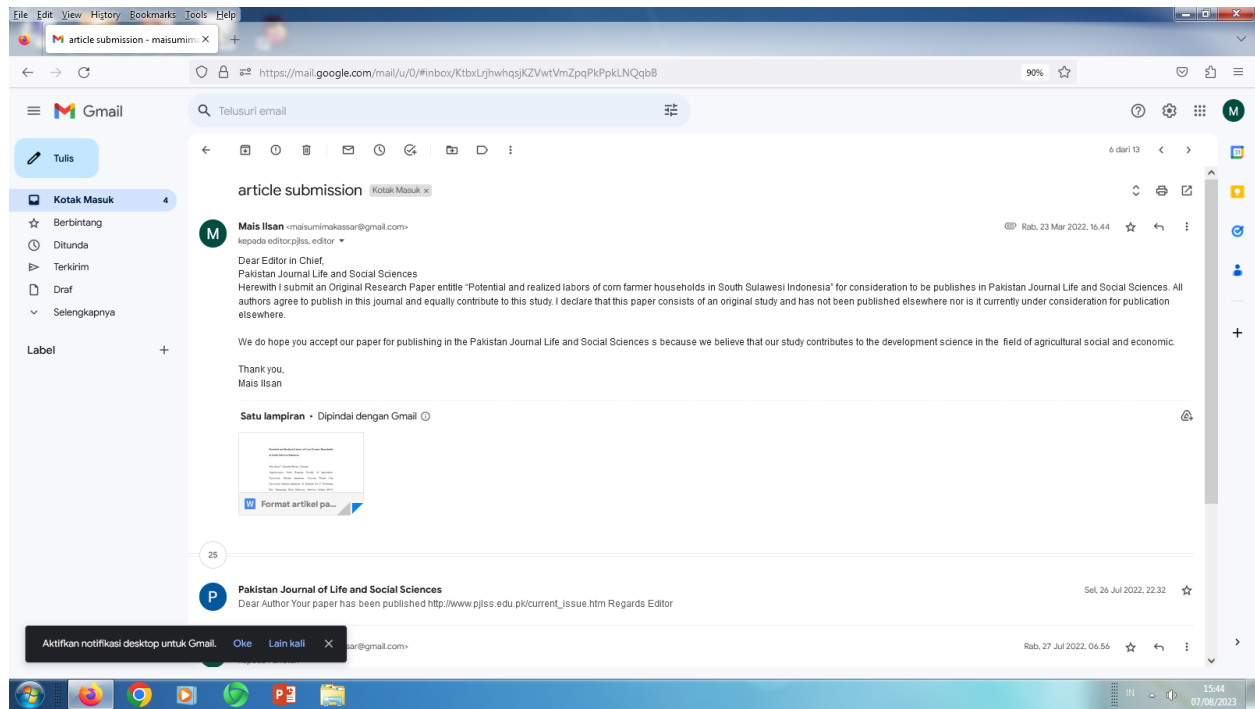


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Potential and Realized Labors of Corn Farmer Households in South Sulawesi Indonesia

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Abstract: This research aims to analyze the potential and output of the internal workforce of corn farmer households in South Sulawesi, as well as the extent to which child labor is involved. It was conducted in Gowa Regency (GO), Jeneponto Regency (JE), and Bulukumba Regency (BU) in South Sulawesi. A multistage sampling technique was adopted to get representative data in each regency. Furthermore, a sub-regency was selected based on land area and productivity. In each sub-regency, two villages were selected to form a total of six. The primary data were collected through interviews with the guidelines on the research questionnaire. In contrast, secondary data were collected from various sources related to the research objectives. A total of 300 subjects responded to the questionnaire, and the data obtained were analyzed descriptively. The workload calculation was conducted by considering the conversion of the workload into male equivalent working days (MWD). The MWD and the female workforce are equivalent to 7 hours of work and 0.7 MWD, while child labor equals 0.5 MWD. The results show that the potential for domestic work of corn farmers in South Sulawesi is relatively high. Male employment potentials were ranked highest, followed by female and kid workforce potentials. The farming activities such as weed cleaning, planting, and fertilizer spreading absorb a large workforce. In contrast, the percentage of women's work output per potential is higher than that of men. This indicates a high proportion of women working in agriculture. Therefore, the proportion of workforce production devoted to women's potential should be increased.

Keywords: child worker, agriculture, workload, workforce

INTRODUCTION

Corn is a long-established agricultural commodity in Indonesia; and presently, there is a substantial demand exceeding 10 million tons of dry shells per year. The most significant consumption of corn is for food and the animal feed industry. This is because about 51% of the raw material for animal feed is corn. In aggregate, 72% of national corn production is used for the animal feed industry, 21% for food consumption, and 7% for other industrial needs (Kolo & Hutapea, 2016; Wanto et al., 2019). As one of the essential agricultural commodities, the development of corn production continues to be improved to realize self-sufficiency. Therefore, the development policy of corn agribusiness has been implemented with various strategies. However, there are constraints in household decisions in making production, labor allocation, and decisions for consumption. The availability of farm inputs largely determines corn production decisions, such as seed quality, availability of fertilizers, pesticides, and technological packages that can increase maize productivity.

South Sulawesi is one of the corn-producing provinces in Indonesia and its production in 2015 ranked third, after East and Central Java. The area of maize planted in South Sulawesi has fluctuated for five years. In 2011, 2012, 2013, 2014, and 2015, the area of maize planted was 303,375 ha, 297,226 ha, 325,329 ha, 274,046 and 289,736 ha, respectively. The occurrence of fluctuations in corn plantations is influenced by the decisions of corn farmers in the production process. The decision is based on the availability of production inputs and labor. Land area, seeds, labor, experience, number of family dependents, education, and age significantly affect corn farming production (Hoar & Fallo, 2017). Labor is an important factor in farming, especially the family workforce and members. The allocation of labor needs attention because the workforce

may influence farming financing. The number of labor owned by households as a source workforce is often insufficient; hence the farmer recruits workers outside the family (Suratiyah, 2008).

Attempts to enhance productivity through the workforce are often conducted. Smallholder farmers often include their children in work to cut labor expenses. According to the survey conducted by the International Labor Organization (ILO) and the Central Statistics Agency (BPS), the total number of child workers aged 5-17 years was around 58.8 million. The result showed that 48.1 million (81.8%) children attend school, 24.3 million (41.2%) are engaged in house works, and 6.7 million (11.4%) do not attend school or are involved in house works (Rizkianto et al., 2013). Children are also involved in the labor force in various developing and developed nations (Berlan, 2013; David & Myers, 2006). The agriculture industry employs the vast majority of child workers. For example, about one-fifth of all Bangladeshi children under 5 and 14 years were classified as child workers in 2000. The result supports the widely-held hypothesis that poverty compels children to work (Salmon, 2005). Therefore, this research aims to analyze the potential and workload of internal labor of corn farmer households in the South, as well as the extent to which child labor is involved.

MATERIALS AND METHODS

The research was conducted in Gowa Regency (GO), Jeneponto Regency (JE), and Bulukumba Regency (BU). The total area of corn plantations in South Sulawesi in 2015 was 289,736 hectares. Therefore, the regencies were selected because of their large corn plantations, contributing 41.9% of the corn area in South Sulawesi. Based on the data, GO, JE and BU have a corn production area of 42,599 hectares, 49,627 hectares, and 29,047 hectares, respectively.

A multistage sampling technique was adopted to get representative data in each regency, and a sub-regency was selected based on land area and productivity. Furthermore, two villages were selected from each sub-regency, resulting in a total of six.

Primary and secondary data were used in this research. Primary data were collected through interviews with the guidelines on the research questionnaire. In contrast, secondary data were collected from various sources related to the research objectives, and 300 subjects responded to the questionnaire.

Data analysis was conducted descriptively, and the calculation was carried out by considering the conversion of the workload. For example, a Male Working Day (MWD) and the female workforce are equivalent to 7 hours of work and 0.7 MWD. Meanwhile, child, livestock, and machine labor equals 0.5 MWD, 25 MWD, and 50 MWD, respectively.

RESULTS

The realization of internal labor for corn farmers in South Sulawesi is high. Subsequently, the mean potential for household work is 752.11 MWD, consisting of 437 (59.2%) men, 200.71 (26.9%) women, and 114.4 (13.7%) children. The highest percentage of male and female workers is in BU and GO regencies, while the highest percentage of child workers is in the JE regency (Table 1).

Table 1: Analysis of farmer household work potential in South Sulawesi, 2017

Regencies	Type and potential of the workforce (MWD)/year						Total of potential (MWD)
	Man		Woman		Children		
	MWD	%	MWD	%	MWD	%	
GO	525	64.8	249.5	30.8	27.3	3.4	810.8
JE	387	45.1	184.8	21.5	287.3	33.4	859.1
BU	399	68	167.9	28.6	19.6	3.3	586.5
Total	1331	177.8	602.1	80.9	334.2	40.2	2256.3
Rata-rata	437	59.3	200.7	27	114.4	13.4	752.1

Source: Primary Data, 2017

The employment potential of both genders in the GO Regency is greater than that of the JE and BU Regencies. The work potential of the internal labor of corn farmer households is allocated to farm activities with the rice-corn-corn cropping pattern (Table 2).

Table 2: Analysis of Farmer household work potential per planting season in South Sulawesi

Regencies	Type and potential of the workforce (MWD)/year						Total of potential (MWD)
	Man		Woman		Children		
	MWD	%	MWD	%	MWD	%	
GO	175	65.5	83.16	31.1	9.10	3.4	267.26
JE	129	64.6	61.60	30.8	9.10	4.6	199.70
BU	133	68.2	55.59	28.5	6.53	3.3	195.12
Total	437	198.2	200.35	90.5	24.73	11.3	662.08
Rata-rata	145.67	66.1	66.78	30.2	8.24	3.8	220.69

Source: Primary Data, 2017.

The internal labor (workload) for maize farming activities for maize farmers in South Sulawesi season 1 is 138.08 MWD. The survey area showed a total workload of 89.67 MW, 46.80 MW, and 1.61 MW for men, women, and children. From the analysis results, planting (22.45) absorbs the most workforce, followed by weed clearing 1 (17.955.98) and harvesting (17.77) (Table 3).

Table 3: Labor force per agricultural activity in season 1

Farming Activities	Workforce (MWD)			Total workforce
	Man	Woman	Children	
Tillage	11.87	3.14	0.00	15.01
Planting	13.93	7.83	0.69	22.45
Fertilization 1	10.88	6.27	0.53	17.68
Weed cleaning 1	12.05	5.81	0.10	17.95
Pest control	6.57	0.00	0.00	6.57
Fertilization 2	9.80	7.30	0.16	17.25
Weed Cleaning 2	7.92	5.89	0.00	13.81
Harvesting	11.04	6.61	0.12	17.77
Post-harvesting	5.61	3.96	0.01	9.58
Total output workload	89.67	46.80	1.61	138.08

The output (workload) of internal labor for farming activities of corn farmers in South Sulawesi season 2 is 146.37 MWD. Based on the survey area, the total workload of men, women, and

children was 93.34 MWD, 49.17 MWD, and 3.86 MWD. From the analysis, weed cleaning 1 (23.31) absorbs the most workforce, followed by planting (21.30) and fertilization 1 (19.24) (Table 4).

Table 4: Output of workforce for each farming activity in season 2

Farming activities	workforce (MWD)			Total workforce
	Man	Woman	Children	
Tillage	13.39	4.10	0.59	18.08
Planting	12.86	7.63	0.81	21.30
Fertilization 1	11.59	7.29	0.36	19.24
Weed cleaning 1	13.93	8.55	0.83	23.31
Pest control	7.41	0.03	0.00	7.44
Fertilization 2	6.95	4.37	0.08	11.40
Weed Cleaning 2	8.77	6.14	0.37	15.28
Harvesting	10.98	6.40	0.33	17.71
Post-harvesting	7.45	4.66	0.50	12.61
Total output workload	93.34	49.17	3.86	146.37

The output (workload) of corn farmers in season 3 is 172.6 MWD. Based on the survey area, the total workload of men, women, and children was 108.44 MWD, 57.89 MWD, and 6.26 MWD. From the analysis results, harvesting (25.17) absorbs the largest workforce, followed by weed cleaning 1 (24.23) and 2 (21.79) (Table 5).

Table 5: Output of workforce for each farming activity in season 1

Farming Activities	workforce (MWD)			Mean workforce
	Man	Woman	Children	
Tillage	14.83	6.34	0.54	21.70
Planting	10.87	6.53	0.65	18.06
Fertilization 1	11.27	7.06	0.42	18.75
Weed cleaning 1	14.66	8.13	1.43	24.23
Pest control	8.02	0.03	0.00	8.05
Fertilization 2	11.44	6.95	0.08	18.47
Weed Cleaning 2	12.66	8.39	0.73	21.79
Harvesting	14.84	8.91	1.43	25.17
Post-harvesting	9.85	5.55	0.98	16.38

Total output workload	108.44	57.89	6.26	172.60
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Source: Primary Data, 2017

The analysis showed that the workforce output among men, women, and children differed ($F = 401.24$; $P < 0.001$) among farming activities ($F = 11.25$; $P < 0.001$). There was a significant interaction between the workload category and farming activity. However, there was no interaction between the workforce category and the season. Men almost dominate pest control and tillage activities, while women contribute to the other activities with less than 40%. Then children show few contributions in planting, fertilization 1, weed cleaning 1, harvesting, and post-harvesting (Table 6).

Table 6: Summary of F statistic followed by the significance of fruit fly abundance and diversity among locations, selling levels, and cultivars

Variables	Workforce category (c)	Farming activity (f)	Season (s)	c x f	c x s	f x s
F	401.24	11.25	6.66	3.83	.93	1.28
P	<0.001	<0.001	.002	<0.001	.447	.217

The survey results show the percentage of female workforce realization beyond their potential in season 1. The percentage of female workers who leave is between 61.44% to 74.17%. On the other hand, the percentage of male and children workers ranged from 55.75%-68.71% and 11.85-47.93% (Table 7).

Table 7: Contribution of farmer's household workforce output season 1 for rice commodity in South Sulawesi

Workforce categories	Workforce potential (MWD)			Workforce output (MWD)			Realized workforce output (%)		
	GO	JA	BU	GO	JA	BU	GO	JA	BU
Men	175.00	129.00	133.00	105.69	71.92	91.39	60.00	55.75	68.71
Women	83.16	61.60	55.59	61.68	37.85	40.91	74.17	61.44	73.59
Children	9.11	9.10	6.53	1.08	0.61	3.13	11.85	6.70	47.93
Total	267.27	199.70	195.12	168.45	110.39	135.43	62.98	55.28	69.41

The realization of the percentage of women workforce output in season 2 also shows a high value from 62.94% to 84.07%. On the other hand, the percentage of man and children workforce output ranged from 56.13% to 76.53% and 12.18 to 81.78% (Table 8).

Table 8: Contribution of Farmer's household work output season 2 for corn commodity in South Sulawesi

Workforce categories	Workforce potential (MWD)			Workforce output (MWD)			Realized workforce output (%)		
	GO	JA	BU	GO	JA	BU	GO	JA	BU
Men	175,00	129,00	133,00	98,22	98,73	89,95	56,13	76,53	67,63
Women	83,16	61,60	55,59	52,34	51,79	43,37	62,94	84,07	78,02
Children	9,11	9,10	6,53	1,11	5,12	5,34	12,18	56,26	81,78
Total	267,27	199,70	195,12	151,67	155,64	138,66	56,75	77,94	71,06

Source: Primary Data. 2017.

The realization of the percentage of women workforce output in season 3 also shows a high value ranging from 66.04% to 99.30%. In contrast, the percentage of men and children workforce output ranged from 61.01% to 83.50% and 14.16% to 156.87% (Table 8).

Table 9: Contribution of farmer's household work output season 3 for corn commodity in South Sulawesi

Workforce categories	Workforce potential (MWD)			Workforce output (MWD)			Realized workforce output (%)		
	GO	JA	BU	GO	JA	BU	GO	JA	BU
Men	175.00	129.00	133.00	106.76	107.71	103.42	61.01	83.50	77.76
Women	83.16	61.60	55.59	55.22	61.17	48.86	66.40	99.30	87.89
Children	9.11	9.10	6.53	1.29	6.16	10.25	14.16	67.69	156.97
Total	267.27	199.70	195.12	163.27	175.04	162.53	61.09	87.65	83.30

Source: Primary Data. 2017.

4 Discussion

The results showed that the potential for domestic work of corn farmers in South Sulawesi is relatively high. The male workforce potentials' means were the highest, followed by women and children. From the analysis of agricultural activities, weed cleaning, planting, and fertilizer spreading absorb a large amount of labor. In contrast, the contribution of women's work output is

higher than that of men. This indicates a high proportion of women working in agriculture. In addition to working on-farm, males are involved in various off-farm and nonagricultural activities. Male employees can often do all agricultural work, particularly the labor-intensive tasks that need great physical ability and those women avoid, such as ploughing. Another research indicated that women mostly did weeding and harvesting alone. In contrast, males did most of the sowing, seeding, maintenance, transplanting, and irrigation management (Paul & Rani, 2017).

Farmers' working time depends on many factors, including social factors. Subsequently, the factors influencing the working time of farmers include age, depends on the number of families, work experience, education level, and other occupations (Fauziyah et al., 2017). Marital status, income, and age significantly affect women's participation in agricultural production (Harun, 2014). The results are consistent with previous research that stated that women have a more significant workload than men because they are involved in agricultural and household activities (Paul & Rani, 2017). A research in Ethiopia revealed that women spent 26 hours per week in agricultural activities (Harun, 2014). Furthermore, studies conducted on coffee plantations show the importance of women in cultivating coffee plants. They conduct lighter activities requiring more accuracy and tenacity, such as fertilizing and pruning (Rizki et al., 2019). Farmer households generally carry out the labor division based on gender. Research in Kenya shows that men are involved in land clearing, land preparation, planting, and other activities. Therefore, they allocate more time for agricultural activities than women. Women are more involved in growing food crops, watering plants, food storage, and processing. They are also responsible for many productive activities in the house and productive community management activities. As a result, women perform more tasks, have more responsibilities, and work longer hours than men. With the division of tasks, household activities, including food preparation and cooking, are carried out

mainly by the wife, followed by the husband. As for children, girls are more involved in the task when compared to boys. Therefore, the continuity of the family role is traditionally associated with women (Lu, 2007).

Research conducted in Yogyakarta (Indonesia), Myanmar, and the Philippines show that manual planting is common for crop cultivation. Rice is propagated in South Sumatra (Sumatra, Indonesia) and Thailand. Transplants are usually carried out in groups, mainly consisting of women. However, men can assist in pulling and distributing seedlings. Most women are a good time to weed during the rice-growing phase. The application of fertilizers and pesticides is considered a man's job. Harvesting Guidelines are standard practice in most areas, apart from Thailand and some villages in South Sumatra (Sumatra, Indonesia) (Akter et al., 2017). The men and women occupied most of the activities related to agriculture, but in the case of livestock activities, women's participation was more.

The results differ from previous studies, where the output of male labor is higher than females. The intensity of men's work is also more significant in the household because they have a big responsibility to fulfill members' needs. On the other hand, the output of women's work in farming is lower than that of men. In rice farming, women assist with planting and harvesting activities. Therefore, they focus more on household activities, including looking after children under five (Norfahmi et al., 2017). Adeyonu & Oni, (2014) suggest that men work more time than women in paid agricultural business activities and work in non-agriculture. Meanwhile, women allocate more time to handle household chores.

The realization of the contribution of children's labor output is relatively low. However, it shows a sharp increase in season 3, following an output above 50%, and in one district, the score reaches 146%. This shows that the workload carried out by children exceeds the maximum limit.

