



UDC 332

FARMERS' BEHAVIOR IN INCREASING PRODUCTION AND INCOME OF SORGHUM FARMING AT RAJI VILLAGE OF DEMAK SUB-DISTRICT, DEMAK DISTRICT, INDONESIA

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ABSTRACT

Sorghum is a very potential commodity in the food diversity and security program. Knowledge, attitudes and skills determine the behavior of farmers in crop cultivation, which has a very large influence on sorghum productivity. This study aims to analyze the behavior of farmers in increasing production and income of sorghum farming in Raji Village, Demak District, Demak Regency. The method in this research is a survey. Determination of the sample by purposive sampling, the number of samples was 130 respondents from a total of 195 sorghum farmers. The results showed that knowledge, attitudes and skills had a positive and significant effect on production, knowledge and skills had a positive and significant effect on income but attitudes did not affect income, production had a positive and significant effect on income, the average farmer's land area was 0.43 ha, production was 2.06 tons/season, productivity was 4.85 tons/ha, farmers' profits were Rp. 9,383,400/ha/season.

KEY WORDS

Farmers, behavior, sorghum, seven farm efforts, Raji, Demak.

Global climate change in recent years has resulted in erratic weather that also has an impact on agriculture, crop cultivation becomes difficult and production yields are reduced including rice crops, not only in Indonesia but also in rice-producing countries. Indonesia is still importing staple foods, Indonesia's rice imports during January-August 2023 were recorded at 1.59 million tons. Indonesia also still imports 11 million tons of wheat every year. The government continues to encourage food diversification to realize food security in Indonesia (BPOM, 2023). Alternative foodstuffs to replace rice and wheat, one of which is sorghum. Domestic sorghum development has the opportunity to reduce domestic rice imports, according to the 2022-2024 sorghum roadmap, the main targets of this sorghum plant are as food, feed, and fuel (bioethanol) (Rachmadi, 2022). Sorghum belongs to the cereal group, has the potential to be developed as a food substitute for rice (Aryani *et al.*, 2022).

The potential for sorghum flour substitution for national wheat needs is very large. Indonesia's need for wheat reaches 11 million tons/year and if it is equalized the budget spent on buying wheat is equivalent to 50 trillion/year, with such conditions it will drain the country's foreign exchange. With the ability to substitute wheat flour varying according to the type of processed product in the form of bread, pastries, and wet cakes, sorghum flour has the potential to substitute 1.18 million tons of the total wheat demand (equivalent to 380,557 ha of sorghum plantations) productivity of 3.1 tons/ha (Rochmadi, 2022).

Government efforts and policies are not enough to double the planting area and increase sorghum productivity, but also to create markets and guarantee the level of sorghum absorption in both domestic and foreign markets. In the road map of the national sorghum development program, sorghum development is scheduled in 17 provinces with a target area of 30,000 ha (2023) and 40,000 ha (2024) with a production target of 115,848 tons (2023) and 154,464 tons (2024) assuming productivity of 4.0 tons/ha (Nugraha, 2022). According to data from the Central Statistics Agency (2019-2020), sorghum production amounts to around 4,000-6,000 tons per year and is spread across five provinces, namely West Java, Central Java, East Java, Special Region of Yogyakarta, and East Nusa



Tenggara. Based on data obtained from the Directorate of Cereal Cultivation in 2019, sorghum crop production in Indonesia in the last five years has only increased by 25% (Hemawan & Andrianyta, 2023).