Internal and external factors influence children's motivation to enter the world of work. A child's decision to work is closely related to the family's economic status (Yeni, 2018). Farmer household incomes are derived from farming and non-agriculture activities. According to Xu et al., (2017), households adjust labor for agriculture and non-agriculture. Therefore, farmer households increase participation in the local labor market in nonagricultural activities to increase income. The ILO (2004) adds that the decision of children to work due to economic and family demands has introduced various values of rules and responsibilities. Children's participation is also related to the value of parents' perspective. This includes parents that view children as exchange values and utilities in the family. Besides motivation, the other significant concern is the impact of working activities on children's health, education, and social atmosphere. According to the ILO (2004), children in the workforce would have low motivation to continue their education. Therefore, they may become unsuccessful and fall on low work performance. In research conducted by Smeru Research Institute, the failure of children in education results from the poverty factor of their families (Usman, 2002).

In the communities with low-income in developing countries, old-fashioned culture and traditions that underestimate the educational process in the school support the growing involvement of child labor. This situation is caused by the low education of the parents, low social and economic level of the family, and traditions. Therefore, many parents make odd choices like encouraging their kids to stop school and work on the farm instead of supporting their education. They argued that women do not need school following the high cost of education and unemployment rate among the higher education alumni. With low education and economic powerlessness, parents tend to be narrow-minded about their children's future. Therefore, they lack the consciousness to consider the benefits of higher schools that may improve the welfare of their

children's future. This situation encourages children to become laborers. Child labor is a violation of children's rights since it always has a detrimental influence on their physical, emotional, and social development (Hamamah, 2015).

5 Conclusion

The results indicate that the potential for domestic work of corn farmers in South Sulawesi is relatively high. The male workforce potentials' means were the highest, followed by women and children. Furthermore, the farming activities such as weed cleaning, planting, and fertilizer spreading absorb a large workforce. The contribution of women's work output is higher than that of men since a high proportion are involved in agriculture. Therefore, this research aims to minimize the male workforce's percentage and reduce children's workload.

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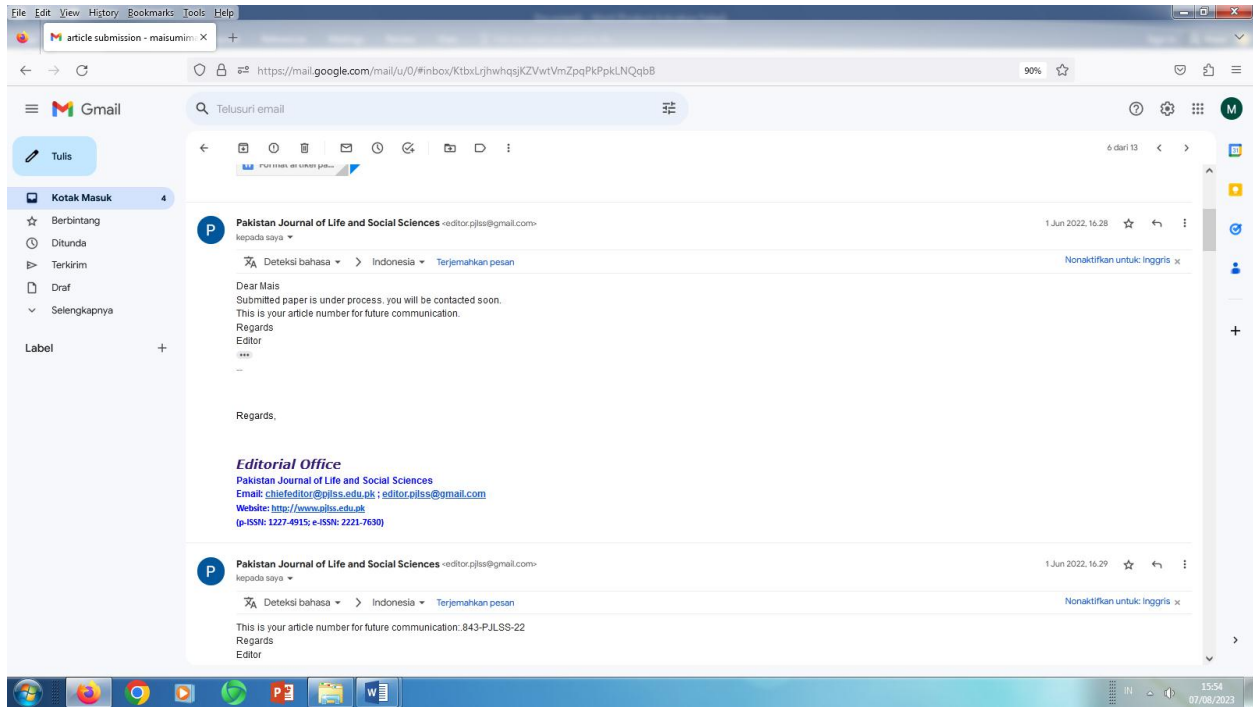
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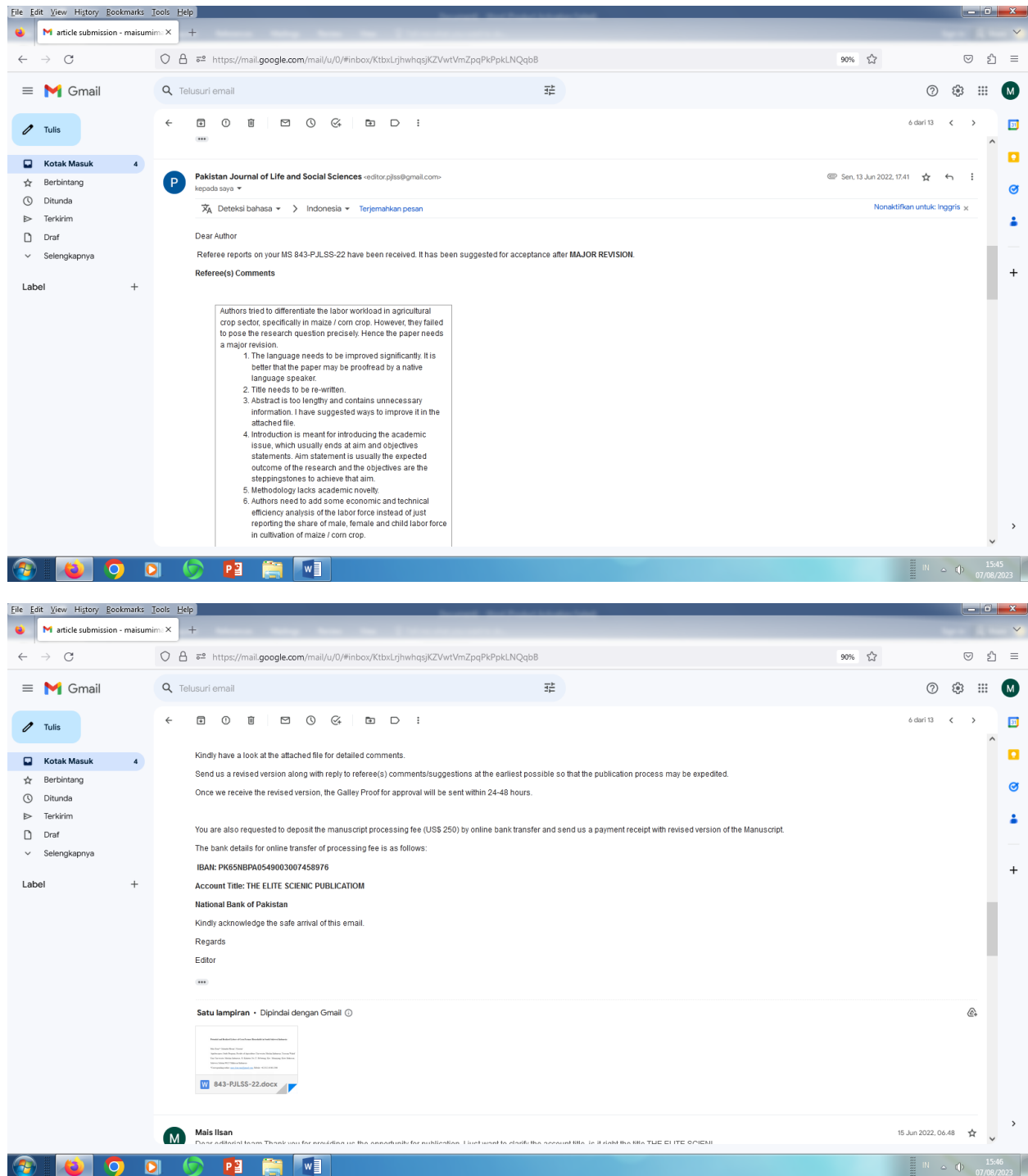
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Jawaban dari editor yg menyatakan bahwa artikel sudah diproses



Tanggapan dari editor yg menyatakan bahwa artikel harus diperbaiki (major revision)



Artikel yang direview oleh reviwer jurnal

(Terlampir di bawah dalam bentuk atikel pdf)

1 **Potential and Realized of Farmer Household Labor to Support Optimal Performance of Corn**
2 **and Rice Farming in South Sulawesi Indonesia**

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1 **Abstract:** The objective of this study is to analyze the potential and output of the internal workforce of
2 farmer households to support optimal performance of corn and rice farming in South Sulawesi,
3 Indonesia. It was conducted in six villages in Gowa Regency (GO), Jeneponto Regency (JE), and
4 Bulukumba Regency (BU) in South Sulawesi. The primary data were collected through interviews
5 with the guidelines on the research questionnaire. A total of 300 subjects responded to the
6 questionnaire, and the data obtained were analyzed descriptively. The workload calculation was
7 conducted by considering the conversion of the workload into male equivalent working days
8 (MWD). The MWD of female workforce are equivalent to 7 hours of work or 0.7 MWD, while child
9 labor equals 0.5 MWD. The results showed that the potential for domestic work of corn farmers in
10 South Sulawesi is relatively high. Male employment potentials were ranked highest, followed by
11 female and kid workforce potentials. The farming activities such as weed cleaning, planting, and
12 fertilizer spreading absorb a large workforce. In contrast, the percentage of women's work output
13 per potential is higher than that of men. This indicates a high proportion of women working in
14 agriculture. Therefore, the proportion of workforce production devoted to men potential should be
15 increased.

16 **Keywords:** child worker, agriculture, workload, workforce

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INTRODUCTION

Corn and rice are a long-established agricultural commodities in Indonesia. Presently, there is a substantial dry shell corn demand exceeding 10 million tons per year. The highest consumption of corn is for food and the animal feed. The feed industries consume about 51% of the raw material for animal feed. In aggregate, 72% of national corn production is used for the animal feed industry, 21% for food consumption, and 7% for other industrial needs (Kolo & Hutapea, 2016; Wanto et al., 2019). As one of the essential agricultural commodities, the development of corn production continues to increase to realize self-sufficiency. For that purpose the development policy of corn agribusiness has been implemented with various strategies. However, the land owner encountered some constraints in decisions making for production, labor allocation, and consumption. The availability of farm inputs such as seed quality, availability of fertilizers, pesticides, and technological packages largely determines corn production decisions, that can increase corn productivity (Hoar & Fallo, 2017). Meanwhile, the labor allocation including the number and type of worker needs to be regulated so that the land owner can employ them optimally and received a high productivity.

The allocation of labor needs attention because the workforce may influence farming financing. the number of workers who come from family members of land owners is often insufficient; hence they recruits workers outside their family (Suratiah, 2008). Attempts to enhance productivity through the workforce are often conducted. Smallholder farmers generally include their children in work to cut labor expenses. According to the survey conducted by the International Labor Organization (ILO) and the Central Statistics Agency of Indonesia, the total number of child workers aged 5-17 years was around 58.8 million. The result showed that 48.1 million (81.8%) children attend school, 24.3 million (41.2%) are engaged in house works, and 6.7 million (11.4%) do not attend school nor are involved in house works (Rizkianto et al., 2013). Children are also involved in the labor force in various developing and developed nations (Berlan, 2013; David & Myers, 2006), because the agriculture industry employs the vast majority of child workers. For example, about one-fifth of all Bangladeshi children under 5 and 14

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1 years were classified as child workers in 2000. The result supports the widely-held hypothesis that
2 poverty compels children to work (Salmon, 2005).

3 South Sulawesi is one of the corn-producing provinces in Indonesia and its production in 2020
4 ranked fifth. Corn production in this province reaches 1.82 million tons with an area of 377.7 thousand
5 hectares or equivalent to 4.83 tons/ha. In the last five years, corn production in this province has shown
6 a fluctuating trend. This trend is influenced by the decisions of corn farmers in the production process.
7 The number and skills of workers affect the productivity of corn fields. Optimal use of labor has an
8 impact on the income of both land owners and workers. Therefore, the objective of this study to analyze
9 the potential and realized workforce of corn farmer households in the South Sulawesi and discuss the
10 impact for improving efficiency.

11

12 MATERIALS AND METHODS

13 The research was conducted in three regencies in South Sulawesi Indonesia consisted of Gowa
14 Regency (GO), Jeneponto Regency (JE), and Bulukumba Regency (BU). Those regencies were selected
15 because of their large corn farms, contributing 41.9% of the corn area in South Sulawesi. Based on the
16 data, GO, JE and BU contributed a corn production area of 42,599 hectares, 49,627 hectares, and 29,047
17 hectares, respectively. During the rainy season, corn fields are generally utilized to cultivate raised
18 rice. The average corn production is 5.67 tonnes per ha and the price per kilogram was IDR 3500 (equal
19 to 2.4 USD), while the rice production is 4.81 tonnes per ha, and the price per kilogram was IDR 5000
20 (equal to 3.4 USD).

21 A multistage sampling technique was adopted to get representative data in each regency, and a sub-
22 regency was selected based on land area and productivity. Furthermore, two villages were selected from
23 each sub-regency, resulting in a total of six locations.

24 Primary and secondary data were collected in this research. Primary data were collected from
25 respondents through interviews with the guidelines on the research questionnaire. A total of 300

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Usually the aim is the expected outcome of the study and
objectives are smaller stepping stones to achieve that aim.

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were used? And what was the sense of that objective. It is not
clear.

1 respondents participated in responded to the questionnaire. Secondary data were collected from various
2 sources related to supporting data of total harvest corn price and daily wage.

3 Data analysis was conducted descriptively, and the calculation of realized workforce (workload
4 output) was conducted by considering the conversion of the workload into male equivalent working
5 days (MWD). The MWD of female workforce are equivalent to 7 hours of work or 0.7 MWD, while
6 child labor equals 0.5 MWD. Daily wage MWD is IDR 50,000 (equal to 3.4 USD).

8 RESULTS

9 *Potential of workforce among the category in three regencies*

10 This study showed that the highest workforce potential was found in GO (267.26 MWD/season), while
11 the lowest was found in BU (195.12 MWD/season). The man workforce potential was higher (66.1%)
12 compare to that of waman (30.2%) and child (3.8%) (Table 1). The employment potentials of both man
13 and woman in the GO Regency was greater than that of the JE and BU Regencies.

14 . Table 1: The farmer workforce potential per season in three regencies in South
15 Sulawesi

Bulawesi

Regencies	Category and potential of the workforce (MWD)/year						Total of potential (MWD)
	Man		Woman		Child		
	MWD	%	MWD	%	MWD	%	
GO	175	65.5	83.16	31.1	9.10	3.4	267.26
JE	129	64.6	61.60	30.8	9.10	4.6	199.70
BU	133	68.2	55.59	28.5	6.53	3.3	195.12
Total	437	198.2	200.35	90.5	24.73	11.3	662.08
Average	145.67	66.1	66.78	30.2	8.24	3.8	220.69

17 *Potential and realized workforce among the regencies in three seasons*

18 In season 1 (rice cultivation), the realization of workforce output for all categories reached 153.38 or an
19 average of 51.1% of the available potential. Women contributed the most (69.7%), while children
20 contributed the least (22.16%) (Table 2).

1 **Table 2: Contribution of farmer's household workforce output season 1 for rice commodity in**
2 **South Sulawesi**

Workforce categories	Workforce potential (MWD)			Workforce output (MWD)			Realized output (%)			Average of realized workforce
	GO	JA	BU	GO	JA	BU	GO	JA	BU	
Man	175	129	133	105.7	71.9	91.4	60	55.8	68.7	61.5
Woman	83.2	61.6	55.6	61.7	37.9	40.9	74.2	61.4	73.6	69.7
Child	9.1	9.1	6.5	1.1	0.6	3.1	11.9	6.7	47.9	22.2
Total	267.3	199.7	195.1	168.5	110.4	135.4	146	123.9	190.2	153.4

3

4 In season 2 (corn cultivation), the realization of workforce output for all categories reached 191.8 or an
5 average of 63.9% of the available potential. Women contributed the most (75%), while children
6 contributed the least (50.1%) (Table 3).

7 **Table 3: Contribution of Farmer's household work output season 2 for corn commodity in South**
8 **Sulawesi**

Workforce categories	Workforce potential (MWD)			Workforce output (MWD)			Realized output (%)			Average of realized workforce
	GO	JA	BU	GO	JA	BU	GO	JA	BU	
Man	175.0	129.0	133.0	98.2	98.7	90.0	56.1	76.5	67.6	66.8
Woman	83.2	61.6	55.6	52.3	51.8	43.4	62.9	84.1	78.0	75.0
Child	9.1	9.1	6.5	1.1	5.1	5.3	12.2	56.3	81.8	50.1
Total	267.3	199.7	195.1	151.7	155.6	138.7	131.3	216.9	227.4	191.8

10

11 In season 3 (corn cultivation), the realization of workforce output for all categories reached 238.2 or an
12 average of 79.4% of the available potential. Women contributed the most (84.5%), while men
13 contributed the least (74.1%) (Table 4). From these data, it can be seen that there has been a surge in the
14 realization of the workforce for children, even in one district (BU) reaching more than 100% (157%),
15 this indicates a workload that exceeds the standard.

16 **Table 4: Contribution of farmer's household work output season 3 for corn commodity in South**
17 **Sulawesi**

Workforce categories	Workforce potential (MWD)			Workforce output (MWD)			Realized output (%)			Average of realized workforce
	GO	JA	BU	GO	JA	BU	GO	JA	BU	
Man	175.0	129.0	133.0	106.8	107.7	103.4	61.0	83.5	77.8	74.1
Woman	83.2	61.6	55.6	55.2	61.2	48.9	66.4	99.3	87.9	84.5
Child	9.1	9.1	6.5	1.3	6.2	10.3	14.2	67.7	157.0	79.6
Total	267.3	199.7	195.1	163.3	175.0	162.5	141.6	250.5	322.6	238.2

19

20

21

1 *Realized workload output each season*

2 Realized workload output each season was presented in Tables 2 to 4. The total workload output in
 3 season 1 (rice cultivation) was 138.08 MWD. The total workload outputs for men, women, and children
 4 were 89.67 MWD, 46.80 MWD, and 1.61 MWD respectively. Planting absorbs the most workforce
 5 (22.45 MWD), followed by weed clearing 1 (17.95 MWD) and harvesting (17.77 MWD). The output of
 6 man workforce was allocated in planting and weed cleaning 1; that of woman was allocated in planting
 7 and fertilizing 2, and the child was allocated in planting and fertilizing 1 (Table 5).

8

9 **Table 5: The realized workforce output into farming activities in season 1 (rice)**

Farming Activities	Workforce (MWD)			Total workforce
	Man	Woman	Children	
Tillaging	11.87	3.14	0.00	15.01
Planting	13.93	7.83	0.69	22.45
Fertilization 1	10.88	6.27	0.53	17.68
Weed cleaning 1	12.05	5.81	0.10	17.95
Pest control	6.57	0.00	0.00	6.57
Fertilization 2	9.80	7.30	0.16	17.25
Weed Cleaning 2	7.92	5.89	0.00	13.81
Harvesting	11.04	6.61	0.12	17.77
Post-harvesting	5.61	3.96	0.01	9.58
Total workload output	89.67	46.80	1.61	138.08

10

11 The total workload output in season 2 (corn cultivation) was 146.37 MWD. The total workload outputs
 12 for men, women, and children were 93.34 MWD, 49.17 MWD, and 3.86 MWD respectively. Weed
 13 cleaning 1 absorbed the most workforce (23.31 MWD), followed by planting (21.30 MWD) and
 14 fertilizing 1 (19.24 MWD). The output of man workforce was allocated in tillaging and weed cleaning
 15 1, that of woman and child were allocated in weed cleaning 1 and planting (Table 6).

16 **Table 6: The realized workforce output into farming activities in season 2 (corn)**

Farming activities	workforce (MWD)			Total workforce
	Man	Woman	Children	
Tillaging	13.39	4.10	0.59	18.08
Planting	12.86	7.63	0.81	21.30
Fertilization 1	11.59	7.29	0.36	19.24
Weed cleaning 1	13.93	8.55	0.83	23.31

Pest control	7.41	0.03	0.00	7.44
Fertilization 2	6.95	4.37	0.08	11.40
Weed Cleaning 2	8.77	6.14	0.37	15.28
Harvesting	10.98	6.40	0.33	17.71
Post-harvesting	7.45	4.66	0.50	12.61
Total output workload	93.34	49.17	3.86	146.37

The total workload output in season 3 (corn cultivation) was 172.6 MWD. The total workload outputs for men, women, and children were 108.44 MWD, 57.89 MWD, and 6.26 MWD respectively. Harvesting absorbed the most workforce (25.17 MWD), followed by weed cleaning 1 (24.23 MWD) and weed cleaning 1 (21.79 MWD). The output of man workforce was allocated in harvesting and tillaging, that of woman was allocated in harvesting and weed cleaning 2, and the child was allocated in harvesting and weed cleaning 1 (Table 7).

Table 7: Output of workforce for each farming activity in season 3 (corn)

Farming Activities	Workforce (MWD)			Mean workforce
	Man	Woman	Children	
Tillaging	14.83	6.34	0.54	21.70
Planting	10.87	6.53	0.65	18.06
Fertilization 1	11.27	7.06	0.42	18.75
Weed cleaning 1	14.66	8.13	1.43	24.23
Pest control	8.02	0.03	0.00	8.05
Fertilization 2	11.44	6.95	0.08	18.47
Weed Cleaning 2	12.66	8.39	0.73	21.79
Harvesting	14.84	8.91	1.43	25.17
Post-harvesting	9.85	5.55	0.98	16.38
Total output workload	108.44	57.89	6.26	172.60

Source: Primary Data, 2017

Based on the analysis of three seasons, result showed that in season 1 (rice), the land absorbed 138.08 workforce (equal to 466.5 USD expense), meanwhile the total gross income was 1623.7 USD, resulting in an efficiency for gross income/workforce expense of 3.48. In the second season, the land absorbed

1 146.37 workforce (equal to 494.5 USD expense), meanwhile the total gross income was 1360.8 USD,
 2 resulting in an efficiency for income/workforce expense of 2.75. In the third season, the land absorbed
 3 172.6 workforce (equal to 583.1 USD expense), meanwhile the total gross income was 1360.8 USD,
 4 resulting in an efficiency for income/workforce expense of 2.33.
 5 The workforce output differed significantly among workforce category ($F = 401.24$; $P < 0.001$), farming
 6 activities ($F = 11.25$; $P < 0.001$) and season ($F = 6.66$; $P < 0.01$). There was a significant interaction
 7 between the workload category and farming activity, but no interaction between the workforce category
 8 and the season as well as between farming activity and season (Table 8).

9

10 **Table 8: Summary of F statistic followed by the significance of fruit fly abundance and diversity**
 11 **among locations, selling levels, and cultivars**

Variables	Workforce category (c)	Farming activity (f)	Season (s)	c x f	c x s	f x s
F	401.24	11.25	6.66	3.83	0.93	1.28
P	<0.001	<0.001	0.002	<0.001	0.447	0.217

12

13

14 **4 Discussion**

15 The results showed that the potential for domestic work of corn farmers in South Sulawesi is
 16 relatively high. The male workforce demonstrated the highest potential, followed by women and children.
 17 Namun demikian, dalam realisasinya woman workforce memiliki kontribusi persentase yang paling
 18 besar, lebih dari 70% dari potensi tenaga kerja wanita terserap dalam lapangan kerja di faming. This
 19 indicates a high proportion of women working in agriculture. In addition to working on-farm, males are
 20 involved in various off-farm and nonagricultural job activities. Male employees can often do all
 21 agricultural work, particularly the labor-intensive tasks that need great physical ability such as
 22 ploughing. From the analysis of agricultural activities, weed cleaning, planting, and fertilizing absorb a
 23 large amount of labor. Another research indicated that women mostly did weeding and harvesting alone.

1 In contrast, males did most of the sowing, seeding, maintenance, transplanting, and irrigation
2 management (Paul & Rani, 2017).

3 Farmers' working time depends on many factors, including social factors. Those include of age,
4 marital status, number of dependent family members, work experience, education level, and other
5 occupations (Fauziyah et al., 2017). Marital status, income, and age significantly affect women's
6 participation in agricultural production (Harun, 2014). The results are consistent with previous research
7 that stated that women have a more significant workload than men because they are involved in both
8 agricultural and household activities (Paul & Rani, 2017). Farmer households generally carry out the
9 labor division based on gender. A research in Ethiopia revealed that women spent 26 hours per week in
10 agricultural activities (Harun, 2014). Furthermore, a study conducted on coffee plantations shows the
11 importance of women in cultivating coffee plants. They conduct lighter activities requiring more
12 accuracy and tenacity, such as fertilizing and pruning (Rizki et al., 2019). Research in Kenya shows that
13 men are involved in land clearing, land preparation, planting, and other activities. Therefore, they
14 allocate more time for agricultural activities than women. Women are more involved in growing food
15 crops, watering plants, food storage, and processing. They are also responsible for many productive
16 activities in the house and productive community management activities. As a result, women perform
17 more tasks, have more responsibilities, and work longer hours than men. With the division of tasks,
18 household activities, including food preparation and cooking, are carried out mainly by the wife,
19 followed by the husband. As for children, girls are more involved in the task when compared to boys.
20 Therefore, the continuity of the family role is traditionally associated with women (Lu, 2007).

21 Research conducted in Yogyakarta (Indonesia), Myanmar, and the Philippines show that manual
22 planting is common for crop cultivation. Rice is propagated in South Sumatra (Sumatra, Indonesia) and
23 Thailand. Transplants are usually carried out in groups, mainly consisting of women. However, men can
24 assist in pulling and distributing seedlings. Most women are a good time to weed during the rice-growing
25 phase. The application of fertilizers and pesticides is considered a man's job. Harvesting Guidelines are

1 standard practice in most areas, apart from Thailand and some villages in South Sumatra (Sumatra,
2 Indonesia) (Akter et al., 2017). The men and women occupied most of the activities related to
3 agriculture, but in the case of livestock activities, women's participation was more.

4 The results differ from previous studies, where the output of male labor is higher than females. The
5 intensity of men's work is also more significant in the household because they have a big responsibility
6 to fulfill members' needs. On the other hand, the output of women's work in farming is lower than that
7 of men. In rice farming, women assist with planting and harvesting activities. Therefore, they focus
8 more on household activities, including looking after children under five (Norfahmi et al., 2017). The
9 men spent more time than women in agricultural business activities as well as work in non-agriculture
10 sector. Meanwhile, women allocate more time to handle household chores (Adeyonu & Oni, 2014).

11 The results showed the strong influence of the season on realized workforce. In the first season,
12 which coincides with the rainy season, farmers generally plant rainfed rice which has a higher level of
13 efficiency. In the following season the rainfall declines hence the farmers switched to plant corn. The
14 higher efficiency of using labor in the rice season because rice cultivation absorbs less labor than corn.
15 Therefore, this study recommends that workers who are not absorbed in the rice cultivation work switch
16 to the another job.

17 The realization of the contribution of children's labor output is relatively moderate. The average of
18 absorbed child labor potential was 50.6%. Interestingly, it demonstrated a sharp increase in season 3,
19 following an output above 75%, and in one district, the score reaches 156%. This shows that the
20 workload carried out by children exceeds the maximum limit. Internal and external factors influence
21 children's motivation to enter the world of work. A child's decision to work is closely related to the
22 family's economic status (Yeni, 2018). Farmer household incomes are derived from farming and non-
23 agriculture activities. According to Xu et al., (2017), households adjust labor for agriculture and non-
24 agriculture. Therefore, farmer households increase participation in the local labor market in
25 nonagricultural activities to increase income. The decision of children to work due to economic and

family demands has introduced various values of rules and responsibilities (ILO, 2004). Children's participation is also related to the value of parents' perspective. This includes parents that view children as exchange values and utilities in the family. Besides motivation, the other significant concern is the impact of working activities on children's health, education, and social atmosphere. According to the ILO (2004), children in the workforce would have low motivation to continue their education. Therefore, they may become unsuccessful and fall on low work performance. In research conducted by Smeru Research Institute, the failure of children in education results from the poverty factor of their families (Usman, 2002).

In the communities with low-income in developing countries, old-fashioned culture and traditions that underestimate the educational process in the school support the growing involvement of child labor. This tradition may associated with the low parent's education, social and economic level. Therefore, many parents make odd choices like encouraging their kids to stop school and work on the farm instead of supporting their education. They argued that women do not need school following the high cost of education and unemployment rate among the higher education alumni. With low education and economic powerlessness, parents tend to be narrow-minded about their children's future. Therefore, they lack the consciousness to consider the benefits of higher schools that may improve the welfare of their children's future. This situation encourages children to become laborers. Child labor is a violation of children's rights since it always has a detrimental influence on their physical, emotional, and social development (Hamamah, 2015).

5 Conclusion

The results indicate that the potential for domestic work of corn farmers in South Sulawesi is relatively high. The male workforce potentials' means were the highest, followed by women and children. Furthermore, the farming activities such as weed cleaning, planting, and fertilizer spreading absorb a large workforce. The contribution of women's work output is higher than that of men since a

1 high proportion are involved in agriculture. Therefore, this research aims to minimize the male
2 workforce's percentage and reduce children's workload.

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8

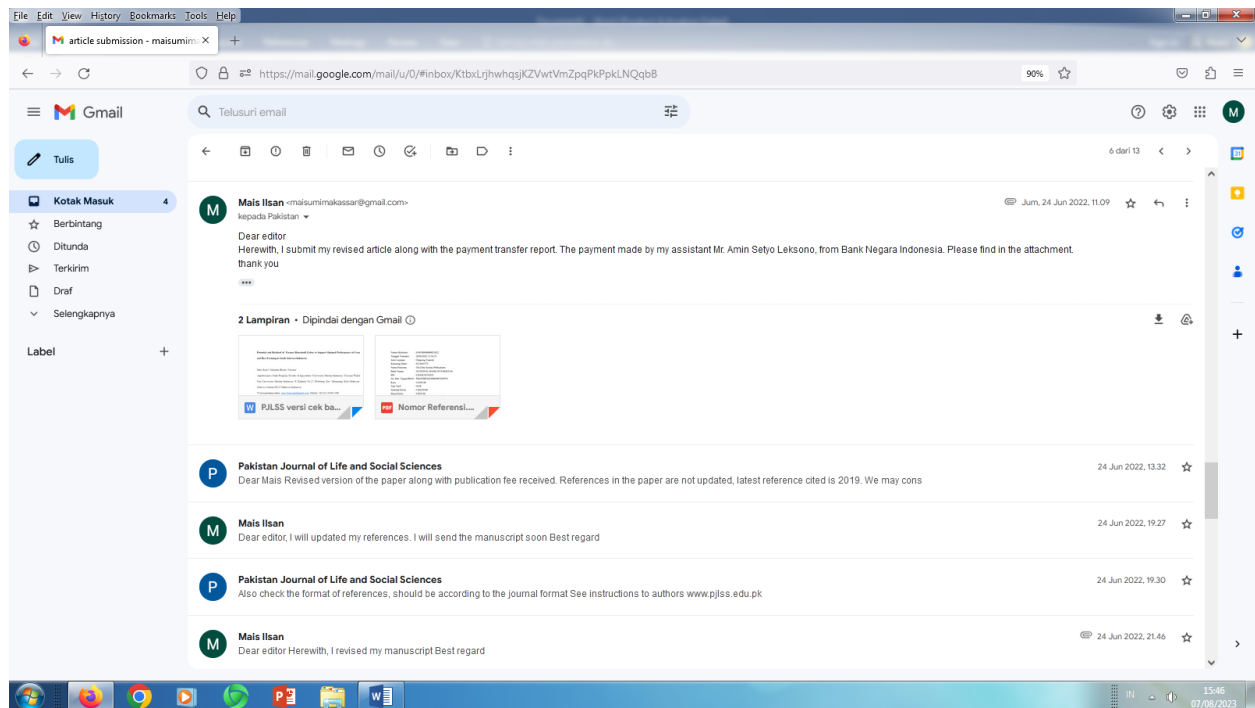
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Artikel yang telah direvisi penulis

(terlampir di bawah dalam bentuk pdf)

1 **Potential and Realized of Farmer Household Labor to Support Optimal Performance of Corn**
2 **and Rice Farming in South Sulawesi Indonesia**

3

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Abstract: the objective of this study is to analyze the potential and realized workforce of corn farmer households in South Sulawesi and discuss the impact of improving efficiency. Surveys were conducted in three regencies in South Sulawesi Indonesia consisting of Gowa Regency (GO), Jeneponto Regency (JE), and Bulukumba Regency (BU). A multistage sampling technique was adopted to get representative data in each regency, and a sub-regency was selected based on land area and productivity. Furthermore, two villages were selected from each sub-regency, resulting in a total of six locations. six villages. The primary data were collected through interviews with the respondents based on the research questionnaire guidelines. A total of 300 respondents responded to the questionnaire. The workload calculation was conducted by considering the conversion of the workload into man-equivalent working days (MWD). The MWD of the woman workforce is equivalent to 7 hours of work or 0.7 MWD, while child labor equals 0.5 MWD. The male workforce demonstrated the highest potential, followed by women and children. However, in reality, the female workforce has the largest percentage contribution more than 70% of the potential female workforce is absorbed in farming jobs. This indicates a high proportion of women working in agriculture. The first season of rice cultivation had highest efficiency while the third season demonstrated the lowest efficiency.

Keywords: child worker, agriculture, workload, workforce

1 INTRODUCTION

2 Corn and rice are long-established agricultural commodities in Indonesia. Presently, there is a
3 substantial dry shell corn demand exceeding 10 million tons per year. The highest consumption of corn
4 is for food and animal feed. In aggregate, 72% of national corn production is used for the animal feed
5 industry, 21% for food consumption, and 7% for other industrial needs (Kolo & Hutapea, 2016; Wanto
6 et al., 2019). As one of the essential agricultural commodities, the development of corn production
7 continues to increase to realize self-sufficiency. For that purpose, the development policy of corn
8 agribusiness has been implemented with various strategies. However, the land owners remain
9 encountered some constraints in decisions making for production, labor allocation, and consumption.
10 The availability of farm inputs such as seed quality, availability of fertilizers, pesticides, and
11 technological packages largely determines corn production decisions (Hoar & Fallo, 2017). Meanwhile,
12 the labor allocation including the number and category of workers needs to be regulated so that the land
13 owner can employ them optimally and receive high productivity. The allocation of labor needs attention
14 because the workforce influence farming financing. The number of internal workers from family
15 members of land owners is often insufficient; hence they recruits workers outside their family
16 (Suratiyah, 2008). Attempts to enhance productivity through increasing the workforce are often
17 conducted.

18 Smallholder farmers generally include their children in work to cut labor expenses. According to the
19 survey conducted by the International Labor Organization (ILO) and the Central Statistics Agency of
20 Indonesia, the total number of child workers aged 5-17 years was around 58.8 million. The result showed
21 that 48.1 million (81.8%) children attend school, 24.3 million (41.2%) are engaged in the house works,
22 and 6.7 million (11.4%) do not attend school nor are involved in the house works (Rizkianto et al.,
23 2013). Children are also involved in the labor force in various developing and developed nations (Berlan,
24 2013; David & Myers, 2006) because the agriculture industry employs the vast majority of child
25 workers. For example, about one-fifth of all Bangladeshi children under 5 and 14 years were classified

as child workers in 2000. The result supports the widely-held hypothesis that poverty compels children to work (Salmon, 2005).

South Sulawesi is one of the corn-producing provinces in Indonesia and its production in 2020 ranked fifth. Corn production in this province reaches 1.82 million tons with an area of 377.7 thousand hectares or equivalent to 4.83 tons/ha. In the last five years, corn production in this province has shown a fluctuating trend. This trend is influenced by the decisions of corn farmers in the production process. The number and skills of workers affect the productivity of corn fields. Optimal use of labor has an impact on the income of both land owners and workers. Therefore, the objective of this study is to analyze the potential and realized workforce of farmer households in South Sulawesi and discuss its impact for improving efficiency.

MATERIALS AND METHODS

The research was conducted in three regencies in South Sulawesi Indonesia consisting of Gowa Regency (GO), Jeneponto Regency (JE), and Bulukumba Regency (BU). Those regencies were selected because of their large corn farms, contributing 41.9% of the corn area in South Sulawesi. Based on the data, GO, JE and BU contributed a corn production area of 42,599 hectares, 49,627 hectares, and 29,047 hectares, respectively. During the rainy season, corn fields are generally utilized to cultivate rain-fed rice. The average corn production is 5.67 tonnes per ha and the price per kilogram was IDR 3500 (equal to 2.4 USD), while the rice production is 4.81 tonnes per ha, and the price per kilogram was IDR 5000 (equal to 3.4 USD).

A multistage sampling technique was adopted to get representative data in each regency, and a sub-regency was selected based on land area and productivity. Furthermore, two villages were selected from each sub-regency, resulting in a total of six locations.

Primary and secondary data were collected in this research. Primary data were collected from respondents through interviews with the guidelines on the research questionnaire. A total of 300

respondents participated in responding to the questionnaire. Secondary data were collected from various sources related to supporting data of total harvest corn price and daily wage.

Data analysis was conducted descriptively, and the calculation of realized workforce (workload output) was conducted by considering the conversion of the workload into male-equivalent working days (MWD). The MWD of female workforce is equivalent to 7 hours of work or 0.7 MWD, while child labor equals 0.5 MWD. The daily wage MWD is IDR 50,000 (equal to 3.4 USD).

7

8 RESULTS

9 *Potential of the workforce among the category in the three regencies*

This study showed that the highest workforce potential was found in GO (267.26 MWD/season), while the lowest was found in BU (195.12 MWD/season). The man workforce potential was higher (66.1%) compare to that of women (30.2%) and children (3.8%) (Table 1). The employment potential of both men and women in the GO Regency was greater than that of the JE and BU Regencies.