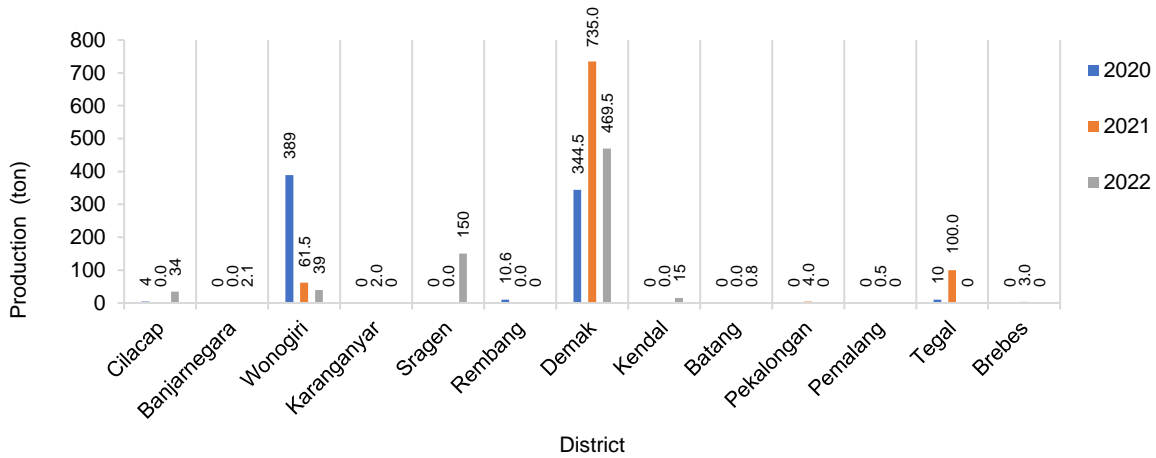


Figure 1 – Sorghum Production Data at Central Java Province Level (Source: Central Java Provincial Agriculture Office, 2022)

Sorghum production in Demak District over the last 3 years has fluctuated, presented in Figure 2.

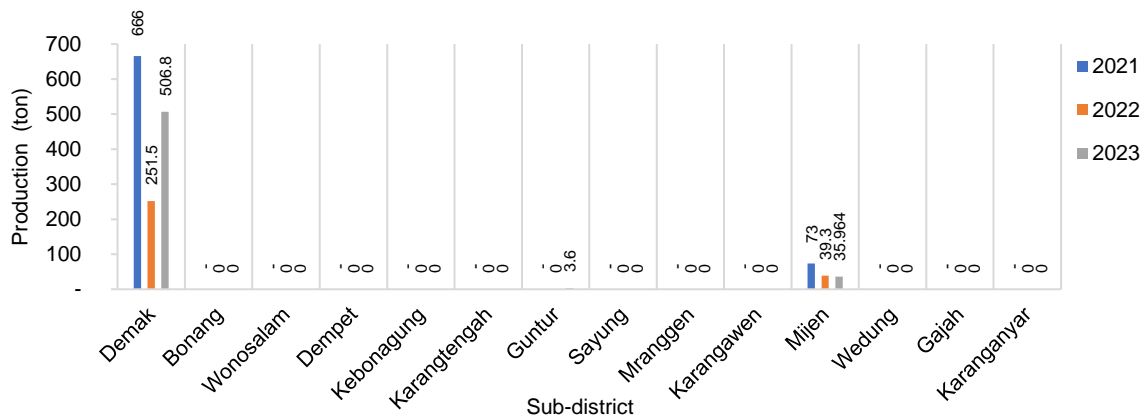


Figure 2 – Sorghum Production Data of Demak District (Source: Demak District Agriculture and Food Service, 2023)

Sorghum production in 2021 amounted to 666 tons, decreased by 62.23% in 2022, In 2023 there was an increase in production of 101.5% or a total production of 506.8 tons obtained from a harvest area of 96 hectares and a productivity of 5.28 tons/hectare. The results of sorghum productivity in Raji Village are still less than the potential of sorghum plants which can reach 6 - 8 tons/hectare.

(BRIN, 2022) and (Abay, 2020) stated that the average production of sorghum seeds was 6.36 tons/hectare with the potential for seeds to reach 8-9 tons/ha. Research results (Nasution *et al.*, 2023) showed that the highest plant was the Super 2 sorghum variety, which was 336.23 cm. The highest seed weight per panicle was the Super 2 variety which was 153.93 g. The highest yield per ha was also found in the Super 2 variety which was 8.50 tons, so it can be concluded that the Super 2 variety can adapt well and is recommended to be developed.

The high potential of sorghum production is a great opportunity for Indonesia, especially farmers in Raji Village, to increase sorghum production and productivity. One way



to increase production and productivity is by changing and improving the behavior of sorghum farmers so that they know want and applying of Seven Farm Efforts, including tilling the land, using superior seeds, fertilizing, controlling pests and diseases, irrigation, processing results and marketing to generate maximum income.

Behavior is all human behavior that essentially has a motive, which includes knowledge, attitudes, and skills. (Supriyanto *et al.*, 2016). Human activities can be single or multiple motives. Usually the action is driven by a main motive and several supporting motives which are details of the main motive. (Memah *et al.*, 2022) states that behavior is the result of all kinds of experiences and human interaction with the environment that is manifested in the form of knowledge, attitudes and actions. Basically, the behavior of farmers is strongly influenced by the knowledge, skills and mental attitude of the farmers themselves, every farmer wants to improve the welfare of his life, but these things are a barrier so that the way of thinking, the way of working and their old way of life has not changed. (Dahlia, 2018). (Dewi *et al.*, 2019) Farmer behavior includes knowledge, attitudes and skills. These three aspects play an important role in the application of sustainable agricultural systems, the higher the level of knowledge of farmers, the more positive the attitude response of farmers. This knowledge and attitude will then encourage the high skills possessed by farmers in relation to the success of the benefits that can be obtained from the application of sustainable agricultural systems.

Farmers' knowledge is important because it can increase their ability to apply new technology in agriculture. If farmers' knowledge is high and they are positive about a new technology in agriculture, then the application of the technology will be more perfect which in turn will provide more satisfactory results both in quantity and quality (Sari *et al.*, 2017). (Arniati, 2019) states that attitude is a form of evaluation or reaction to an object, favorable or impartial which is a certain regularity in terms of feelings (affection), thoughts (cognition) and predisposition to action (conation) of a person towards an object in the surrounding environment.

Skills are learning outcomes in the psychomotor domain that are formed resembling cognitive learning outcomes. Skills are the ability to do or perform something well (Vani, 2015). Farmer skills are a process of communicating knowledge to change farmer behavior in order to quickly and accurately build a craft and technology in cultivation. Farmers' skills can be seen from their physical ability to carry out cultivation activities, but what is also an important basis is their ability to make decisions so that the skills they have can be used optimally (Sulthoni *et al.*, 2023). The purpose of this study was to analyze farmers' behavior in applying of Seven Farm Efforts technology for sorghum farming and its effect on production and farmers' income.

METHODS OF RESEARCH

This research was conducted from March to April 2024 in Raji Village, Demak District, Demak Regency because Raji Village is the center of sorghum cultivation. The survey was conducted on 2 farmer groups in Raji Village, namely Margo Raharjo and Margo Utomo, which were determined based on the presence of farmers who planted sorghum. Data were collected through interviews with the help of structured questionnaires. The types of data collected consisted of primary data and secondary data.

The sample determination was carried out by purposive sampling, the total population of sorghum farmers was 195 people who were divided into Margo Raharjo farmer group 90 people and Margo Utomo farmer group 105 people, the sample determination used the Isaac & Michael formula and obtained a sample of 130 respondents. Sampling technique using proportional random sampling method, and get a sample from Margo Raharjo Farmer Group 60 respondents and Margo Utomo farmer group 70 respondents.

Data were analyzed descriptively and path analysis. Descriptive analysis was used to identify farmers' behavior in applying of Seven Farm Efforts technology. Indicators used in this study are the knowledge, attitudes and skills of farmers in applying Seven Farm Efforts including: the use of quality seeds, land cultivation, planting, fertilization, pest control,



irrigation and maintenance, harvest and post-harvest, and marketing. Each of these indicators is measured using a Likert Scale with a value setting:

- 1: Strongly not “Know/Agree/Skilled”;
- 2: Not “Know/Agree/Skilled”;
- 3: Fairly “Know/Agree/Skilled”;
- 4: “Know/Agree/Skilled”;
- 5: Very “Know/Agree/Skilled”.

The variables in this study are divided into 3 criteria: low, medium, and high. Each variable consists of 7 indicators, so the classifications are as follows:

- Highest score: $28 \times 5 = 140$;
- Lowest score: $28 \times 1 = 28$.

The interval class obtained by the variable is $((140-28)/3) = 37,33$. Then to determine the criteria as follows:

Table 1 – Interval Class Criteria for Variable Application of Seven Farm Efforts Technology

Value	Criteria
28 – 65,33	Low
65,4 – 102,73	Medium
102,8 – 140	High

Path analysis was used to analyze the effect of farmer behavior in applying Seven Farm Efforts on sorghum production and income of sorghum farmers. Path analysis is processed using AMOS. The path analysis model can be seen in the following Figure 3.