14 **Table 1: The farmer workforce potential in each category from three regencies in South Sulawesi**

Regencies	Category and potential of the workforce (MWD)/year						Total of potential (MWD)
	Man		Woman		Child		
	MWD	%	MWD	%	MWD	%	
GO	175	65.5	83.16	31.1	9.10	3.4	267.26
JE	129	64.6	61.60	30.8	9.10	4.6	199.70
BU	133	68.2	55.59	28.5	6.53	3.3	195.12
Total	437	198.2	200.35	90.5	24.73	11.3	662.08
Average	145.67	66.1	66.78	30.2	8.24	3.8	220.69

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16 *Potential and realized workforce among the regencies in three seasons*

In season 1 (rice cultivation), the realization of workforce output for all categories reached 153.38 MWD, or an average of 51.1% of the available potential. Women contributed the most (69.7%), while children contributed the least (22.16%) (Table 2).

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Table 2: Contribution of farmer's household workforce output season 1 for rice commodity in South Sulawesi

Workforce categories	Workforce potential (MWD)			Workforce output (MWD)			Realized output (%)			Average of realized workforce
	GO	JA	BU	GO	JA	BU	GO	JA	BU	
Man	175	129	133	105.7	71.9	91.4	60	55.8	68.7	61.5
Woman	83.2	61.6	55.6	61.7	37.9	40.9	74.2	61.4	73.6	69.7
Child	9.1	9.1	6.5	1.1	0.6	3.1	11.9	6.7	47.9	22.2
Total	267.3	199.7	195.1	168.5	110.4	135.4	146	123.9	190.2	153.4

In season 2 (corn cultivation), the realization of workforce output for all categories reached 191.8 MWD or an average of 63.9% of the available potential. Women contributed the most (75%), while children contributed the least (50.1%) (Table 3).

Table 3: Contribution of Farmer's household work output season 2 for corn commodity in South Sulawesi

Workforce categories	Workforce potential (MWD)			Workforce output (MWD)			Realized output (%)			Average of realized workforce
	GO	JA	BU	GO	JA	BU	GO	JA	BU	
Man	175.0	129.0	133.0	98.2	98.7	90.0	56.1	76.5	67.6	66.8
Woman	83.2	61.6	55.6	52.3	51.8	43.4	62.9	84.1	78.0	75.0
Child	9.1	9.1	6.5	1.1	5.1	5.3	12.2	56.3	81.8	50.1
Total	267.3	199.7	195.1	151.7	155.6	138.7	131.3	216.9	227.4	191.8

In season 3 (corn cultivation), the realization of workforce output for all categories reached 238.2 MWD or an average of 79.4% of the available potential. Women contributed the most (84.5%), while men contributed the least (74.1%) (Table 4). From these data, it can be seen that there has been a surge in the realization of the workforce for children, even in a one district (BU) reaching more than 100% (157%), this indicates a workload that exceeds the standard.

Table 4: Contribution of farmer's household work output season 3 for corn commodity in South Sulawesi

Workforce categories	Workforce potential (MWD)			Workforce output (MWD)			Realized output (%)			Average of realized workforce
	GO	JA	BU	GO	JA	BU	GO	JA	BU	
Man	175.0	129.0	133.0	106.8	107.7	103.4	61.0	83.5	77.8	74.1
Woman	83.2	61.6	55.6	55.2	61.2	48.9	66.4	99.3	87.9	84.5
Child	9.1	9.1	6.5	1.3	6.2	10.3	14.2	67.7	157.0	79.6
Total	267.3	199.7	195.1	163.3	175.0	162.5	141.6	250.5	322.6	238.2

Realized workload output each season

Realized workload output each season was presented in Tables 2 to 4. The total workload output in season 1 (rice cultivation) was 138.08 MWD. The total workload outputs for men, women, and children were 89.67 MWD, 46.80 MWD, and 1.61 MWD respectively. Planting absorbs the most workforce (22.45 MWD), followed by weed clearing 1 (17.95 MWD) and harvesting (17.77 MWD). The output of the man workforce was allocated to planting and weed cleaning 1; that of the woman was allocated to planting and fertilizing 2, and the child was allocated to planting and fertilizing 1 (Table 5).

Table 5: The realized workforce output into farming activities in season 1 (rice)

Farming Activities	Workforce (MWD)			Total workforce
	Man	Woman	Children	
Tillaging	11.87	3.14	0.00	15.01
Planting	13.93	7.83	0.69	22.45
Fertilization 1	10.88	6.27	0.53	17.68
Weed cleaning 1	12.05	5.81	0.10	17.95
Pest control	6.57	0.00	0.00	6.57
Fertilization 2	9.80	7.30	0.16	17.25
Weed Cleaning 2	7.92	5.89	0.00	13.81
Harvesting	11.04	6.61	0.12	17.77
Post-harvesting	5.61	3.96	0.01	9.58
Total workload output	89.67	46.80	1.61	138.08

The total workload output in season 2 (corn cultivation) was 146.37 MWD. The total workload outputs for men, women, and children were 93.34 MWD, 49.17 MWD, and 3.86 MWD respectively. Weed cleaning 1 absorbed the most workforce (23.31 MWD), followed by planting (21.30 MWD) and fertilizing 1 (19.24 MWD). The output of the man workforce was allocated to tillaging and weed cleaning 1, and that of woman and child were allocated to weed cleaning 1 and planting (Table 6).

Table 6: The realized workforce output into farming activities in season 2 (corn)

Farming activities	workforce (MWD)			Total workforce
	Man	Woman	Children	
Tillaging	13.39	4.10	0.59	18.08
Planting	12.86	7.63	0.81	21.30
Fertilization 1	11.59	7.29	0.36	19.24
Weed cleaning 1	13.93	8.55	0.83	23.31
Pest control	7.41	0.03	0.00	7.44
Fertilization 2	6.95	4.37	0.08	11.40
Weed Cleaning 2	8.77	6.14	0.37	15.28
Harvesting	10.98	6.40	0.33	17.71
Post-harvesting	7.45	4.66	0.50	12.61
Total output workload	93.34	49.17	3.86	146.37

The total workload output in season 3 (corn cultivation) was 172.6 MWD. The total workload outputs for men, women, and children were 108.44 MWD, 57.89 MWD, and 6.26 MWD respectively. Harvesting absorbed the most workforce (25.17 MWD), followed by weed cleaning 1 (24.23 MWD) and weed cleaning 1 (21.79 MWD). The output of the man workforce was allocated to harvesting and tillaging, that of the woman was allocated to harvesting and weed cleaning 2, and the child was allocated to harvesting and weed cleaning 1 (Table 7).

Table 7: Output of workforce for each farming activity in season 3 (corn)

Farming Activities	Workforce (MWD)			Mean workforce
	Man	Woman	Children	
Tillaging	14.83	6.34	0.54	21.70
Planting	10.87	6.53	0.65	18.06
Fertilization 1	11.27	7.06	0.42	18.75
Weed cleaning 1	14.66	8.13	1.43	24.23
Pest control	8.02	0.03	0.00	8.05
Fertilization 2	11.44	6.95	0.08	18.47
Weed Cleaning 2	12.66	8.39	0.73	21.79
Harvesting	14.84	8.91	1.43	25.17
Post-harvesting	9.85	5.55	0.98	16.38
Total output workload	108.44	57.89	6.26	172.60

Source: Primary Data, 2017

Based on the analysis of three seasons, the result showed that in season 1 (rice), the land absorbed 138.08 workforces (equal to 466.5 USD expense), meanwhile, the total gross income was 1623.7 USD, resulting

in efficiency for gross income/workforce expense of 3.48. In the second season, the land absorbed 146.37 workforces (equal to 494.5 USD expense), meanwhile, the total gross income was 1360.8 USD, resulting in efficiency for income/workforce expense of 2.75. In the third season, the land absorbed 172.6 workforces (equal to 583.1 USD expense), meanwhile, the total gross income was 1360.8 USD, resulting in efficiency for income/workforce expense of 2.33.

The workforce output differed significantly among workforce category ($F = 401.24$; $P < 0.001$), farming activities ($F = 11.25$; $P < 0.001$) and season ($F = 6.66$; $P < 0.01$). There was a significant interaction between the workload category and farming activity, but no interaction between the workforce category and the season as well as between farming activity and season (Table 8).

Table 8: Summary of F statistic followed by the significance of fruit fly abundance and diversity among locations, selling levels, and cultivars

Variables	Workforce category (c)	Farming activity (f)	Season (s)	c x f	c x s	f x s
F	401.24	11.25	6.66	3.83	0.93	1.28
P	<0.001	<0.001	0.002	<0.001	0.447	0.217

4 Discussion

The results showed that the potential for domestic work of corn farmers in South Sulawesi is relatively high. The male workforce demonstrated the highest potential, followed by women and children. However, in reality, the female workforce has the largest percentage contribution more than 70% of the potential female workforce is absorbed in farming jobs. This indicates a high proportion of women working in agriculture. In addition to working on-farm, males are involved in various off-farm and nonagricultural job activities. Male employees can often do all agricultural work, particularly the labor-intensive tasks that need great physical ability such as plowing. From the analysis of agricultural activities, weed cleaning, planting, and fertilizing absorb a large amount of labor. Another research

1 indicated that women mostly did weeding and harvesting alone. In contrast, males did most of the
2 sowing, seeding, maintenance, transplanting, and irrigation management (Paul & Rani, 2017).

3 Farmers' working time depends on many factors, including social factors. These include age, marital
4 status, number of dependent family members, work experience, education level, and other occupations
5 (Fauziyah et al., 2017). Marital status, income, and age significantly affect women's participation in
6 agricultural production (Harun, 2014). The results are consistent with previous research that stated that
7 women have a more significant workload than men because they are involved in both agricultural and
8 household activities (Paul & Rani, 2017). Farmer households generally carry out the labor division
9 based on gender. Research in Ethiopia revealed that women spent 26 hours per week in agricultural
10 activities (Harun, 2014). Furthermore, a study conducted on coffee plantations shows the importance of
11 women in cultivating coffee plants. They conduct lighter activities requiring more accuracy and tenacity,
12 such as fertilizing and pruning (Rizki et al., 2019). Research in Kenya shows that men are involved in
13 land clearing, land preparation, planting, and other activities. Therefore, they allocate more time for
14 agricultural activities than women. Women are more involved in growing food crops, watering plants,
15 food storage, and processing. They are also responsible for many productive activities in the house and
16 productive community management activities. As a result, women perform more tasks, have more
17 responsibilities, and work longer hours than men. With the division of tasks, household activities,
18 including food preparation and cooking, are carried out mainly by the wife, followed by the husband.
19 As for children, girls are more involved in the task when compared to boys. Therefore, the continuity of
20 the family role is traditionally associated with women (Lu, 2007).

21 Research conducted in Yogyakarta (Indonesia), Myanmar, and the Philippines shows that manual
22 planting is common for crop cultivation. Rice is propagated in South Sumatra (Sumatra, Indonesia) and
23 Thailand. Transplants are usually carried out in groups, mainly consisting of women. However, men can
24 assist in pulling and distributing seedlings. Most women are a good time to weed during the rice-growing
25 phase. The application of fertilizers and pesticides is considered a man's job. Harvesting Guidelines are

standard practice in most areas, apart from Thailand and some villages in South Sumatra (Sumatra, Indonesia) (Akter et al., 2017). The men and women occupied most of the activities related to agriculture, but in the case of livestock activities, women's participation was more.

The results differ from previous studies, where the output of male labor is higher than females. The intensity of men's work is also more significant in the household because they have a big responsibility to fulfill members' needs. On the other hand, the output of women's work in farming is lower than that of men. In rice farming, women assist with planting and harvesting activities. Therefore, they focus more on household activities, including looking after children under five (Norfahmi et al., 2017). The men spent more time than women in agricultural business activities as well as work in the non-agriculture sector. Meanwhile, women allocate more time to handle household chores (Adeyonu & Oni, 2014).

The results showed the strong influence of the season on the realized workforce. In the first season, which coincides with the rainy season, farmers generally plant rainfed rice which has a higher level of efficiency. In the following season, the rainfall declined hence the farmers switched to cultivating corn. The higher efficiency of using labor in the rice season because rice cultivation absorbs less labor than corn. Therefore, this study recommends that workers who are not absorbed in the rice cultivation work switch to the other job.

The realization of the contribution of children's labor output is relatively moderate. The average of absorbed child labor potential was 50.6%. Interestingly, it demonstrated a sharp increase in season 3, following an output above 75%, and in one district, the score reaches 156%. This shows that the workload carried out by children exceeds the maximum limit. Internal and external factors influence children's motivation to enter the world of work. A child's decision to work is closely related to the family's economic status (Yeni, 2018). Farmer household incomes are derived from farming and non-agriculture activities. According to Xu et al., (2017), households adjust labor for agriculture and non-agriculture. Therefore, farmer households increase participation in the local labor market in

1 nonagricultural activities to increase income. The decision of children to work due to economic and
2 family demands has introduced various values of rules and responsibilities (ILO, 2004). Children's
3 participation is also related to the value of parents' perspective. This includes parents that view children
4 as exchange values and utilities in the family. Besides motivation, the other significant concern is the
5 impact of working activities on children's health, education, and social atmosphere. According to the
6 ILO (2004), children in the workforce would have low motivation to continue their education. Therefore,
7 they may become unsuccessful and fall on low work performance. In research conducted by Smeru
8 Research Institute, the failure of children in education results from the poverty factor of their families
9 (Usman, 2002).

10 In the communities with low income in developing countries, old-fashioned culture and traditions
11 that underestimate the educational process in the school support the growing involvement of child labor.
12 This tradition may be associated with the low parent's education and social and economic levels.
13 Therefore, many parents make odd choices like encouraging their kids to stop school and work on the
14 farm instead of supporting their education. They argued that women do not need school following the
15 high cost of education and unemployment rate among the higher education alumni. With low education
16 and economic powerlessness, parents tend to be narrow-minded about their children's future. Therefore,
17 they lack the consciousness to consider the benefits of higher schools that may improve the welfare of
18 their children's future. This situation encourages children to become laborers. Child labor is a violation
19 of children's rights since it always has a detrimental influence on their physical, emotional, and social
20 development (Hamamah, 2015).

21 **5 Conclusion**

22 The results indicate that the potential for domestic work of corn farmers in South Sulawesi is
23 relatively high. The male workforce potential means we're the highest, followed by women and children.
24 Furthermore, the farming activities such as weed cleaning, planting, and fertilizer spreading absorb a

large workforce. The contribution of women's work output is higher than that of men since a high proportion are involved in agriculture.

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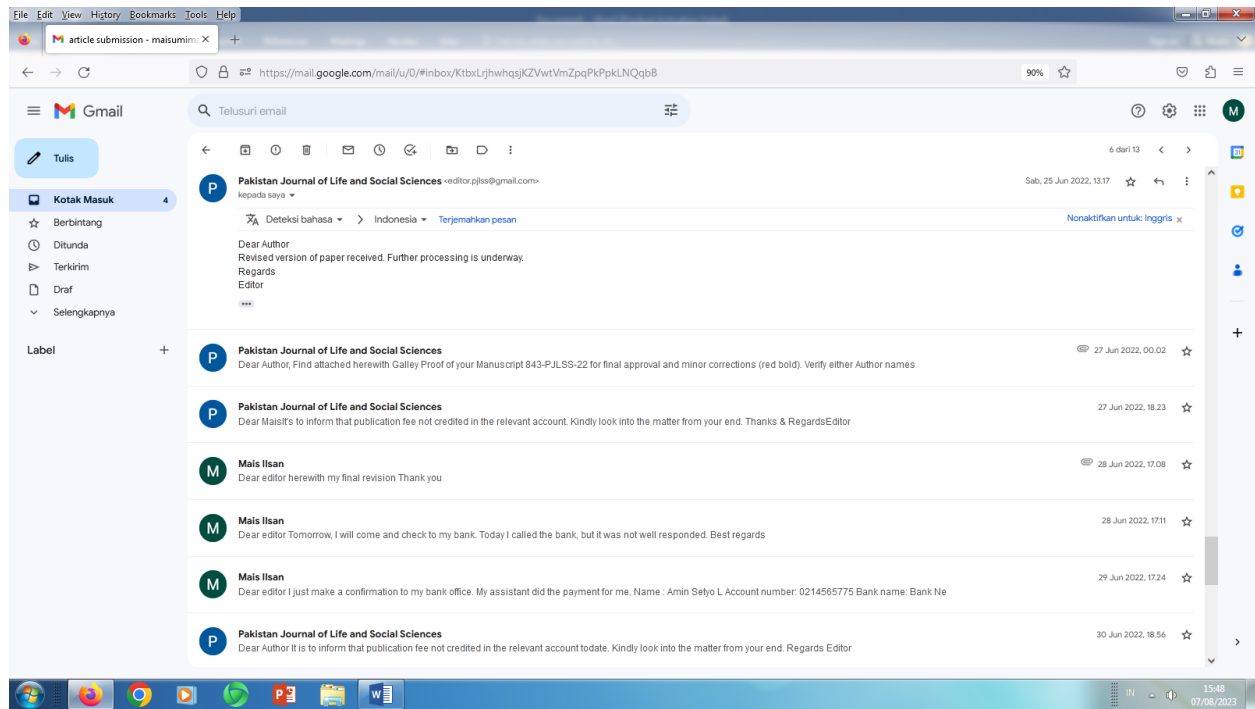
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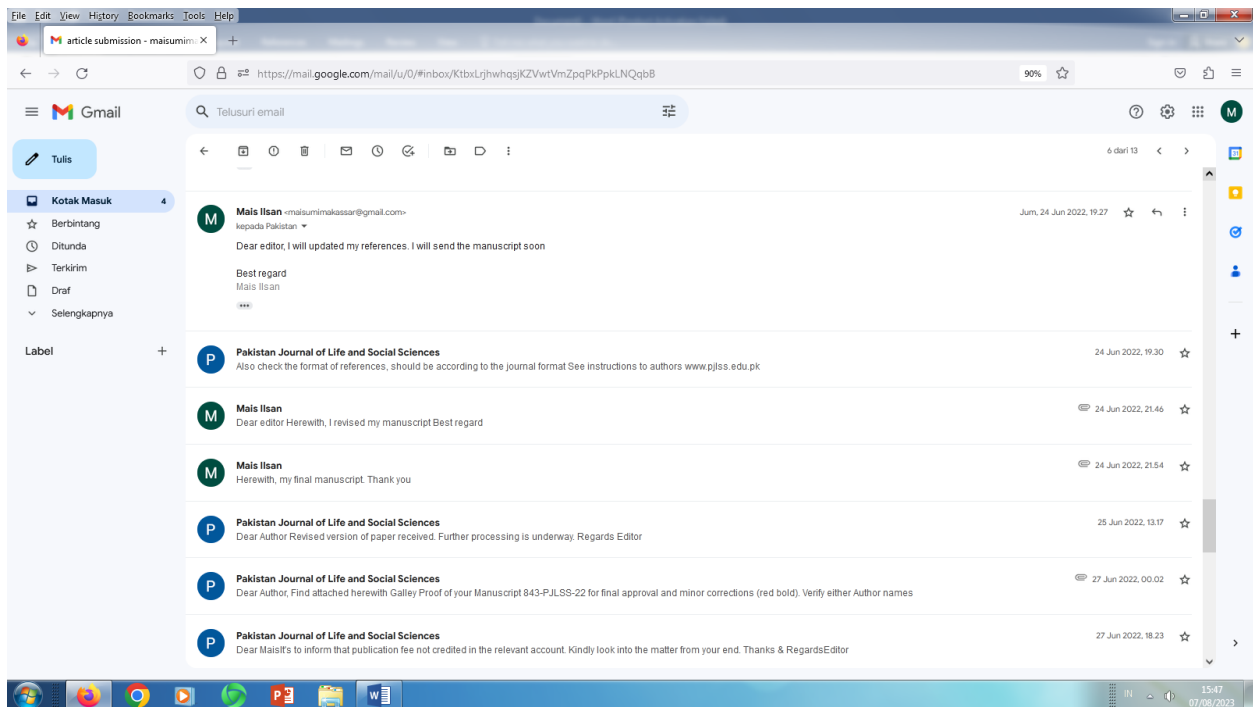
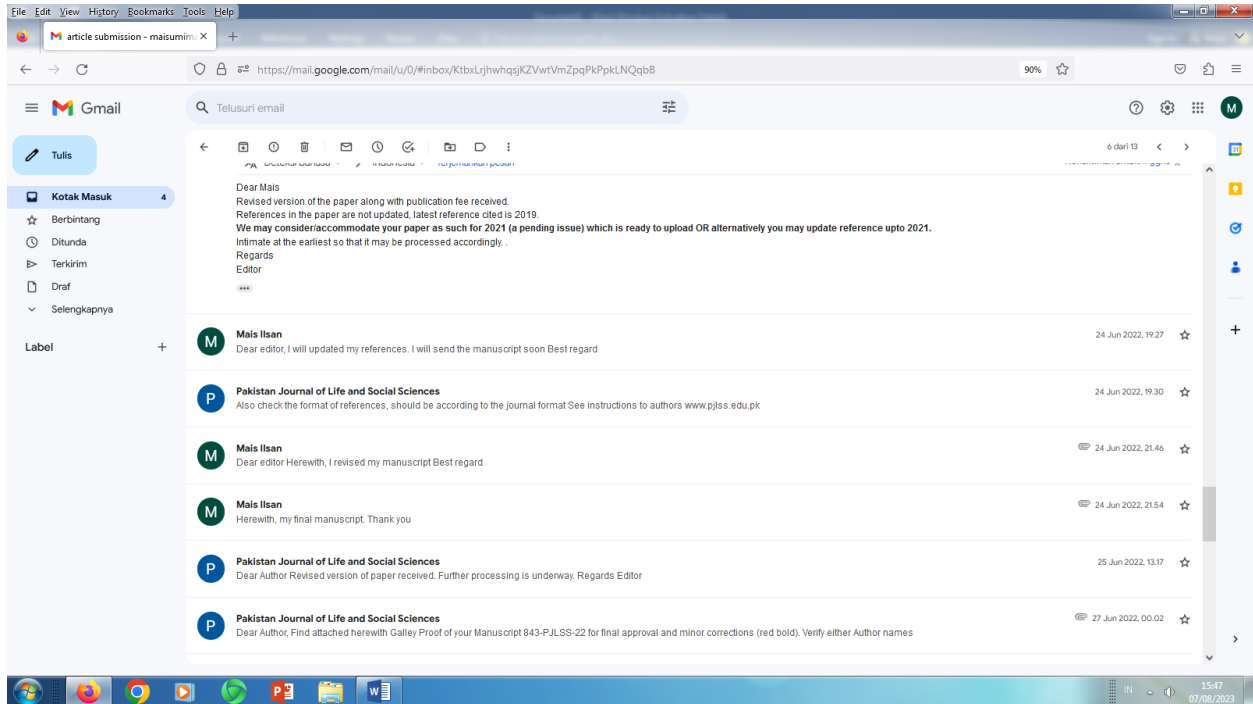
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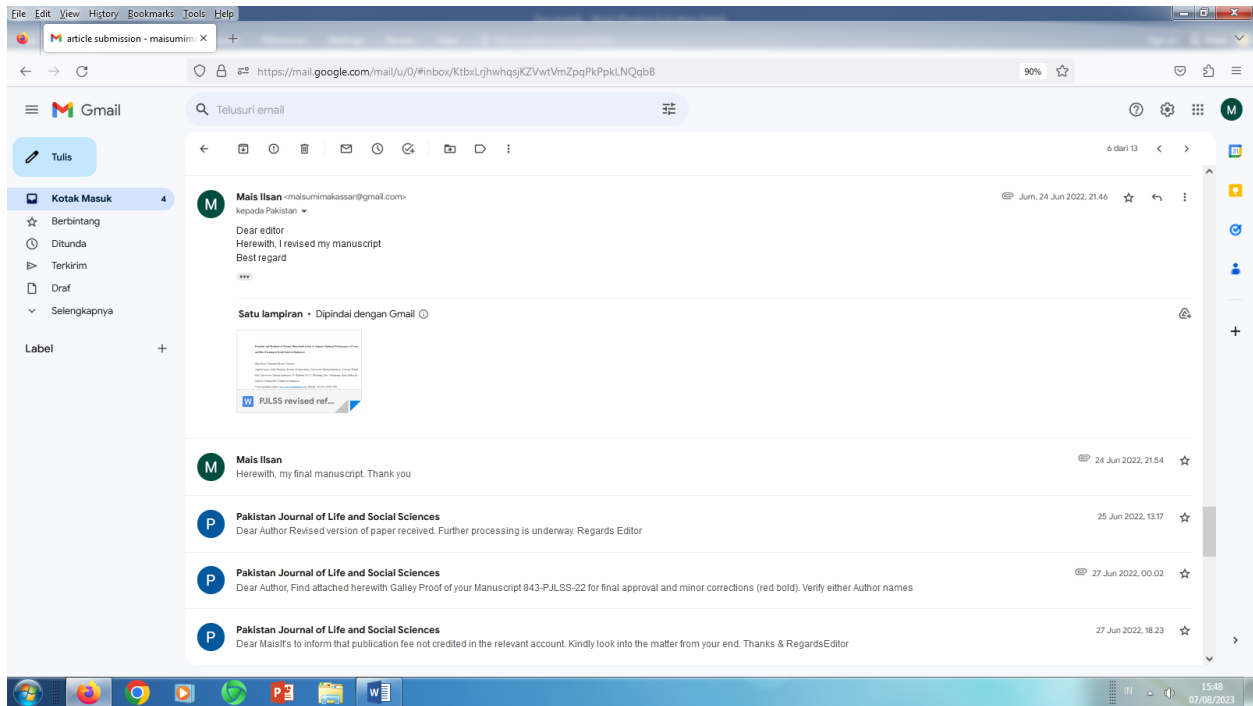
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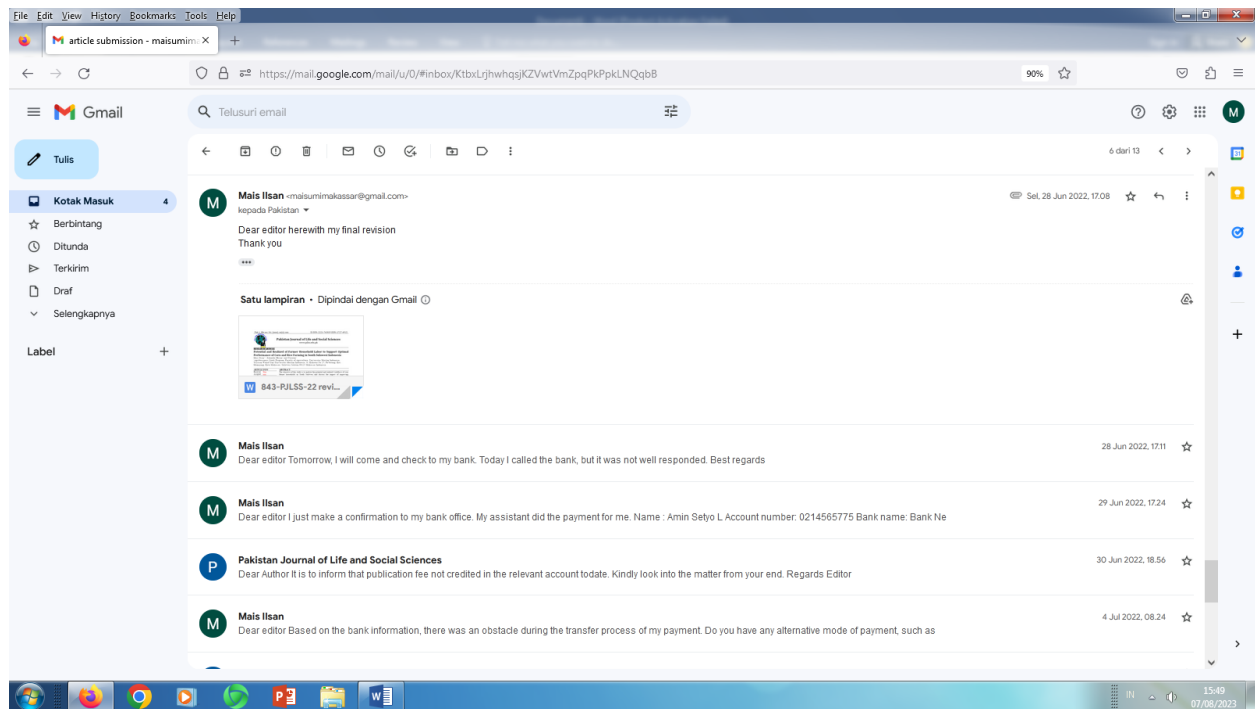


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1 **Potential and Realized of Farmer Household Labor to Support Optimal Performance of Corn and**
2 **Rice Farming in South Sulawesi Indonesia**

3

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Abstract: the objective of this study is to analyze the potential and realized workforce of corn farmer households in South Sulawesi and discuss the impact of improving efficiency. Surveys were conducted in three regencies in South Sulawesi Indonesia consisting of Gowa Regency (GO), Jeneponto Regency (JE), and Bulukumba Regency (BU). A multistage sampling technique was adopted to get representative data in each regency, and a sub-regency was selected based on land area and productivity. Furthermore, two villages were selected from each sub-regency, resulting in a total of six locations. six villages. The primary data were collected through interviews with the respondents based on the research questionnaire guidelines. A total of 300 respondents responded to the questionnaire. The workload calculation was conducted by considering the conversion of the workload into man-equivalent working days (MWD). The MWD of the woman workforce is equivalent to 7 hours of work or 0.7 MWD, while child labor equals 0.5 MWD. The male workforce demonstrated the highest potential, followed by women and children. However, in reality, the female workforce has the largest percentage contribution more than 70% of the potential female workforce is absorbed in farming jobs. This indicates a high proportion of women working in agriculture. The first season of rice cultivation had highest efficiency while the third season demonstrated the lowest efficiency.

Keywords: child worker, agriculture, workload, workforce

1 INTRODUCTION

2 Corn and rice are long-established agricultural commodities in Indonesia. Presently, there is a
3 substantial dry shell corn demand exceeding 10 million tons per year. The highest consumption of corn
4 is for food and animal feed. In aggregate, 72% of national corn production is used for the animal feed
5 industry, 21% for food consumption, and 7% for other industrial needs (Kolo & Hutapea, 2016; Wanto
6 et al., 2019). As one of the essential agricultural commodities, the development of corn production
7 continues to increase to realize self-sufficiency. For that purpose, the development policy of corn
8 agribusiness has been implemented with various strategies. However, the land owners remain
9 encountered some constraints in decisions making for production, labor allocation, and consumption.
10 The availability of farm inputs such as seed quality, availability of fertilizers, pesticides, and
11 technological packages largely determines corn production decisions (Hoar & Fallo, 2017). Meanwhile,
12 the labor allocation including the number and category of workers needs to be regulated so that the land
13 owner can employ them optimally and receive high productivity. The allocation of labor needs attention
14 because the workforce influence farming financing. The number of internal workers from family
15 members of land owners is often insufficient; hence they recruits workers outside their family
16 (Suratiyah, 2008). Attempts to enhance productivity through increasing the workforce are often
17 conducted.

18 Smallholder farmers generally include their children in work to cut labor expenses. According to the
19 survey conducted by the International Labor Organization (ILO) and the Central Statistics Agency of
20 Indonesia, the total number of child workers aged 5-17 years was around 58.8 million. The result showed
21 that 48.1 million (81.8%) children attend school, 24.3 million (41.2%) are engaged in the house works,
22 and 6.7 million (11.4%) do not attend school nor are involved in the house works (Rizkianto et al.,
23 2013). Children are also involved in the labor force in various developing and developed nations (Berlan,
24 2013; David & Myers, 2006) because the agriculture industry employs the vast majority of child
25 workers. For example, about one-fifth of all Bangladeshi children under 5 and 14 years were classified

as child workers in 2000. The result supports the widely-held hypothesis that poverty compels children to work (Salmon, 2005).

South Sulawesi is one of the corn-producing provinces in Indonesia and its production in 2020 ranked fifth. Corn production in this province reaches 1.82 million tons with an area of 377.7 thousand hectares or equivalent to 4.83 tons/ha. In the last five years, corn production in this province has shown a fluctuating trend. This trend is influenced by the decisions of corn farmers in the production process. The number and skills of workers affect the productivity of corn fields. However, increasing the workforce does not always results in higher productivity. Therefore, optimal use of labor has an impact on the income of both land owners and workers. The objective of this study is to analyze the potential and realized workforce of farmer households in South Sulawesi and discuss its impact for improving efficiency.

MATERIALS AND METHODS

The research was conducted in three regencies in South Sulawesi Indonesia consisting of Gowa Regency (GO), Jeneponto Regency (JE), and Bulukumba Regency (BU). Those regencies were selected because of their large corn farms, contributing 41.9% of the corn area in South Sulawesi. Based on the data, GO, JE and BU contributed a corn production area of 42,599 hectares, 49,627 hectares, and 29,047 hectares, respectively. During the rainy season, corn fields are generally utilized to cultivate rain-fed rice. The average corn production is 5.67 tonnes per ha and the price per kilogram was IDR 3500 (equal to 2.4 USD), while the rice production is 4.81 tonnes per ha, and the price per kilogram was IDR 5000 (equal to 3.4 USD).

A multistage sampling technique was adopted to get representative data in each regency, and a sub-regency was selected based on land area and productivity. Furthermore, two villages were selected from each sub-regency, resulting in a total of six locations.

Primary and secondary data were collected in this research. Primary data were collected from respondents through interviews with the guidelines on the research questionnaire. A total of 300 respondents participated in responding to the questionnaire. Secondary data were collected from various sources related to supporting data of total harvest corn price and daily wage.

Data analysis was conducted descriptively, and the calculation of realized workforce (workload output) was conducted by considering the conversion of the workload into male-equivalent working days (MWD). The MWD of female workforce is equivalent to 7 hours of work or 0.7 MWD, while child labor equals 0.5 MWD. The daily wage MWD is IDR 50,000 (equal to 3.4 USD).

RESULTS

Potential of the workforce among the category in the three regencies

This study showed that the highest workforce potential was found in GO (267.26 MWD/season), while the lowest was found in BU (195.12 MWD/season). The man workforce potential was higher (66.1%) compare to that of women (30.2%) and children (3.8%) (Table 1). The employment potential of both men and women in the GO Regency was greater than that of the JE and BU Regencies.

Table 1: The farmer workforce potential in each category from three regencies in South Sulawesi

Regencies	Category and potential of the workforce (MWD)/year						Total of potential (MWD)
	Man		Woman		Child		
	MWD	%	MWD	%	MWD	%	
GO	175	65.5	83.16	31.1	9.10	3.4	267.26
JE	129	64.6	61.60	30.8	9.10	4.6	199.70
BU	133	68.2	55.59	28.5	6.53	3.3	195.12
Total	437	198.2	200.35	90.5	24.73	11.3	662.08
Average	145.67	66.1	66.78	30.2	8.24	3.8	220.69

Potential and realized workforce among the regencies in three seasons

In season 1 (rice cultivation), the realization of workforce output for all categories reached 153.38 MWD, or an average of 51.1% of the available potential. Women contributed the most (69.7%), while children contributed the least (22.16%) (Table 2).

Table 2: Contribution of farmer's household workforce output season 1 for rice commodity in South Sulawesi

Workforce categories	Workforce potential (MWD)			Workforce output (MWD)			Realized workforce output (%)			Average of realized workforce
	GO	JA	BU	GO	JA	BU	GO	JA	BU	
Man	175	129	133	105.7	71.9	91.4	60	55.8	68.7	61.5
Woman	83.2	61.6	55.6	61.7	37.9	40.9	74.2	61.4	73.6	69.7
Child	9.1	9.1	6.5	1.1	0.6	3.1	11.9	6.7	47.9	22.2
Total	267.3	199.7	195.1	168.5	110.4	135.4	146	123.9	190.2	153.4

In season 2 (corn cultivation), the realization of workforce output for all categories reached 191.8 MWD or an average of 63.9% of the available potential. Women contributed the most (75%), while children contributed the least (50.1%) (Table 3).

Table 3: Contribution of Farmer's household work output season 2 for corn commodity in South Sulawesi

Workforce categories	Workforce potential (MWD)			Workforce output (MWD)			Realized workforce output (%)			Average of realized workforce
	GO	JA	BU	GO	JA	BU	GO	JA	BU	
Man	175.0	129.0	133.0	98.2	98.7	90.0	56.1	76.5	67.6	66.8
Woman	83.2	61.6	55.6	52.3	51.8	43.4	62.9	84.1	78.0	75.0
Child	9.1	9.1	6.5	1.1	5.1	5.3	12.2	56.3	81.8	50.1
Total	267.3	199.7	195.1	151.7	155.6	138.7	131.3	216.9	227.4	191.8

In season 3 (corn cultivation), the realization of workforce output for all categories reached 238.2 MWD or an average of 79.4% of the available potential. Women contributed the most (84.5%), while men contributed the least (74.1%) (Table 4). From these data, it can be seen that there has been a surge in the realization of the workforce for children, even in a one district (BU) reaching more than 100% (157%), this indicates a workload that exceeds the standard.

Table 4: Contribution of farmer's household work output season 3 for corn commodity in South Sulawesi

Workforce categories	Workforce potential (MWD)			Workforce output (MWD)			Realized workforce output (%)			Average of realized workforce
	GO	JA	BU	GO	JA	BU	GO	JA	BU	
Man	175.0	129.0	133.0	106.8	107.7	103.4	61.0	83.5	77.8	74.1
Woman	83.2	61.6	55.6	55.2	61.2	48.9	66.4	99.3	87.9	84.5
Child	9.1	9.1	6.5	1.3	6.2	10.3	14.2	67.7	157.0	79.6
Total	267.3	199.7	195.1	163.3	175.0	162.5	141.6	250.5	322.6	238.2

Realized workload output each season

Realized workload output each season was presented in Tables 2 to 4. The total workload output in season 1 (rice cultivation) was 138.08 MWD. The total workload outputs for men, women, and children were 89.67 MWD, 46.80 MWD, and 1.61 MWD respectively. Planting absorbs the most workforce (22.45 MWD), followed by weed clearing 1 (17.95 MWD) and harvesting (17.77 MWD). The output of the man workforce was allocated to planting and weed cleaning 1; that of the woman was allocated to planting and fertilizing 2, and the child was allocated to planting and fertilizing 1 (Table 5).

Table 5: The realized workforce output into farming activities in season 1 (rice)

Farming Activities	Workforce (MWD)			Total workforce
	Man	Woman	Children	
Tillaging	11.87	3.14	0.00	15.01
Planting	13.93	7.83	0.69	22.45
Fertilization 1	10.88	6.27	0.53	17.68
Weed cleaning 1	12.05	5.81	0.10	17.95
Pest control	6.57	0.00	0.00	6.57
Fertilization 2	9.80	7.30	0.16	17.25
Weed Cleaning 2	7.92	5.89	0.00	13.81
Harvesting	11.04	6.61	0.12	17.77
Post-harvesting	5.61	3.96	0.01	9.58
Total workload output	89.67	46.80	1.61	138.08

The total workload output in season 2 (corn cultivation) was 146.37 MWD. The total workload outputs for men, women, and children were 93.34 MWD, 49.17 MWD, and 3.86 MWD respectively. Weed cleaning 1 absorbed the most workforce (23.31 MWD), followed by planting (21.30 MWD) and fertilizing 1 (19.24 MWD). The output of the man workforce was allocated to tillaging and weed cleaning 1, and that of woman and child were allocated to weed cleaning 1 and planting (Table 6).