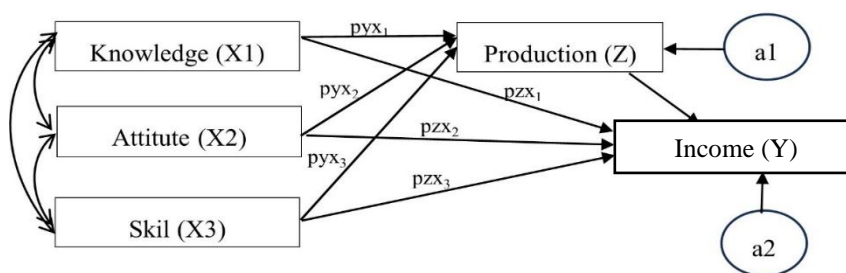


Figure 3 – Research Flow Diagram Model

Convert the flowchart into the path analysis equation formula as follows:

$$\begin{aligned} Z &= pyx_1X1 + pyx_2X2 + pyx_3X3 + e1 & (1) \\ Y &= pzx_1X1 + pzx_2X2 + pzx_3X3 + e2 & (2) \end{aligned}$$

Where: X1 = Knowledge; X2 = Attitude; X3 = Skill; Z = Production Sorghum; Y = Farmer Income; py_{xn} = Path Coefficient Y; pz_{xn} = Path Coefficient Z; e1 and e2 = Error rate or research error rate (5%).

The amount of sorghum farming income according to (Suratiah, 2011) Income is the difference between the value of output and all costs. Income can be formulated as follows:

$$\Pi = TR - TC \quad (3)$$

Where: Π - Income; TR - Total Revenue; TC: Total Cost.

RESULTS AND DISCUSSION

Characteristics of respondents in this study include: age, education, farming experience, sorghum land area, production, productivity. Respondents in this study amounted to 130 people, taken from members of 2 farmer groups in Raji Village, namely the Margo Raharjo Farmer Group (KTMR) as many as 60 respondents and the Margo Utomo



Farmer Group (KTMU) as many as 70 respondents. Data on the characteristics of respondents can be seen in Figure 4:

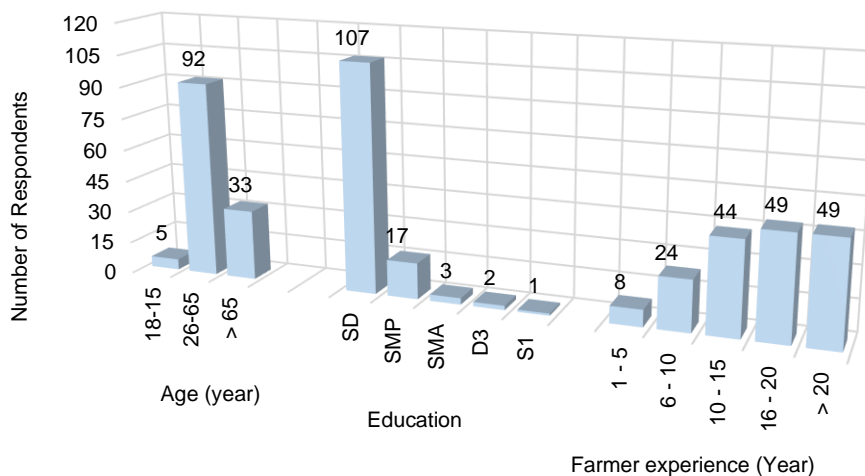


Figure 4 – Number of respondents and percentages based on age, farmer education and length of farming (Source: Primary data processed, 2024)

Most farmers were aged 26 to 65 years with 92 respondents or 70.77%. The average respondent farmer is at a productive age. The classification of productive age groups is based on Labor Law No. 13 of 2013 which explains the size of productive age in the age range 15-64 years and non-productive age in the age range 0-14 years and above 64 years. Farmers who are at a productive age have advantages in the field of experience. This is in accordance with the opinion of (Susanti *et al.*, 2016) which states that farmers who are older than 59 years have advantages in terms of experience, judgment, work ethics and commitment to quality. Group members with productive ages allow members to be dynamic in the problem-solving process and achieve common goals.