Table 6: The realized workforce output into farming activities in season 2 (corn)

Farming activities	workforce (MWD)			Total workforce
	Man	Woman	Children	
Tillaging	13.39	4.10	0.59	18.08
Planting	12.86	7.63	0.81	21.30
Fertilization 1	11.59	7.29	0.36	19.24
Weed cleaning 1	13.93	8.55	0.83	23.31
Pest control	7.41	0.03	0.00	7.44
Fertilization 2	6.95	4.37	0.08	11.40
Weed Cleaning 2	8.77	6.14	0.37	15.28
Harvesting	10.98	6.40	0.33	17.71
Post-harvesting	7.45	4.66	0.50	12.61
Total output workload	93.34	49.17	3.86	146.37

The total workload output in season 3 (corn cultivation) was 172.6 MWD. The total workload outputs for men, women, and children were 108.44 MWD, 57.89 MWD, and 6.26 MWD respectively. Harvesting absorbed the most workforce (25.17 MWD), followed by weed cleaning 1 (24.23 MWD) and weed cleaning 1 (21.79 MWD). The output of the man workforce was allocated to harvesting and tillaging, that of the woman was allocated to harvesting and weed cleaning 2, and the child was allocated to harvesting and weed cleaning 1 (Table 7).

Table 7: Output of workforce for each farming activity in season 3 (corn)

Farming Activities	Workforce (MWD)			Mean workforce
	Man	Woman	Children	
Tillaging	14.83	6.34	0.54	21.70
Planting	10.87	6.53	0.65	18.06
Fertilization 1	11.27	7.06	0.42	18.75
Weed cleaning 1	14.66	8.13	1.43	24.23
Pest control	8.02	0.03	0.00	8.05
Fertilization 2	11.44	6.95	0.08	18.47
Weed Cleaning 2	12.66	8.39	0.73	21.79
Harvesting	14.84	8.91	1.43	25.17
Post-harvesting	9.85	5.55	0.98	16.38

Total output workload	108.44	57.89	6.26	172.60
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Source: Primary Data, 2017

Based on the analysis of three seasons, the result showed that in season 1 (rice), the land absorbed 138.08 workforces (equal to 466.5 USD expense), meanwhile, the total gross revenue was 1623.7 USD, resulting in efficiency for gross revenue /workforce expense of 3.48. In the second season, the land absorbed 146.37 workforces (equal to 494.5 USD expense), meanwhile, the total gross revenue was 1360.8 USD, resulting in efficiency for income/workforce expense of 2.75. In the third season, the land absorbed 172.6 workforces (equal to 583.1 USD expense), meanwhile, the total gross revenue was 1360.8 USD, resulting in efficiency for revenue/workforce expense of 2.33.

The workforce output differed significantly among workforce category ($F = 401.24$; $P < 0.001$), farming activities ($F = 11.25$; $P < 0.001$) and season ($F = 6.66$; $P < 0.01$). There was a significant interaction between the workload category and farming activity, but no interaction between the workforce category and the season as well as between farming activity and season (Table 8).

Table 8: Summary of F statistic followed by the significance of fruit fly abundance and diversity among locations, selling levels, and cultivars

Variables	Workforce category (c)	Farming activity (f)	Season (s)	c x f	c x s	f x s
F	401.24	11.25	6.66	3.83	0.93	1.28
P	<0.001	<0.001	0.002	<0.001	0.447	0.217

4 Discussion

The results showed that the potential for domestic work of corn farmers in South Sulawesi is relatively high. The male workforce demonstrated the highest potential, followed by women and children. However, in reality, the female workforce has the largest percentage contribution more than 70% of the potential female workforce is absorbed in faming jobs. This indicates a high proportion of women working in agriculture. Women contribute a lot to the agricultural sector, especially in rural

1 areas and produce more than 50% of the world's food. In some areas of Africa female farmers spend
2 less time than men cultivating rice in Africa, except on parboiling. Male farmers generally earn higher
3 income than female farmers because they spent more time in rice production (Medagbe et al., 2020). In
4 addition to working on-farm, males are involved in various off-farm and nonagricultural job activities.
5 Male employees can often do all agricultural work, particularly the labor-intensive tasks that need great
6 physical ability such as plowing. From the analysis of agricultural activities, weed cleaning, planting,
7 and fertilizing absorb a large amount of labor. Another research indicated that women mostly did
8 weeding and harvesting alone. In contrast, males did most of the sowing, seeding, maintenance,
9 transplanting, and irrigation management (Paul & Rani, 2017).

10 Farmers' working time depends on many factors, including social factors. These include age, marital
11 status, number of dependent family members, work experience, education level, and other occupations
12 (Fauziyah et al., 2017). Marital status, income, and age significantly affect women's participation in
13 agricultural production (Harun, 2014). The results are consistent with previous research that stated that
14 women have a more significant workload than men because they are involved in both agricultural and
15 household activities (Paul & Rani, 2017). Farmer households generally carry out the labor division
16 based on gender. Research in Ethiopia revealed that women spent 26 hours per week in agricultural
17 activities (Harun, 2014). Furthermore, a study conducted on coffee plantations shows the importance of
18 women in cultivating coffee plants. They conduct lighter activities requiring more accuracy and tenacity,
19 such as fertilizing and pruning (Rizki et al., 2019). Research in Kenya shows that men are involved in
20 land clearing, land preparation, planting, and other activities. Therefore, they allocate more time for
21 agricultural activities than women. Women are more involved in growing food crops, watering plants,
22 food storage, and processing. They are also responsible for many productive activities in the house and
23 productive community management activities. As a result, women perform more tasks, have more
24 responsibilities, and work longer hours than men. With the division of tasks, household activities,
25 including food preparation and cooking, are carried out mainly by the wife, followed by the husband.

1 As for children, girls are more involved in the task when compared to boys. Therefore, the continuity of
2 the family role is traditionally associated with women (Lu, 2007).

3 Research conducted in Yogyakarta (Indonesia), Myanmar, and the Philippines shows that manual
4 planting is common for crop cultivation. Rice is propagated in South Sumatra (Sumatra, Indonesia) and
5 Thailand. Transplants are usually carried out in groups, mainly consisting of women. However, men can
6 assist in pulling and distributing seedlings. Most women are a good time to weed during the rice-growing
7 phase. The application of fertilizers and pesticides is considered a man's job. Harvesting Guidelines are
8 standard practice in most areas, apart from Thailand and some villages in South Sumatra (Sumatra,
9 Indonesia) (Akter et al., 2017). The men and women occupied most of the activities related to
10 agriculture, but in the case of livestock activities, women's participation was more.

11 The results differ from previous studies, where the output of male labor is higher than females. The
12 intensity of men's work is also more significant in the household because they have a big responsibility
13 to fulfill members' needs. On the other hand, the output of women's work in farming is lower than that
14 of men. In rice farming, women assist with planting and harvesting activities. Therefore, they focus
15 more on household activities, including looking after children under five (Norfahmi et al., 2017). The
16 men spent more time than women in agricultural business activities as well as work in the non-
17 agriculture sector. Meanwhile, women allocate more time to handle household chores (Adeyonu & Oni,
18 2014).

19 The results showed the strong influence of the season on the realized workforce. In the first season,
20 which coincides with the rainy season, farmers generally plant rainfed rice which has a higher level of
21 efficiency. In the following season, the rainfall declined hence the farmers switched to cultivating corn.
22 The higher efficiency of using labor in the rice season because rice cultivation absorbs less labor than
23 corn. Therefore, this study recommends that workers who are not absorbed in the rice cultivation work
24 switch to the other job.

1 The realization of the contribution of children's labor output is relatively moderate. The average of
2 absorbed child labor potential was 50.6%. Interestingly, it demonstrated a sharp increase in season 3,
3 following an output above 75%, and in one district, the score reaches 157%. This shows that the
4 workload carried out by children exceeds the maximum limit. Internal and external factors influence
5 children's motivation to enter the world of work. A child's decision to work is closely related to the
6 family's economic status (Yeni, 2018). Farmer household incomes are derived from farming and non-
7 agriculture activities. According to Xu et al., (2017), households adjust labor for agriculture and non-
8 agriculture. Therefore, farmer households increase participation in the local labor market in
9 nonagricultural activities to increase income. The decision of children to work due to economic and
10 family demands has introduced various values of rules and responsibilities (ILO, 2004). Children's
11 participation is also related to the value of parents' perspective. This includes parents that view children
12 as exchange values and utilities in the family. Besides motivation, the other significant concern is the
13 impact of working activities on children's health, education, and social atmosphere. According to the
14 ILO (2004), children in the workforce would have low motivation to continue their education. Therefore,
15 they may become unsuccessful and fall on low work performance.

16 The results of this study estimate the revenue for corn production of USD 1360.8. In another study,
17 it was reported that maize production revenues in other provinces ranged from USD 1060 to 1163
18 (Satyarini and Pangarso, 2021). This result is smaller than rice production which can achieve a revenue
19 of USD 1623.7. This result is even smaller than the gross revenue of rice production in Nigeria with a
20 production of 3.3 tonnes/ha earning USD 1,384 (Nwahia, 2020). Corn revenue yields can be equal to or
21 greater than rice if production is more than 6.8 tonnes. Research conducted with Sweet Corn and Hybrid
22 Corn varieties showed yields of 4.4 tonnes and 2.9 tonnes respectively over an area of 0.4 hectares (Dyah
23 & Kahfi, 2021). Therefore, it is highly recommended to increase corn productivity by applying
24 technology or selecting superior types. One technology that has the potential to be developed is yield
25 and soil mapping. Modeling research in the United States shows that this technology increases by 5.6%

or 11.9% as a result of map adoption (McFadden et al., 2021). Another option can be selected by adopting organic farming systems (Brock et al., 2021; Choudhary et al., 2021).

In the communities with low income in developing countries, old-fashioned culture and traditions that underestimate the educational process in the school support the growing involvement of child labor. This tradition may be associated with the low parent's education and social and economic levels. Therefore, many parents make odd choices like encouraging their kids to stop school and work on the farm instead of supporting their education. They argued that women do not need school following the high cost of education and unemployment rate among the higher education alumni. With low education and economic powerlessness, parents tend to be narrow-minded about their children's future. Therefore, they lack the consciousness to consider the benefits of higher schools that may improve the welfare of their children's future. This situation encourages children to become laborers. Child labor is a violation of children's rights since it always has a detrimental influence on their physical, emotional, and social development (Hamamah, 2015).

5 Conclusion

The results indicate that the potential for domestic work of corn farmers in South Sulawesi is relatively high. The male workforce potential means we're the highest, followed by women and children. Furthermore, the farming activities such as weed cleaning, planting, and fertilizer spreading absorb a large workforce. The contribution of women's work output is higher than that of men since a high proportion are involved in agriculture.

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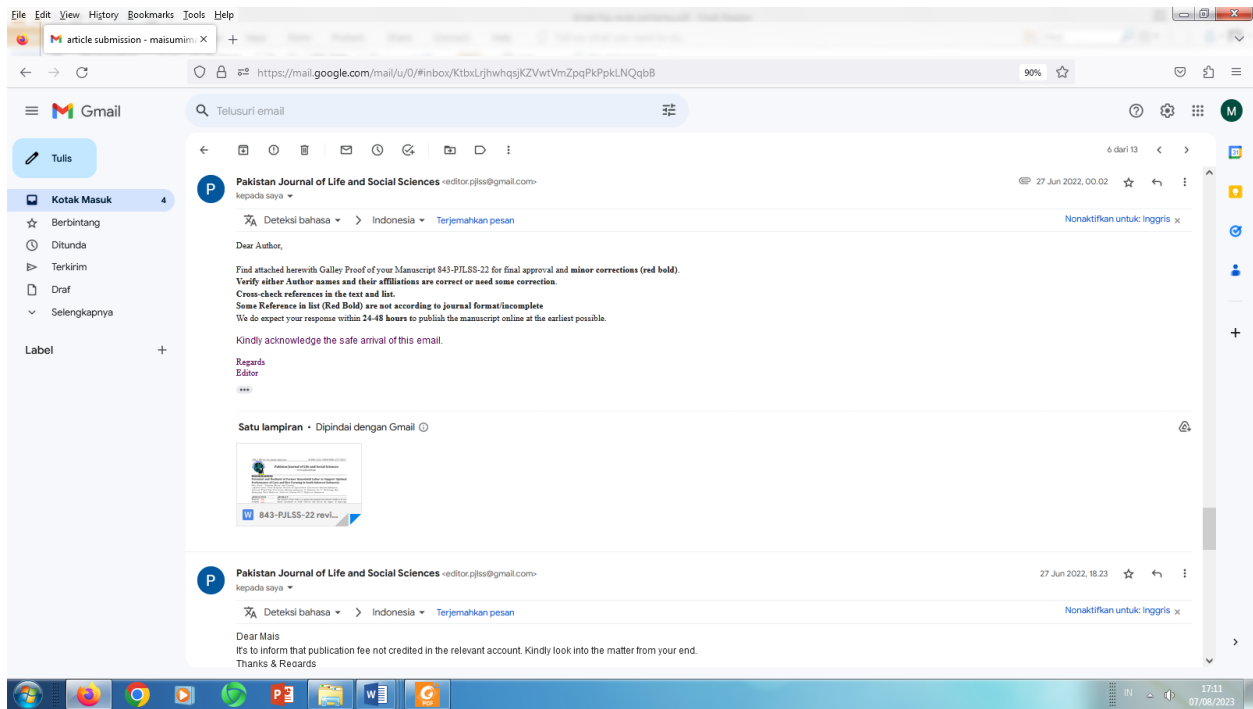
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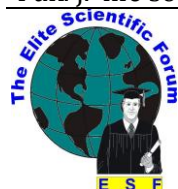
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RESEARCH ARTICLE

Potential and Realized of Farmer Household Labor to Support Optimal Performance of Corn and Rice Farming in South Sulawesi Indonesia

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ABSTRACT

The objective of this study is to analyze the potential and realized workforce of corn farmer households in South Sulawesi and discuss the impact of improving efficiency. Surveys were conducted in three regencies in South Sulawesi Indonesia consisting of Gowa Regency (GO), Jeneponto Regency (JE), and Bulukumba Regency (BU). A multistage sampling technique was adopted to get representative data in each regency and a sub-regency was selected based on land area and productivity. Furthermore, two villages were selected from each sub-regency, resulting in a total of six locations. six villages. The primary data were collected through interviews with the respondents based on the research questionnaire guidelines. A total of 300 respondents responded to the questionnaire. The workload calculation was conducted by considering the conversion of the workload into man-equivalent working days (MWD). The MWD of the woman workforce is equivalent to 7 hours of work or 0.7 MWD, while child labor equals 0.5 MWD. The male workforce demonstrated the highest potential, followed by women and children. However, in reality, the female workforce has the largest percentage contribution more than 70% of the potential female workforce is absorbed in farming jobs. This indicates a high proportion of women working in agriculture. The first season of rice cultivation had highest efficiency while the third season demonstrated the lowest efficiency.

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INTRODUCTION

Corn and rice are long-established agricultural commodities in Indonesia. Presently, there is a substantial dry shell corn demand exceeding 10 million tons per year. The highest consumption of corn is for food and animal feed. In aggregate, 72% of national corn production is used for the animal feed industry, 21% for food consumption, and 7% for other industrial needs (Kolo and Hutapea, 2016; Wanto et al., 2019). As one of the essential agricultural commodities, the development of corn production continues to increase to realize self-sufficiency. For that purpose, the development policy of corn agribusiness has been implemented with various strategies. However, the land owners remain encountered some constraints in decisions making for production, labor allocation, and consumption. The availability of farm inputs such as seed quality, availability of fertilizers, pesticides and technological packages largely determines corn

production decisions (Hoar and Fallo, 2017). Meanwhile, the labor allocation including the number and category of workers needs to be regulated so that the land owner can employ them optimally and receive high productivity. The allocation of labor needs attention because the workforce influence farming financing. The number of internal workers from family members of land owners is often insufficient; hence they recruits workers outside their family (Suratiyah, 2008). Attempts to enhance productivity through increasing the workforce are often conducted.

Smallholder farmers generally include their children in work to cut labor expenses. According to the survey conducted by the International Labor Organization (ILO) and the Central Statistics Agency of Indonesia, the total number of child workers aged 5-17 years was around 58.8 million. The result showed that 48.1 million (81.8%) children attend school, 24.3 million (41.2%) are engaged in the house works, and 6.7 million (11.4%) do not attend school nor are involved

in the house works (Rizkianto et al., 2013). Children are also involved in the labor force in various developing and developed nations (Berlan, 2013; David and Myers, 2006) because the agriculture industry employs the vast majority of child workers. For example, about one-fifth of all Bangladeshi children under 5 and 14 years were classified as child workers in 2000. The result supports the widely-held hypothesis that poverty compels children to work (Salmon, 2005).

South Sulawesi is one of the corn-producing provinces in Indonesia and its production in 2020 ranked fifth. Corn production in this province reaches 1.82 million tons with an area of 377.7 thousand hectares or equivalent to 4.83 tons/ha. In the last five years, corn production in this province has shown a fluctuating trend. This trend is influenced by the decisions of corn farmers in the production process. The number and skills of workers affect the productivity of corn fields. However, increasing the workforce does not always results in higher productivity. Therefore, optimal use of labor has an impact on the income of both land owners and workers. The objective of this study is to analyze the potential and realized workforce of farmer households in South Sulawesi and discuss its impact for improving efficiency.

MATERIALS AND METHODS

The research was conducted in three regencies in South Sulawesi Indonesia consisting of Gowa Regency (GO), Jeneponto Regency (JE), and Bulukumba Regency (BU). Those regencies were selected because of their large corn farms, contributing 41.9% of the corn area in South Sulawesi. Based on the data, GO, JE and BU contributed a corn production area of 42,599 hectares, 49,627 hectares, and 29,047 hectares, respectively. During the rainy season, corn fields are generally utilized to cultivate rain-fed rice. The average corn production is 5.67 tonnes per ha and the price per kilogram was IDR 3500 (equal to 2.4 USD), while the rice production is 4.81 tonnes per ha, and the price per kilogram was IDR 5000 (equal to 3.4 USD).

A multistage sampling technique was adopted to get representative data in each regency, and a sub-regency was selected based on land area and productivity. Furthermore, two villages were selected from each sub-regency, resulting in a total of six locations.

Primary and secondary data were collected in this research. Primary data were collected from respondents through interviews with the guidelines on the research questionnaire. A total of 300 respondents participated in responding to the questionnaire. Secondary data were collected from various sources related to supporting data of total harvest corn price and daily wage.

Data analysis was conducted descriptively, and the calculation of realized workforce (workload output)

was conducted by considering the conversion of the workload into male-equivalent working days (MWD). The MWD of female workforce is equivalent to 7 hours of work or 0.7 MWD, while child labor equals 0.5 MWD. The daily wage MWD is IDR 50,000 (equal to 3.4 USD).

RESULTS

Potential of the workforce among the category in the three regencies

This study showed that the highest workforce potential was found in GO (267.26 MWD/season), while the lowest was found in BU (195.12 MWD/season). The man workforce potential was higher (66.1%) compare to that of women (30.2%) and children (3.8%) (Table 1). The employment potential of both men and women in the GO Regency was greater than that of the JE and BU Regencies.