The majority of sorghum farmer respondents had an elementary/middle school education or 107 respondents (82.31%). Farmers in Raji Village, Demak District, Demak Regency have a low educational background so that it affects farmers regarding knowledge in farm management. The ability to manage farming is influenced by farming experience and formal and non-formal education (Damayanti, 2019). The low level of education among farmers in Raji Village makes it difficult for members to receive information. The higher the level of education, the more farmers are able to accept and develop new knowledge in their business. Farmers who have low education can increase their knowledge by attending non-formal education. Non-formal education for farmers can be obtained from balanced counseling and training held by extension workers. Farmers in Raji Village, Demak Subdistrict, Demak District, said that the extension workers received more counseling than training and demonstrations so that the knowledge gained from counseling could not be directly applied.

The highest length of farming experience was >20 years with 70 respondents or 53.85%. Farmers who have more than 20 years of farming experience can make farmers have a lot of knowledge and skills in sorghum cultivation. Farmers will be able to plan the use of production factors, thus allowing farmers to be more efficient in using production factors. The higher the experience in a farm will have an impact on the farmer's better knowledge in the farm (Neonbota & Kune, 2016).

The most farmers' sorghum plantation area is < 1 Ha with 114 respondents or 87.69%, which means that farmers in Raji Village, Demak District, Demak Regency, on average, have a land area that is classified as narrow. Land area is one of the factors that can affect the level of sorghum production, the more land area owned by farmers, the higher the sorghum production. Opinion (Juliyanti & Usman, 2018) also states that land area is the amount of land used by farmers to manage their farms in producing production. The larger the land



area owned by the farmer, the greater the production results, on the contrary, the smaller the land area owned by the farmer, the smaller the production results. Factors that can affect the level of sorghum production besides land area are farmer knowledge, farmer attitudes, farmer skills, technology and innovation used and capital capabilities so that they can provide maximum results even though farmers do not have large land areas.. (Gupito *et al.*, 2014) In his research, he concluded and suggested that the factors that positively influence the income of sorghum farmers in Gunungkidul Regency are land area and seed prices. Farmers should further optimize the use of land for sorghum farming so that the production results obtained are more optimal so that farm household income increases.

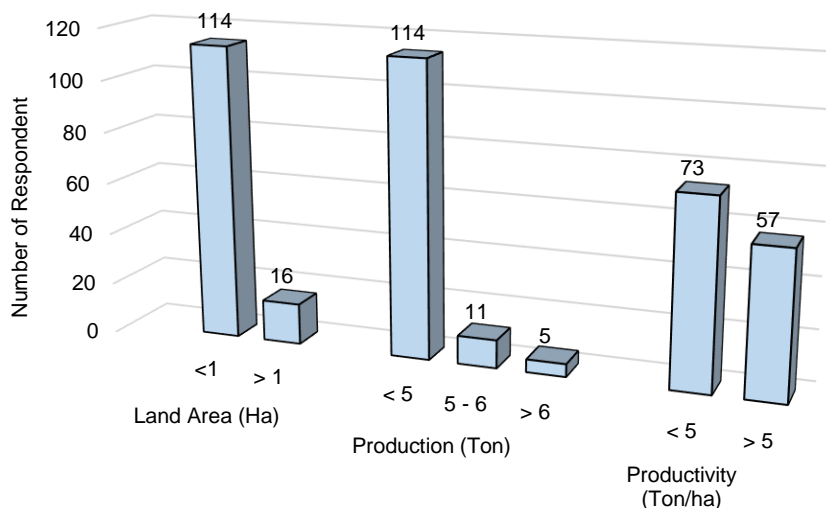


Figure 5 – Number of Respondents and Percentage by Land Area, Production and Productivity of Sorghum (Source: Primary data processed, 2024)

Most farmers' sorghum production is less than 5 tons/ha with 114 respondents or 87.69%, which means that most farmers in Raji Village, Demak District, Demak Regency have high productivity. Sorghum productivity is considered high because sorghum production reaches 5 tons or more per hectare of land. The Central Java Provincial Agriculture Office, the provisions set by the agriculture office, that the standard productivity of sorghum farming is 5 tons / ha. High productivity can occur if it is supported by agricultural inputs and resources owned by farmers. This is supported by the opinion of (Ramaila *et al.*, 2021) which states that productivity is influenced by inputs and farmers' internal and external factors. Agricultural inputs include labor, farmland, technology, and capital. Internal and external factors include social factors (social capital) and economic factors that are around them.