Potential and realized workforce among the regencies in three seasons

In season 1 (rice cultivation), the realization of workforce output for all categories reached 153.38 MWD, or an average of 51.1% of the available potential. Women contributed the most (69.7%), while children contributed the least (22.16%) (Table 2).

In season 2 (corn cultivation), the realization of workforce output for all categories reached 191.8 MWD or an average of 63.9% of the available potential. Women contributed the most (75%), while children contributed the least (50.1%) (Table 3).

In season 3 (corn cultivation), the realization of workforce output for all categories reached 238.2 MWD or an average of 79.4% of the available potential. Women contributed the most (84.5%), while men contributed the least (74.1%) (Table 4). From these data, it can be seen that there has been a surge in the realization of the workforce for children, even in a one district (BU) reaching more than 100% (157%), this indicates a workload that exceeds the standard.

Realized workload output each season

Realized workload output each season was presented in Table 2 to 4. The total workload output in season 1 (rice cultivation) was 138.08 MWD. The total workload outputs for men, women, and children were 89.67 MWD, 46.80 MWD, and 1.61 MWD respectively. Planting absorbs the most workforce (22.45 MWD), followed by weed clearing 1 (17.95 MWD) and harvesting (17.77 MWD). The output of the man workforce was allocated to planting and weed cleaning 1; that of the woman was allocated to planting and fertilizing 2 and the child was allocated to planting and fertilizing 1 (Table 5).

Table 1: The farmer workforce potential in each category from three regencies in South Sulawesi

Regencies	Category and potential of the workforce (MWD)/year						Total of potential (MWD)
	Man		Woman		Child		
	MWD	%	MWD	%	MWD	%	
GO	175	65.5	83.16	31.1	9.10	3.4	267.26
JE	129	64.6	61.60	30.8	9.10	4.6	199.70
BU	133	68.2	55.59	28.5	6.53	3.3	195.12
Total	437	198.2	200.35	90.5	24.73	11.3	662.08
Average	145.67	66.1	66.78	30.2	8.24	3.8	220.69

Table 2: Contribution of farmer's household workforce output season 1 for rice commodity in South Sulawesi

Workforce categories	Workforce potential (MWD)			Workforce output (MWD)			Realized workforce output (%)			Average of realized workforce
	GO	JA	BU	GO	JA	BU	GO	JA	BU	
Man	175	129	133	105.7	71.9	91.4	60	55.8	68.7	61.5
Woman	83.2	61.6	55.6	61.7	37.9	40.9	74.2	61.4	73.6	69.7
Child	9.1	9.1	6.5	1.1	0.6	3.1	11.9	6.7	47.9	22.2
Total	267.3	199.7	195.1	168.5	110.4	135.4	146	123.9	190.2	153.4

Table 3: Contribution of Farmer's household work output season 2 for corn commodity in South Sulawesi

Workforce categories	Workforce potential (MWD)			Workforce output (MWD)			Realized workforce output (%)			Average of realized workforce
	GO	JA	BU	GO	JA	BU	GO	JA	BU	
Man	175.0	129.0	133.0	98.2	98.7	90.0	56.1	76.5	67.6	66.8
Woman	83.2	61.6	55.6	52.3	51.8	43.4	62.9	84.1	78.0	75.0
Child	9.1	9.1	6.5	1.1	5.1	5.3	12.2	56.3	81.8	50.1
Total	267.3	199.7	195.1	151.7	155.6	138.7	131.3	216.9	227.4	191.8

Table 4: Contribution of farmer's household work output season 3 for corn commodity in South Sulawesi

Workforce categories	Workforce potential (MWD)			Workforce output (MWD)			Realized workforce output (%)			Average of realized workforce
	GO	JA	BU	GO	JA	BU	GO	JA	BU	
Man	175.0	129.0	133.0	106.8	107.7	103.4	61.0	83.5	77.8	74.1
Woman	83.2	61.6	55.6	55.2	61.2	48.9	66.4	99.3	87.9	84.5
Child	9.1	9.1	6.5	1.3	6.2	10.3	14.2	67.7	157.0	79.6
Total	267.3	199.7	195.1	163.3	175.0	162.5	141.6	250.5	322.6	238.2

The total workload output in season 2 (corn cultivation) was 146.37 MWD. The total workload outputs for men, women and children were 93.34 MWD, 49.17 MWD, and 3.86 MWD respectively. Weed cleaning 1 absorbed the most workforce (23.31 MWD), followed by planting (21.30 MWD) and fertilizing 1 (19.24 MWD). The output of the man workforce was allocated to tillaging and weed cleaning 1, and that of woman and child were allocated to weed cleaning 1 and planting (Table 6).

The total workload output in season 3 (corn cultivation) was 172.6 MWD. The total workload outputs for men, women, and children were 108.44 MWD, 57.89 MWD, and 6.26 MWD respectively. Harvesting absorbed the most workforce (25.17 MWD), followed by weed cleaning 1 (24.23 MWD) and weed cleaning 1 (21.79 MWD). The output of the man workforce was allocated to harvesting and tillaging, that of the woman was allocated to harvesting and weed cleaning 2, and the child was allocated to harvesting and weed cleaning 1 (Table 7).

Based on the analysis of three seasons, the result showed that in season 1 (rice), the land absorbed 138.08 workforces (equal to 466.5 USD expense), meanwhile,

the total gross revenue was 1623.7 USD, resulting in efficiency for gross revenue /workforce expense of 3.48. In the second season, the land absorbed 146.37 workforces (equal to 494.5 USD expense), meanwhile, the total gross revenue was 1360.8 USD, resulting in efficiency for income/workforce expense of 2.75. In the third season, the land absorbed 172.6 workforces (equal to 583.1 USD expense), meanwhile, the total gross revenue was 1360.8 USD, resulting in efficiency for revenue/workforce expense of 2.33.

The workforce output differed significantly among workforce category ($F = 401.24$; $P < 0.001$), farming activities ($F = 11.25$; $P < 0.001$) and season ($F = 6.66$; $P < 0.01$). There was a significant interaction between the workload category and farming activity, but no interaction between the workforce category and the season as well as between farming activity and season (Table 8).

DISCUSSION

The results showed that the potential for domestic work of corn farmers in South Sulawesi is relatively high.

Table 5: The realized workforce output into farming activities in season 1 (rice)

Farming Activities	Workforce (MWD)			Total workforce
	Man	Woman	Children	
Tillaging	11.87	3.14	0.00	15.01
Planting	13.93	7.83	0.69	22.45
Fertilization 1	10.88	6.27	0.53	17.68
Weed cleaning 1	12.05	5.81	0.10	17.95
Pest control	6.57	0.00	0.00	6.57
Fertilization 2	9.80	7.30	0.16	17.25
Weed Cleaning 2	7.92	5.89	0.00	13.81
Harvesting	11.04	6.61	0.12	17.77
Post-harvesting	5.61	3.96	0.01	9.58
Total workload output	89.67	46.80	1.61	138.08

Table 6: The realized workforce output into farming activities in season 2 (corn)

Farming activities	workforce (MWD)			Total workforce
	Man	Woman	Children	
Tillaging	13.39	4.10	0.59	18.08
Planting	12.86	7.63	0.81	21.30
Fertilization 1	11.59	7.29	0.36	19.24
Weed cleaning 1	13.93	8.55	0.83	23.31
Pest control	7.41	0.03	0.00	7.44
Fertilization 2	6.95	4.37	0.08	11.40
Weed Cleaning 2	8.77	6.14	0.37	15.28
Harvesting	10.98	6.40	0.33	17.71
Post-harvesting	7.45	4.66	0.50	12.61
Total output workload	93.34	49.17	3.86	146.37

Table 7: Output of workforce for each farming activity in season 3 (corn)

Farming Activities	Workforce (MWD)			Mean workforce
	Man	Woman	Children	
Tillaging	14.83	6.34	0.54	21.70
Planting	10.87	6.53	0.65	18.06
Fertilization 1	11.27	7.06	0.42	18.75
Weed cleaning 1	14.66	8.13	1.43	24.23
Pest control	8.02	0.03	0.00	8.05
Fertilization 2	11.44	6.95	0.08	18.47
Weed Cleaning 2	12.66	8.39	0.73	21.79
Harvesting	14.84	8.91	1.43	25.17
Post-harvesting	9.85	5.55	0.98	16.38
Total output workload	108.44	57.89	6.26	172.60

Source: Primary Data, 2017

Table 8: Summary of F statistic followed by the significance of fruit fly abundance and diversity among locations, selling levels, and cultivars

Variables	Workforce category (c)	Farming activity (f)	Season (s)	c x f	c x s	f x s
F	401.24	11.25	6.66	3.83	0.93	1.28
P	<0.001	<0.001	0.002	<0.001	0.447	0.217

The male workforce demonstrated the highest potential, followed by women and children. However, in reality, the female workforce has the largest percentage contribution more than 70% of the potential female workforce is absorbed in faming jobs. This indicates a high proportion of women working in agriculture.

Women contribute a lot to the agricultural sector, especially in rural areas and produce more than 50% of the world's food. In some areas of Africa female farmers spend less time than men cultivating rice in Africa, except on parboiling. Male farmers generally earn higher income than female farmers because they spent more time in rice production (Medagbe et al., 2020). In addition to working on-farm, males are involved in various off-farm and nonagricultural job activities. Male employees can often do all agricultural work, particularly the labor-intensive tasks that need great physical ability such as plowing. From the analysis of agricultural activities, weed cleaning, planting, and fertilizing absorb a large amount of labor. Another research indicated that women mostly did weeding and harvesting alone. In contrast, males did most of the sowing, seeding, maintenance, transplanting, and irrigation management (Paul and Rani, 2017).

Farmers' working time depends on many factors, including social factors. These include age, marital status, number of dependent family members, work experience, education level, and other occupations (Fauziyah et al., 2017). Marital status, income, and age significantly affect women's participation in agricultural production (Harun, 2014). The results are consistent with previous research that stated that women have a more significant workload than men because they are involved in both agricultural and household activities (Paul and Rani, 2017). Farmer households generally carry out the labor division based on gender. Research in Ethiopia revealed that women spent 26 hours per week in agricultural activities (Harun, 2014). Furthermore, a study conducted on coffee plantations shows the importance of women in cultivating coffee plants. They conduct lighter activities requiring more accuracy and tenacity, such as fertilizing and pruning (Rizki et al., 2019). Research in Kenya shows that men are involved in land clearing, land preparation, planting, and other activities. Therefore, they allocate more time for agricultural activities than women. Women are more involved in growing food crops, watering plants, food storage, and processing. They are also responsible for many productive activities in the house and productive community management activities. As a result, women perform more tasks, have more responsibilities, and work longer hours than men. With the division of tasks, household activities, including food preparation and cooking, are carried out mainly by the wife, followed by the husband. As for children, girls are more involved in the task when compared to boys. Therefore, the continuity of the family role is traditionally associated with women (Lu, 2007).

Research conducted in Yogyakarta (Indonesia), Myanmar, and the Philippines shows that manual planting is common for crop cultivation. Rice is

propagated in South Sumatra (Sumatra, Indonesia) and Thailand. Transplants are usually carried out in groups, mainly consisting of women. However, men can assist in pulling and distributing seedlings. Most women are a good time to weed during the rice-growing phase. The application of fertilizers and pesticides is considered a man's job. Harvesting Guidelines are standard practice in most areas, apart from Thailand and some villages in South Sumatra (Sumatra, Indonesia) (Akter et al., 2017). The men and women occupied most of the activities related to agriculture, but in the case of livestock activities, women's participation was more. The results differ from previous studies, where the output of male labor is higher than females. The intensity of men's work is also more significant in the household because they have a big responsibility to fulfill members' needs. On the other hand, the output of women's work in farming is lower than that of men. In rice farming, women assist with planting and harvesting activities. Therefore, they focus more on household activities, including looking after children under five (Norfahmi et al., 2017). The men spent more time than women in agricultural business activities as well as work in the non-agriculture sector. Meanwhile, women allocate more time to handle household chores (Adeyonu and Oni, 2014). The results showed the strong influence of the season on the realized workforce. In the first season, which coincides with the rainy season, farmers generally plant rainfed rice which has a higher level of efficiency. In the following season, the rainfall declined hence the farmers switched to cultivating corn. The higher efficiency of using labor in the rice season because rice cultivation absorbs less labor than corn. Therefore, this study recommends that workers who are not absorbed in the rice cultivation work switch to the other job. The realization of the contribution of children's labor output is relatively moderate. The average of absorbed child labor potential was 50.6%. Interestingly, it demonstrated a sharp increase in season 3, following an output above 75%, and in one district, the score reaches 157%. This shows that the workload carried out by children exceeds the maximum limit. Internal and external factors influence children's motivation to enter the world of work. A child's decision to work is closely related to the family's economic status (Yeni, 2018). Farmer household incomes are derived from farming and non-agriculture activities. According to Xu et al., (2017), households adjust labor for agriculture and non-agriculture. Therefore, farmer households increase participation in the local labor market in nonagricultural activities to increase income. The decision of children to work due to economic and family demands has introduced various values of rules and responsibilities (ILO, 2004). Children's participation is also related to the value of parents' perspective. This includes parents

that view children as exchange values and utilities in the family. Besides motivation, the other significant concern is the impact of working activities on children's health, education, and social atmosphere. According to the ILO (2004), children in the workforce would have low motivation to continue their education. Therefore, they may become unsuccessful and fall on low work performance.

The results of this study estimate the revenue for corn production of USD 1360.8. In another study, it was reported that maize production revenues in other provinces ranged from USD 1060 to 1163 (Satyarini and Pangarso, 2021). This result is smaller than rice production which can achieve a revenue of USD 1623.7. This result is even smaller than the gross revenue of rice production in Nigeria with a production of 3.3 tonnes/ha earning USD 1,384 (Nwahia, 2020). Corn revenue yields can be equal to or greater than rice if production is more than 6.8 tonnes. Research conducted with Sweet Corn and Hybrid Corn varieties showed yields of 4.4 tonnes and 2.9 tonnes respectively over an area of 0.4 hectares (Dyah and Kahfi, 2021). Therefore, it is highly recommended to increase corn productivity by applying technology or selecting superior types. One technology that has the potential to be developed is yield and soil mapping. Modeling research in the United States shows that this technology increases by 5.6% or 11.9% as a result of map adoption (McFadden et al., 2021). Another option can be selected by adopting organic farming systems (Brock et al., 2021; Choudhary et al., 2021).

In the communities with low income in developing countries, old-fashioned culture and traditions that underestimate the educational process in the school support the growing involvement of child labor. This tradition may be associated with the low parent's education and social and economic levels. Therefore, many parents make odd choices like encouraging their kids to stop school and work on the farm instead of supporting their education. They argued that women do not need school following the high cost of education and unemployment rate among the higher education alumni. With low education and economic powerlessness, parents tend to be narrow-minded about their children's future. Therefore, they lack the consciousness to consider the benefits of higher schools that may improve the welfare of their children's future. This situation encourages children to become laborers. Child labor is a violation of children's rights since it always has a detrimental influence on their physical, emotional, and social development (Hamamah, 2015).

Conclusion

The results indicate that the potential for domestic work of corn farmers in South Sulawesi is relatively high. The male workforce potential means we're the highest, followed by women and children. Furthermore, the

farming activities such as weed cleaning, planting, and fertilizer spreading absorb a large workforce. The contribution of women's work output is higher than that of men since a high proportion are involved in agriculture.

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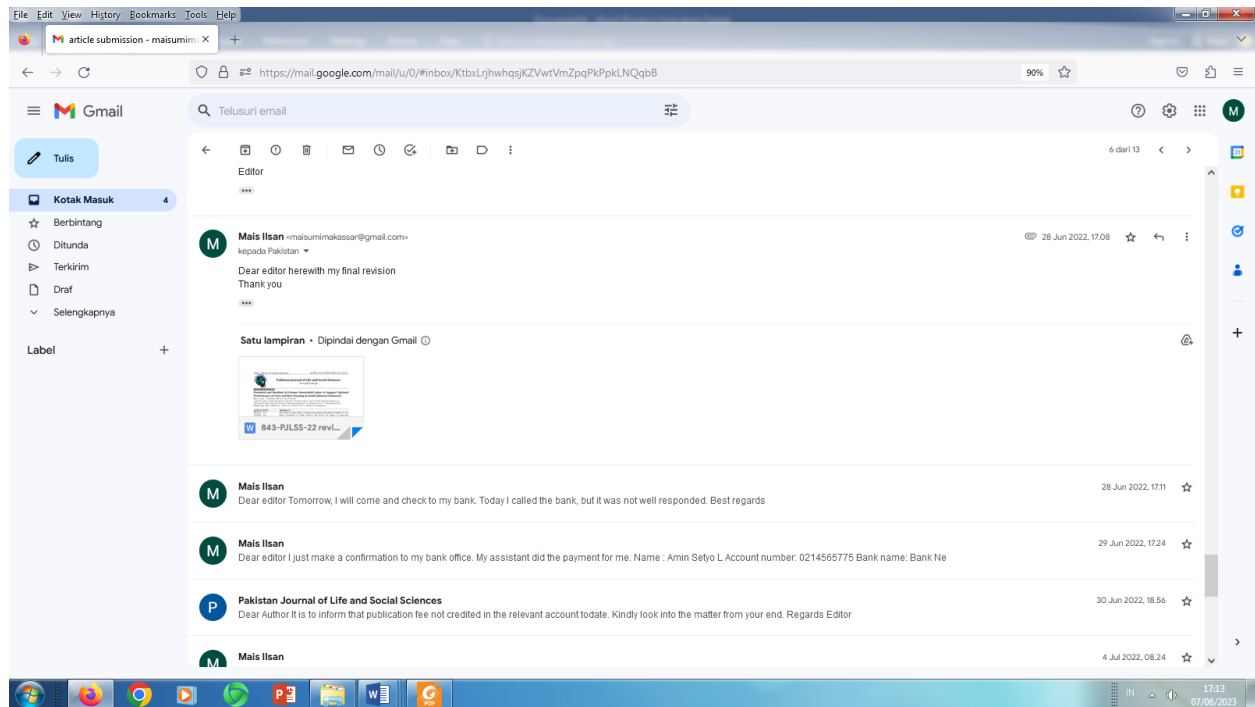
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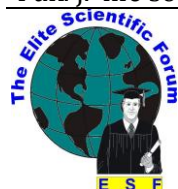
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RESEARCH ARTICLE

Potential and Realized of Farmer Household Labor to Support Optimal Performance of Corn and Rice Farming in South Sulawesi Indonesia

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ABSTRACT

The objective of this study is to analyze the potential and realized workforce of corn farmer households in South Sulawesi and discuss the impact of improving efficiency. Surveys were conducted in three regencies in South Sulawesi Indonesia consisting of Gowa Regency (GO), Jeneponto Regency (JE), and Bulukumba Regency (BU). A multistage sampling technique was adopted to get representative data in each regency and a sub-regency was selected based on land area and productivity. Furthermore, two villages were selected from each sub-regency, resulting in a total of six locations. six villages. The primary data were collected through interviews with the respondents based on the research questionnaire guidelines. A total of 300 respondents responded to the questionnaire. The workload calculation was conducted by considering the conversion of the workload into man-equivalent working days (MWD). The MWD of the woman workforce is equivalent to 7 hours of work or 0.7 MWD, while child labor equals 0.5 MWD. The male workforce demonstrated the highest potential, followed by women and children. However, in reality, the female workforce has the largest percentage contribution more than 70% of the potential female workforce is absorbed in farming jobs. This indicates a high proportion of women working in agriculture. The first season of rice cultivation had highest efficiency while the third season demonstrated the lowest efficiency.