Most farmers' sorghum productivity was below 5 tons/hectare/season with 73 respondents or 56.15%. Sorghum production is influenced by land area so that the more land owned by farmers, the higher the sorghum production produced. Although sorghum production in Demak is already classified as greater than other regions in Indonesia, production is still not optimal and has the opportunity to be increased, both from the planting area and the harvest area. (Widodo *et al.*, 2023) reported that sorghum productivity in Wonogiri Regency was still low, ranging from 2.4 to 3.0 tons/ha (in Wonogiri Regency, farmers generally did not apply intensive cultivation techniques in growing sorghum so that the resulting production was not optimal between 2.4-3.0 tons/ha) and sorghum productivity in Gunungkidul Regency was still low, ranging from 1-2 tons/ha. The land area factor is not the only factor affecting sorghum production but there are several production factors such as seeds, urea fertilizer, TSP fertilizer and labor that also affect the production and production efficiency of paddy field farming. (Andrias, 2017).

Levels of knowledge, attitudes and skills are components that shape behavior. The behavior of farmers in Raji Village, Demak Sub-district, Demak Regency, is how farmers manage their farms. Farmers from the 2 farmer groups that were sampled were more or less



the same in their farming, both starting from the selection of seeds to the marketing of their crops so that there were no significant differences in their cultivation techniques. The following are the results of measuring the level of knowledge, attitudes and skills in applying of Seven Farm Efforts sorghum in Raji Village, Demak District, Demak Regency.

Table 2 – Average Score and Measurement Criteria of the Knowledge Attitude and Skills Variables in the Application of Sorghum Farming Businesses

No	Indicator	Knowledge		Attitude		Skills	
		Score	Criteria	Score	Criteria	Score	Criteria
1	Seed	17,04	High	17,04	High	17,12	High
2	Tillage and Planting	17,31	High	17,31	High	17,20	High
3	Fertilization	17,23	High	17,23	High	17,22	High
4	Pest and Disease Control	17,20	High	17,20	High	17,13	High
5	Irrigation	16,90	High	16,90	High	16,97	High
6	Harvest and Post-Harvest	17,09	High	17,09	High	16,98	High
7	Marketing	17,23	High	17,23	High	17,18	High
	Amount	120,0	High	119,8	High	119,8	High

Source: Primary data processed, 2024.

Based on Table 2, it shows that knowledge about seeds, land processing and planting, fertilization, pest and disease control, irrigation, harvesting and post-harvesting and marketing in Raji Village, Demak District, Demak Regency in the application of sorghum farming is high. The highest knowledge score achievement was in the land processing and planting indicator which obtained an average score of 17.31. The high knowledge of farmers in Raji Village, Demak District, Demak Regency in the application of sorghum farming is influenced by the role of the extension agent and the role of the farmer group. Group members who participate in every group activity consisting of counseling and training make members have high knowledge and knowledge so that members are more skilled in farming activities. Factors that influence knowledge in general include education, socio-culture, economy, environment, experience, and age. This is in accordance with the opinion of (Rambe and Honorita, 2011) which states that knowledge is influenced by experience, length of farming and the farmer's environment. The existence of good knowledge about something will encourage changes in behavior in individuals, where knowledge of the benefits of something will cause someone to be positive about it, and vice versa.

Farmers' attitudes regarding seeds, land processing and planting, fertilization, pest and disease control, irrigation, harvest and post-harvest and marketing in the farmer group of Raji Village, Demak District, Demak Regency in the application of sorghum farming are high. A positive attitude occurs because farmers can follow every extension process given to farmer group members. The achievement of the highest attitude score is on the fertilization indicator which obtained an average score of 17.22. This happened because the farmers expressed an agreeable attitude at the time of testing good seeds, knowing how if irrigation is damaged is to make artificial irrigation using pipes, knowing when ready to harvest. Attitudes can be formed through the process of learning, observing and concluding what happens in the environment (Suryani, 2018). According to interviews during counseling, the positive attitude of farmer group members can be reflected in their receptiveness, willingness to respond well and willingness to appreciate and be open to new things and constructive criticism. In addition, farmers also apply innovations, programs, and government recommendations in sorghum farming activities.

Farmers' skills regarding seeds, land processing and planting, fertilization, pest and disease control, irrigation, harvest and post-harvest and marketing in the farmer group of Raji Village, Demak District, Demak Regency in the application of sorghum farming are high. Farmers in the farmer group are able to apply the knowledge gained from extension activities. The highest skill score achievement was in the marketing indicator which obtained an average score of 17.20. This happened because farmers were able to market their crops by offering them to collectors based on the appropriate price. Farmers who have quality crops are able to offer them to buyers at a high price.



The full model analysis carried out in this study uses the AMOS (Analysis of Moment Structure) program, the results of which can be seen in the following Figure 6:

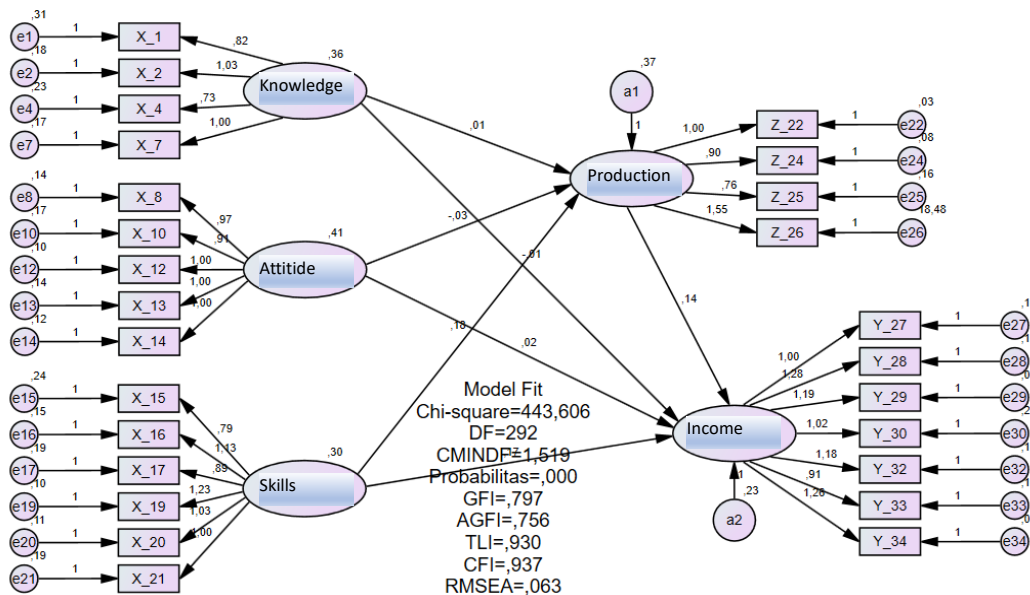


Figure 6 – Full Model Path

Estimation results (regression weight) for hypothesis testing by observing the critical ratio value ($c.r \geq 1.65$) and significance level ($\leq \alpha = 0.05$).

Table 3 – Regression Weight

			Estimate	S.E.	C.R.	P	Label
Production	<---	Knowledge	,287	,101	1,825	,019	par_1
Production	<---	Skills	,183	,106	1,661	,022	par_2
Production	<---	Attitude	,326	,089	1,918	,009	par_3
Income	<---	Knowledge	,212	,079	2,833	***	par_4
Income	<---	Attitude	,015	,070	,656	,132	par_5
Income	<---	Skills	,174	,085	1,832	,015	par_6
Income	<---	Production	,140	,074	1,721	,025	par_28

Source: Primary data processed, 2024.

Based on table 3, knowledge, attitudes and skills have a positive and significant effect on production, which means that the higher the knowledge, the better the attitude and the better the skills of farmers will be directly proportional to the production obtained (Yuswandi *et al.*, 2023, Fadhilah *et al.*, 2018, Latif *et al.*, 2023) stated that knowledge, attitudes and skills have a significant effect on production. The level of knowledge, attitudes, and skills of the application of agribusiness systems simultaneously have a real effect on rice production both together and partially. The accumulation of attitudes or perceptions, knowledge and skills will determine one's behavior. The size of farmer behavior seen from the aspects of knowledge, attitudes and skills will affect the process of implementing the agribusiness system so that it has an impact on production. Knowledge is the initial stage of perception which then affects attitudes and at a later stage gives birth to deeds or actions (skills). The existence of a good insight of farmers about a matter, will encourage the occurrence of attitudes which in turn encourage changes in behavior (Fadhilah *et al.*, 2018). Farmers with good skills can make the right choices so that they can know what is efficient and effective (Rambe and Honorita, 2011).