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INTRODUCTION

Corn and rice are long-established agricultural commodities in Indonesia. Presently, there is a substantial dry shell corn demand exceeding 10 million tons per year. The highest consumption of corn is for food and animal feed. In aggregate, 72% of national corn production is used for the animal feed industry, 21% for food consumption, and 7% for other industrial needs (Kolo and Hutapea, 2016; Wanto et al., 2019). As one of the essential agricultural commodities, the development of corn production continues to increase to realize self-sufficiency. For that purpose, the development policy of corn agribusiness has been implemented with various strategies. However, the land owners remain encountered some constraints in decisions making for production, labor allocation, and consumption. The availability of farm inputs such as seed quality, availability of fertilizers, pesticides and technological packages largely determines corn

production decisions (Hoar and Fallo, 2017). Meanwhile, the labor allocation including the number and category of workers needs to be regulated so that the land owner can employ them optimally and receive high productivity. The allocation of labor needs attention because the workforce influence farming financing. The number of internal workers from family members of land owners is often insufficient; hence they recruits workers outside their family (Suratiyah, 2015). Attempts to enhance productivity through increasing the workforce are often conducted.

Smallholder farmers generally include their children in work to cut labor expenses. According to the survey conducted by the Central Statistics Agency of Indonesia, the total number of child workers aged 5-17 years was around 58.8 million. The result showed that 48.1 million (81.8%) children attend school, 24.3 million (41.2%) are engaged in the house works, and 6.7 million (11.4%) do not attend school nor are involved in the house works (Rizkianto et al., 2013).

Children are also involved in the labor force in various developing and developed nations (Berlan, 2013; David and Myers, 2006) because the agriculture industry employs the vast majority of child workers. For example, about one-fifth of all Bangladeshi children under 5 and 14 years were classified as child workers in 2000. The result supports the widely-held hypothesis that poverty compels children to work (Salmon, 2005). South Sulawesi is one of the corn-producing provinces in Indonesia and its production in 2020 ranked fifth. Corn production in this province reaches 1.82 million tons with an area of 377.7 thousand hectares or equivalent to 4.83 tons/ha. In the last five years, corn production in this province has shown a fluctuating trend. This trend is influenced by the decisions of corn farmers in the production process. The number and skills of workers affect the productivity of corn fields. However, increasing the workforce does not always results in higher productivity. Therefore, optimal use of labor has an impact on the income of both land owners and workers. The objective of this study is to analyze the potential and realized workforce of farmer households in South Sulawesi and discuss its impact for improving efficiency.

MATERIALS AND METHODS

The research was conducted in three regencies in South Sulawesi Indonesia consisting of Gowa Regency (GO), Jeneponto Regency (JE), and Bulukumba Regency (BU). Those regencies were selected because of their large corn farms, contributing 41.9% of the corn area in South Sulawesi. Based on the data, GO, JE and BU contributed a corn production area of 42,599 hectares, 49,627 hectares, and 29,047 hectares, respectively. During the rainy season, corn fields are generally utilized to cultivate rain-fed rice. The average corn production is 5.67 tonnes per ha and the price per kilogram was IDR 3500 (equal to 2.4 USD), while the rice production is 4.81 tonnes per ha, and the price per kilogram was IDR 5000 (equal to 3.4 USD).

A multistage sampling technique was adopted to get representative data in each regency, and a sub-regency was selected based on land area and productivity. Furthermore, two villages were selected from each sub-regency, resulting in a total of six locations.

Primary and secondary data were collected in this research. Primary data were collected from respondents through interviews with the guidelines on the research questionnaire. A total of 300 respondents participated in responding to the questionnaire. Secondary data were collected from various sources related to supporting data of total harvest corn price and daily wage.

Data analysis was conducted descriptively, and the calculation of realized workforce (workload output)

was conducted by considering the conversion of the workload into male-equivalent working days (MWD). The MWD of female workforce is equivalent to 7 hours of work or 0.7 MWD, while child labor equals 0.5 MWD. The daily wage MWD is IDR 50,000 (equal to 3.4 USD).

RESULTS

Potential of the workforce among the category in the three regencies

This study showed that the highest workforce potential was found in GO (267.26 MWD/season), while the lowest was found in BU (195.12 MWD/season). The man workforce potential was higher (66.1%) compare to that of women (30.2%) and children (3.8%) (Table 1). The employment potential of both men and women in the GO Regency was greater than that of the JE and BU Regencies.

Potential and realized workforce among the regencies in three seasons

In season 1 (rice cultivation), the realization of workforce output for all categories reached 153.38 MWD, or an average of 51.1% of the available potential. Women contributed the most (69.7%), while children contributed the least (22.16%) (Table 2).

In season 2 (corn cultivation), the realization of workforce output for all categories reached 191.8 MWD or an average of 63.9% of the available potential. Women contributed the most (75%), while children contributed the least (50.1%) (Table 3).

In season 3 (corn cultivation), the realization of workforce output for all categories reached 238.2 MWD or an average of 79.4% of the available potential. Women contributed the most (84.5%), while men contributed the least (74.1%) (Table 4). From these data, it can be seen that there has been a surge in the realization of the workforce for children, even in a one district (BU) reaching more than 100% (157%), this indicates a workload that exceeds the standard.

Realized workload output each season

Realized workload output each season was presented in Table 2 to 4. The total workload output in season 1 (rice cultivation) was 138.08 MWD. The total workload outputs for men, women, and children were 89.67 MWD, 46.80 MWD, and 1.61 MWD respectively. Planting absorbs the most workforce (22.45 MWD), followed by weed clearing 1 (17.95 MWD) and harvesting (17.77 MWD). The output of the man workforce was allocated to planting and weed cleaning 1; that of the woman was allocated to planting and fertilizing 2 and the child was allocated to planting and fertilizing 1 (Table 5).

Table 1: The farmer workforce potential in each category from three regencies in South Sulawesi

Regencies	Category and potential of the workforce (MWD)/year						Total of potential (MWD)
	Man		Woman		Child		
	MWD	%	MWD	%	MWD	%	
GO	175	65.5	83.16	31.1	9.10	3.4	267.26
JE	129	64.6	61.60	30.8	9.10	4.6	199.70
BU	133	68.2	55.59	28.5	6.53	3.3	195.12
Total	437	198.2	200.35	90.5	24.73	11.3	662.08
Average	145.67	66.1	66.78	30.2	8.24	3.8	220.69

Table 2: Contribution of farmer's household workforce output season 1 for rice commodity in South Sulawesi

Workforce categories	Workforce potential (MWD)			Workforce output (MWD)			Realized workforce output (%)			Average of realized workforce
	GO	JA	BU	GO	JA	BU	GO	JA	BU	
Man	175	129	133	105.7	71.9	91.4	60	55.8	68.7	61.5
Woman	83.2	61.6	55.6	61.7	37.9	40.9	74.2	61.4	73.6	69.7
Child	9.1	9.1	6.5	1.1	0.6	3.1	11.9	6.7	47.9	22.2
Total	267.3	199.7	195.1	168.5	110.4	135.4	146	123.9	190.2	153.4

Table 3: Contribution of Farmer's household work output season 2 for corn commodity in South Sulawesi

Workforce categories	Workforce potential (MWD)			Workforce output (MWD)			Realized workforce output (%)			Average of realized workforce
	GO	JA	BU	GO	JA	BU	GO	JA	BU	
Man	175.0	129.0	133.0	98.2	98.7	90.0	56.1	76.5	67.6	66.8
Woman	83.2	61.6	55.6	52.3	51.8	43.4	62.9	84.1	78.0	75.0
Child	9.1	9.1	6.5	1.1	5.1	5.3	12.2	56.3	81.8	50.1
Total	267.3	199.7	195.1	151.7	155.6	138.7	131.3	216.9	227.4	191.8

Table 4: Contribution of farmer's household work output season 3 for corn commodity in South Sulawesi

Workforce categories	Workforce potential (MWD)			Workforce output (MWD)			Realized workforce output (%)			Average of realized workforce
	GO	JA	BU	GO	JA	BU	GO	JA	BU	
Man	175.0	129.0	133.0	106.8	107.7	103.4	61.0	83.5	77.8	74.1
Woman	83.2	61.6	55.6	55.2	61.2	48.9	66.4	99.3	87.9	84.5
Child	9.1	9.1	6.5	1.3	6.2	10.3	14.2	67.7	157.0	79.6
Total	267.3	199.7	195.1	163.3	175.0	162.5	141.6	250.5	322.6	238.2

The total workload output in season 2 (corn cultivation) was 146.37 MWD. The total workload outputs for men, women and children were 93.34 MWD, 49.17 MWD, and 3.86 MWD respectively. Weed cleaning 1 absorbed the most workforce (23.31 MWD), followed by planting (21.30 MWD) and fertilizing 1 (19.24 MWD). The output of the man workforce was allocated to tillaging and weed cleaning 1, and that of woman and child were allocated to weed cleaning 1 and planting (Table 6).

The total workload output in season 3 (corn cultivation) was 172.6 MWD. The total workload outputs for men, women, and children were 108.44 MWD, 57.89 MWD, and 6.26 MWD respectively. Harvesting absorbed the most workforce (25.17 MWD), followed by weed cleaning 1 (24.23 MWD) and weed cleaning 1 (21.79 MWD). The output of the man workforce was allocated to harvesting and tillaging, that of the woman was allocated to harvesting and weed cleaning 2, and the child was allocated to harvesting and weed cleaning 1 (Table 7).

Based on the analysis of three seasons, the result showed that in season 1 (rice), the land absorbed 138.08 workforces (equal to 466.5 USD expense), meanwhile, the total gross revenue was 1623.7 USD, resulting in

efficiency for gross revenue /workforce expense of 3.48. In the second season, the land absorbed 146.37 workforces (equal to 494.5 USD expense), meanwhile, the total gross revenue was 1360.8 USD, resulting in efficiency for income/workforce expense of 2.75. In the third season, the land absorbed 172.6 workforces (equal to 583.1 USD expense), meanwhile, the total gross revenue was 1360.8 USD, resulting in efficiency for revenue/workforce expense of 2.33.

The workforce output differed significantly among workforce category ($F = 401.24$; $P < 0.001$), farming activities ($F = 11.25$; $P < 0.001$) and season ($F = 6.66$; $P < 0.01$). There was a significant interaction between the workload category and farming activity, but no interaction between the workforce category and the season as well as between farming activity and season (Table 8).

DISCUSSION

The results showed that the potential for domestic work of corn farmers in South Sulawesi is relatively high.

Table 5: The realized workforce output into farming activities in season 1 (rice)

Farming Activities	Workforce (MWD)			Total workforce
	Man	Woman	Children	
Tillaging	11.87	3.14	0.00	15.01
Planting	13.93	7.83	0.69	22.45
Fertilization 1	10.88	6.27	0.53	17.68
Weed cleaning 1	12.05	5.81	0.10	17.95
Pest control	6.57	0.00	0.00	6.57
Fertilization 2	9.80	7.30	0.16	17.25
Weed Cleaning 2	7.92	5.89	0.00	13.81
Harvesting	11.04	6.61	0.12	17.77
Post-harvesting	5.61	3.96	0.01	9.58
Total workload output	89.67	46.80	1.61	138.08

Table 6: The realized workforce output into farming activities in season 2 (corn)

Farming activities	workforce (MWD)			Total workforce
	Man	Woman	Children	
Tillaging	13.39	4.10	0.59	18.08
Planting	12.86	7.63	0.81	21.30
Fertilization 1	11.59	7.29	0.36	19.24
Weed cleaning 1	13.93	8.55	0.83	23.31
Pest control	7.41	0.03	0.00	7.44
Fertilization 2	6.95	4.37	0.08	11.40
Weed Cleaning 2	8.77	6.14	0.37	15.28
Harvesting	10.98	6.40	0.33	17.71
Post-harvesting	7.45	4.66	0.50	12.61
Total output workload	93.34	49.17	3.86	146.37

Table 7: Output of workforce for each farming activity in season 3 (corn)

Farming Activities	Workforce (MWD)			Mean workforce
	Man	Woman	Children	
Tillaging	14.83	6.34	0.54	21.70
Planting	10.87	6.53	0.65	18.06
Fertilization 1	11.27	7.06	0.42	18.75
Weed cleaning 1	14.66	8.13	1.43	24.23
Pest control	8.02	0.03	0.00	8.05
Fertilization 2	11.44	6.95	0.08	18.47
Weed Cleaning 2	12.66	8.39	0.73	21.79
Harvesting	14.84	8.91	1.43	25.17
Post-harvesting	9.85	5.55	0.98	16.38
Total output workload	108.44	57.89	6.26	172.60

Source: Primary Data, 2017

Table 8: Summary of F statistic followed by the significance of fruit fly abundance and diversity among locations, selling levels, and cultivars

Variables	Workforce category (c)	Farming activity (f)	Season (s)	c x f	c x s	f x s
F	401.24	11.25	6.66	3.83	0.93	1.28
P	<0.001	<0.001	0.002	<0.001	0.447	0.217

The male workforce demonstrated the highest potential, followed by women and children. However, in reality, the female workforce has the largest percentage contribution more than 70% of the potential female workforce is absorbed in faming jobs. This indicates a high proportion of women working in agriculture. Women contribute a lot to the agricultural sector,

especially in rural areas and produce more than 50% of the world's food. In some areas of Africa female farmers spend less time than men cultivating rice in Africa, except on parboiling. Male farmers generally earn higher income than female farmers because they spent more time in rice production (Medagbe et al., 2020). In addition to working on-farm, males are involved in various off-farm and nonagricultural job activities. Male employees can often do all agricultural work, particularly the labor-intensive tasks that need great physical ability such as plowing. From the analysis of agricultural activities, weed cleaning, planting, and fertilizing absorb a large amount of labor. Another research indicated that women mostly did weeding and harvesting alone. In contrast, males did most of the sowing, seeding, maintenance, transplanting, and irrigation management (Paul and Rani, 2017).

Farmers' working time depends on many factors, including social factors. These include age, marital status, number of dependent family members, work experience, education level, and other occupations (Fauziyah et al., 2017). Marital status, income, and age significantly affect women's participation in agricultural production (Harun, 2014). The results are consistent with previous research that stated that women have a more significant workload than men because they are involved in both agricultural and household activities (Paul and Rani, 2017). Farmer households generally carry out the labor division based on gender. Research in Ethiopia revealed that women spent 26 hours per week in agricultural activities (Harun, 2014). Furthermore, a study conducted on coffee plantations shows the importance of women in cultivating coffee plants. They conduct lighter activities requiring more accuracy and tenacity, such as fertilizing and pruning (Rizki et al., 2019). Research in Kenya shows that men are involved in land clearing, land preparation, planting, and other activities. Therefore, they allocate more time for agricultural activities than women. Women are more involved in growing food crops, watering plants, food storage, and processing. They are also responsible for many productive activities in the house and productive community management activities. As a result, women perform more tasks, have more responsibilities, and work longer hours than men. With the division of tasks, household activities, including food preparation and cooking, are carried out mainly by the wife, followed by the husband. As for children, girls are more involved in the task when compared to boys. Therefore, the continuity of the family role is traditionally associated with women (Lu, 2007).

Research conducted in Yogyakarta (Indonesia), Myanmar, and the Philippines shows that manual plating is common for crop cultivation. Rice is propagated in South Sumatra (Sumatra, Indonesia) and

Thailand. Transplants are usually carried out in groups, mainly consisting of women. However, men can assist in pulling and distributing seedlings. Most women are a good time to weed during the rice-growing phase. The application of fertilizers and pesticides is considered a man's job. Harvesting Guidelines are standard practice in most areas, apart from Thailand and some villages in South Sumatra (Sumatra, Indonesia) (Akter et al., 2017). The men and women occupied most of the activities related to agriculture, but in the case of livestock activities, women's participation was more. The results differ from previous studies, where the output of male labor is higher than females. The intensity of men's work is also more significant in the household because they have a big responsibility to fulfill members' needs. On the other hand, the output of women's work in farming is lower than that of men. In rice farming, women assist with planting and harvesting activities. Therefore, they focus more on household activities, including looking after children under five (Norfahmi et al., 2017). The men spent more time than women in agricultural business activities as well as work in the non-agriculture sector. Meanwhile, women allocate more time to handle household chores (Adeyonu and Oni, 2014).

The results showed the strong influence of the season on the realized workforce. In the first season, which coincides with the rainy season, farmers generally plant rainfed rice which has a higher level of efficiency. In the following season, the rainfall declined hence the farmers switched to cultivating corn. The higher efficiency of using labor in the rice season because rice cultivation absorbs less labor than corn. Therefore, this study recommends that workers who are not absorbed in the rice cultivation work switch to the other job.

The realization of the contribution of children's labor output is relatively moderate. The average of absorbed child labor potential was 50.6%. Interestingly, it demonstrated a sharp increase in season 3, following an output above 75%, and in one district, the score reaches 157%. This shows that the workload carried out by children exceeds the maximum limit. Internal and external factors influence children's motivation to enter the world of work. A child's decision to work is closely related to the family's economic status and education level (Utama and Handayani, 2020). Farmer household incomes are derived from farming and non-agriculture activities. According to Xu et al., (2017), households adjust labor for agriculture and non-agriculture. Therefore, farmer households increase participation in the local labor market in nonagricultural activities to increase income. Global number of child labors in 2016 reached 152 million children. The decision of children to work due to economic and family demands has introduced various values of rules and responsibilities (ILO, 2017). Children's participation is also related to

the value of parents' perspective. This includes parents that view children as exchange values and utilities in the family. Besides motivation, the other significant concern is the impact of working activities on children's health, education, and social atmosphere. Children in the workforce would have low motivation to continue their education. Therefore, they may become unsuccessful and fall on low work performance.

The results of this study estimate the revenue for corn production of USD 1360.8. In another study, it was reported that maize production revenues in other provinces ranged from USD 1060 to 1163 (Satyarini and Pangarso, 2021). This result is smaller than rice production which can achieve a revenue of USD 1623.7. This result is even smaller than the gross revenue of rice production in Nigeria with a production of 3.3 tonnes/ha earning USD 1,384 (Nwahia, 2020). Corn revenue yields can be equal to or greater than rice if production is more than 6.8 tonnes. Research conducted with Sweet Corn and Hybrid Corn varieties showed yields of 4.4 tonnes and 2.9 tonnes respectively over an area of 0.4 hectares (Dyah and Kahfi, 2021). Therefore, it is highly recommended to increase corn productivity by applying technology or selecting superior types. One technology that has the potential to be developed is yield and soil mapping. Modeling research in the United States shows that this technology increases by 5.6% or 11.9% as a result of map adoption (McFadden et al., 2022). Another option can be selected by adopting organic farming systems (Brock et al., 2021; Choudhary et al., 2021).

In the communities with low income in developing countries, old-fashioned culture and traditions that underestimate the educational process in the school support the growing involvement of child labor. This tradition may be associated with the low parent's education and social and economic levels. Therefore, many parents make odd choices like encouraging their kids to stop school and work on the farm instead of supporting their education. They argued that women do not need school following the high cost of education and unemployment rate among the higher education alumni. With low education and economic powerlessness, parents tend to be narrow-minded about their children's future. Therefore, they lack the consciousness to consider the benefits of higher schools that may improve the welfare of their children's future. This situation encourages children to become laborers. Child labor is a violation of children's rights since it always has a detrimental influence on their physical, emotional, and social development (Hamamah, 2015).

Conclusion

The results indicate that the potential for domestic work of corn farmers in South Sulawesi is relatively high. The male workforce potential means we're the highest, followed by women and children. Furthermore, the

farming activities such as weed cleaning, planting, and fertilizer spreading absorb a large workforce. The contribution of women's work output is higher than that of men since a high proportion are involved in agriculture.

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