Knowledge and skills have a positive and significant effect on income, but attitudes have no effect and are not significant (Candra *et al.*, 2022) which states that knowledge has



a significant effect on income. Saputri (2017) states that skills have a significant effect on income. (Faqih, 2022) stated that the relationship between farmer knowledge and farm income is significantly different. Knowledge is the result of knowing from humans consisting of a number of possible facts and theories of a person to solve the problems he faces (Notoatmodjo, 2007). Research results (Bandolan, 2008) concluded that the high skills of farmers are due to the knowledge possessed by farmers so that skills including the selection of superior seeds, planting, maintenance and harvesting can be carried out. Skills indicate a process of improving the attitudes, abilities and skills of workers to carry out specific jobs". This expression shows that training activities are a process of helping learners to gain effectiveness in doing their work both now and in the future through the development of habits of mind and actions, skills, knowledge, and attitudes in work.

Farmer attitudes have no positive and significant effect on income, (Chaerani, 2019) states that attitudes have no effect on income, further (Faqih, 2022) In his research, he stated that the relationship between farmers' attitudes and shallot farming income was 0.544, classified at a moderate level of closeness, farmers' attitudes influenced shallot farming income by 29.60%, and the remaining 70.40% was influenced by other factors not included in the model. According to (Azwar, 2012) One of the factors that influence attitudes is personal experience. Personal experience leaves a strong impression so that attitudes will be easier to form if the person occurs in a situation that involves emotional factors. According to (Calhoun, 2019) that attitudes have three main sources, namely personal experience, attitudes can be the result of pleasant or painful experiences with the object of attitude. The second possible source of attitude in this case negative attitude is the transfer of painful feelings. The third source of attitude is social influence and is likely to be the main source. While (Edwards, 2001) suggests that attitude is the degree or level of conformity of a person to a particular object. Even though it is assumed that attitudes are evaluative predispositions that determine how individuals act, attitudes and real actions are often much different. This is because real action is not only determined by attitude alone, but by various other external factors. In addition, it turns out that for one type of action there are many relevant attitude patterns. Therefore, the disharmony of attitudes is more a matter of individual orientation to the existing situation.

Production has a positive and significant effect on income, this shows that the higher the production, the higher the income of farmers. High income can be achieved by several factors, namely production, price, cost. Farmers' sorghum production is quite high, supported by low production costs resulting in high profits (Pradayawati & Cipta, 2021) stated that production has a significant effect on income. The income obtained by farmers is a criterion for determining the level of success of the farm in carrying out the production process. Income is the difference between revenue and costs incurred. In running a farm there are several things that need to be considered, namely costs, revenue and farm income. Farm income is income derived from activities to work on land owned or rented. Off-farm income is income earned from labor and non-agricultural activities (Gupito *et al.*, 2014).

CONCLUSION

The conclusions from the research results are:

1. Knowledge, attitudes, skills have a positive and significant effect on the production of sorghum farming in Raji Village, Demak District, Demak Regency;
2. Knowledge, and skills have a positive and significant effect on the income of sorghum farmers in Raji Village, Demak District, Demak Regency;
3. Attitude has no effect on the income of sorghum farming in Raji Village, Demak District, Demak Regency;
4. Production has a positive and significant effect on the income of sorghum farming in Raji Village, Demak District, Demak Regency;
5. The average farmer's land area is 0.43 ha, production is 2.06 tons/season, productivity is 4.85 tons/ha, farmer profits are Rp. 9,383,400/ha/season.



SUGGESTIONS

Based on the results of the research and conclusions with this research provide the following suggestions:

1. Sorghum farmers in Raji Village, Demak District, Demak Regency are advised to have a good attitude in the cultivation of sorghum plants so that it can affect the income of sorghum farming. Attitudes are often not in line with the actions taken in the management of farming businesses so that the attitudes of farmers should be harmonized in caring for agriculture;
2. It is necessary to continue to improve farmers' knowledge and skills through coaching and counseling, so that group members are motivated to improve farming knowledge and through non-formal education, such as technical training and group financial management, in the context of developing Sorghum farming in order to increase farmers' income;
3. Further researchers are expected to develop and expand related variables regarding knowledge, attitudes and skills on production and income and can add other variables that may affect production and income;
4. Further research on sorghum development strategies, because of the many advantages and advantages that farmers get from sorghum farming.

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